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TRADE CREDIT POLICY AND THE FINANCIAL SITUATION OF DAIRY COOPERATIVES

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ABSTRACT

Aim: The aim of the study is to examine the financial health of dairy cooperatives in relation to their credit position and trade credit strategy. **Methods:** Using the author's synthetic indicator, the position and strategy for granting trade credit were determined, and the levels of profitability, liquidity, debt, and management efficiency were assessed in separate groups of entities: conservative, moderate, and aggressive recipients, versus conservative, moderate, and aggressive providers. The research carried out in the field of trade credit management at dairy cooperatives allowed us to establish that the financial position of the analyzed entities varied depending on their credit position and trade credit strategy. **Results:** The highest level of ROE was found in the group of entities categorized as conservative recipients, where this indicator was 11.1%. Similarly, the group of moderate providers also had a high level of 7.1%. On the other hand, the lowest level was found in the return on sales indicator, which was 0.3% and 0.4% in the moderate recipient and aggressive provider groups, respectively. Additionally, cooperatives following a conservative trade credit strategy had a higher level of return on sales compared to the cooperatives classified in the aggressive provider group. **Conclusions**: The profitability of assets, funds, and sales, as well as the level of liquidity, varied among the distinguished group of cooperatives based on their position and commercial credit strategy. However, there was no variation observed in terms of the level of indebtedness.

Keywords: trade credit, credit position, dairy cooperatives

JEL codes: G0, G30, G32

INTRODUCTION

Trade credit is an essential component of today's trade [Tokarski et al. 2014] and is considered the most important type of credit in economic transactions [Kukiełka et al. 2008]. For many businesses, this form of credit is crucial in ensuring their market functioning. In economic reality, many companies take advantage of the trust of their trading partners, exposing them to the risk of losing liquidity [Tokarski et al. 2014]. Effective management of trade credit allows for the development of stable and long-term relationships with counterparties, as well as the acquisition of information regarding potential customers and their needs [Bera and Tokarski 2011]. Therefore, it is important for companies to carefully execute the process of counterparty crediting [Rytko 2009]. This process is implemented as part of a trade credit management strategy. According to Brigham and Gapenski [2000], receivables management begins with deciding whether to offer trade credit and on what terms. Efficient management of accounts receivable is achieved by identifying the appropriate sales directions for products, connecting receivables with trade payables, and

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implementing effective debt collection. The combination of these processes leads to increased activity in receivables [Krajewski 2008]. According to Rytko [2009], the trade credit management process includes objectives, rules, and procedures for managing counterparty crediting, as well as the structure and any cooperative arrangements with external parties. On the other hand, the credit policy is simply a set of rules and procedures for granting trade credit [Rytko 2009]. A company's credit policy also encompasses rules and procedures regarding the determination of the type, timing, and amount of payments made by counterparties for delivered finished goods, goods, and services [Motylska-Kuźma and Wieprow 2013].

In the literature, one can encounter the approach that credit policy refers to the management of trade receivables and their proportion in current assets [Sierpińska and Wędzki 1997]. Due to the wide range of receivables control issues in enterprises, the principles of receivables management are often referred to as credit policy [Sierpińska and Wędzki 1997, Wędzki 2000], trade credit policy [Dziawgo and Zawadzki 2011], or commercial credit policy. In this context, credit policy is synonymous with processes related to accounts receivable management and trade credit management within companies. The objectives of managing trade credit are expressed through specific credit policy objectives. However, Bożek and Emerling [2013] argue that credit policy encompasses the management of trade receivables. The authors hypothesize that receivables management is an expression of the credit policy being followed. Dziawgo and Zawadzki [2011] also support the idea that receivables management is a narrower concept and a crucial element of a company's credit policy. Furthermore, Folga [2010] highlights that defining a credit policy requires determining the company's credit risk. While credit risk is commonly associated with the banking sector, there is also a credit risk faced by creditors in the case of deferred payment [Koralun-Bereźnicka and Szramowski 2021]. Credit risk is linked to the likelihood of losing some or all of the receivables, as well as the costs resulting from delayed payment by counterparties as a result of granting trade credit. The design of the credit policy primarily depends on the expected profit rate set by

management and the willingness to bear the associated risk [Sierpińska and Wędzki 1997, Kopiński 2001]. Through its credit policy, an enterprise can pursue various objectives, with decisions made in this regard primarily aimed at: maintaining the connection between granted and received trade credit to ensure financial liquidity; utilizing instruments that mitigate the risk of counterparty insolvency; increasing the level of receivables if it leads to higher sales revenue; optimizing the volume of receivables from a financing cost perspective; increasing the share of trade credit among the source of financing while minimizing the cost of this credit [Krzemińska 2005].

Different approaches to the objectives that can be pursued with the adopted credit policy can be found in the literature. On the basis of their research, Pike and Cheng [2001] concluded that trade credit management should primarily serve to reduce the risks associated with counterparty crediting. According to these authors, the main objective of the credit policy is to minimize operational risk. However, Wędzki presents a different view, believing that the key objective for a company should be to realize profit at an expected level at an acceptable rate of risk [Sierpińska and Wędzki 1997]. This objective can only be achieved by maximizing sales revenue rather than minimizing overdue and bad debts. While many factors influencing increased sales benefits do not directly depend on the company, the credit policy formulated by managers has a significant impact on sales volumes. Dziawgo and Zawadzki [2011] noted that a trade credit policy should focus on maximizing sales but, on the other hand, should minimize the level of bad debts. Brigham and Gapenski [2000] stated that an optimal credit policy balances the costs and benefits of receivables and maximizes goodwill. Damodaran [2007] also observed that an optimal credit policy maximizes goodwill. However, Folga [2010] saw a problem in reconciling these two opposing objectives. The author pointed out that the objective of the credit policy could be to maximize sales revenue or to minimize overdue and bad debts, but never both at the same time.

The credit policy is expressed through the development of certain parameters. All of these instruments are controlling in nature, as they define the permissible

changes in receivables and other components of gross working capital that are safe in terms of the objectives they serve. The basic parameters of the credit policy include the payment term, collection period, discount rates, and credit risk indicators. A company's trade receivables indicate the credit extended to its counterparties. Trade receivables are widely recognized as a factor that influences the stimulation of demand and allows an enterprise to increase sales revenue [Wędzki 2000, Krzemińska 2005, Krzemińska 2009, Rytko 2009]. On the one hand, an optimal credit policy should lead to the optimization of the volume of receivables through appropriate measures [Brigham and Gapenski 2000] while, on the other hand, it should be, while also being adaptable to changing demand [Grabowska 2012]. Trade credit management enables the development of individual strategies for granting trade credit, such as setting payment deferral periods as well as the amount of credit limits to be granted [Bera and Tokarski 2011]. Counterparty crediting is linked to implementation by the supplier of a specific credit policy strategy, which can take various forms. However, the nature of the applied credit policy will also be determined by market risk, which is associated with the possibility of liquidity loss [Fisman and Love 2003, Wilson and Summers 2022].

In addition to determining the trade credit strategy, it is necessary to determine the credit position based on the management's policy for maintaining the structure of current assets and short-term capital. Depending on how receivables are financed, two forms of credit policy can be distinguished [Wędzki 2000]: the credit provider and the credit recipient. The credit provider position means that the company extends more credit to its customers than it uses for its own financing. Payment terms for receivables will be longer than the period after which liabilities will be repaid. By assuming the position of a trade credit provider, managers demonstrate a willingness to finance both customers and suppliers. Business units settle trade payables towards suppliers more quickly and, at the same time, extend payment terms for trade receivable invoices from customers. A low share of trade credit in the financing of operations will also generate low risks for the enterprise. At the same time, entity managers become independent of creditors, thus avoiding the debt trap. Enterprises in the

position of trade credit provider have a good financial situation and are usually large, well-established entities. An entity may also assume the position of a trade credit recipient. By assuming the position of a beneficiary, the enterprise will extensively use a source of financing such as trade credit. This position is most often adopted by enterprises that face a shortage of financing sources or lack creditworthiness. In that case, extended payment terms for liabilities can be observed, while short payment terms are applied for own receivables [Dziawgo and Zawadzki 2011]. This means that the cycle of trade payables exceeds the cycle of trade receivables [Wędzki 2000]. Besides extending the maturity of liabilities, buyers also seek to increase credit limits with their suppliers. Companies in the position of a trade credit recipient are more likely to have a restrictive credit policy towards their buyers [Krzemińska 2005]. On one hand, the credit position may be an outcome of the company's financial capacity to meet its current liabilities. On the other hand, it may be a result of the company's approach towards working capital management and its position in the market [Domanska 2014].

AIM AND METHODS

The purpose of the study is to determine the differences in the financial standing of dairy cooperatives based on the credit position taken and the trade credit strategy adopted. An important tool for controlling the level of counterparty credit and the utilization of this financing source is the credit position indicator, which is calculated using the following formula: credit position indicator = trade receivables from other entities/ liabilities for deliveries and services to other entities.

Depending on the value taken by the indicator, two forms of credit position can be distinguished:
- credit position indicator <1 – trade credit recipient's position;
- credit position indicator >1 – trade credit provider's position.

The literature references a credit policy indicator that measures the relationship between the average cycle of trade receivables and the average maturity of invoices. This indicator shows to what extent the average cycle of trade receivables achieved by an

entity deviates from the average maturity of invoices. Depending on the value taken by the credit policy indicator, three types of trade credit strategy can be distinguished:

- credit policy indicator <1 – conservative strategy;
- credit policy ratio = 1 – moderate strategy;
- credit policy indicator >1 – aggressive strategy.

In order to determine the trade credit strategy, an original synthetic indicator was formulated, based on a broader spectrum of counterparty credit policy instruments used by entities than was the case with the traditional indicator cited in the literature. The trade credit strategy was determined using the linear ordering method for multi-characteristics objects. In order to take into account the aspects of credit policy, a synthetic indicator was used in the ordering of objects, which consisted of replacing a given set of characteristics with a single indicator that synthetically determined an object's size due to these characteristics. Normalization of crude values of indicators and qualitative variables included in the credit policy elements and determination of the synthetic indicator were performed according to the following formulas:

For stimulants → $\qquad x`_{ij} = \dfrac{x_{ij} - min_i\{x_{ij}\}}{max_i\{x_{ij}\} - min_i\{x_{ij}\}}$

For destimulants → $\qquad x`_{ij} = \dfrac{max_i\{x_{ij}\} - x_{ij}}{max_i\{x_{ij}\} - min_i\{x_{ij}\}}$

$$W = 100 \times \sum_{j=1}^{m} \alpha_j x`_{ij}$$

where:
m – number of features taken into account,
α_j – weight of the variable in the indicator.

The nature of the trade credit strategy followed was determined based on the level of the synthetic indicator. Selected instruments used in the process of counterparty crediting, indicating the nature of the credit policy, were used to construct the synthetic indicator (Table 1).

Table 1. Credit policy instruments included in a synthetic index

Specification	Weight (%)	Specificity of the variable
Variables		
Weighted average credit policy ratio (multiplicity)	50	stimulant
Average invoice payment time (days)	10	stimulant
Trade receivables cycle indicator (days)	10	stimulant
Discounts and rebates applied (points)	10	de-stimulant
Applicable credit limits (points)	10	stimulant
Security measures applied (points)	10	de-stimulant

Source: Own study.

The variables forming the synthetic indicator included the weighted average credit policy indicator, average invoice payment term, trade receivables cycle indicator, discounts and rebates applied, credit limits granted, as well as collaterals required. A modified version of the credit policy indicator was used for the study, constructed according to the ABC method ABC method. The aim of this method is to separate control groups in order to shape the trade credit policy accordingly. The new model is defined by the following formula:

$$\text{weighted average credit policy ratio} = \frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i}$$

where:
$i = 1, 2, \ldots, n$ – number of groups of counterparties separated by the ABC method;
w_i – share of receivables from counterparties assigned to the ith group using the ABC method to total trade receivables;
x_i – credit policy indicator determined for the ith group using the ABC method.

The selection of stimulants and de-stimulants aimed to assign a lower number of points to entities with a conservative strategy and a higher number of points to those following an aggressive strategy. The weights used in the indicator were determined using

the expert method. The study assumed that managers of dairy cooperatives may adopt a conservative, moderate, or aggressive strategy. The final determination of the strategy used by dairy cooperatives was made by dividing the study population, ranked on the basis of an increasing synthetic index, into equally sized groups. Offering longer average invoice payment terms may indicate a liberal approach to trade credit. A similar approach was applied to the average trade receivables cycle indicator. The longer the receivables collection period, the more liberal the adopted strategy was, especially concerning compliance with payment terms. Regarding the application of limits, it was assumed that increasing the limits granted to counterparties indicated an aggressive trade credit strategy.

Offering discounts and rebates to contractors may have indicated a willingness to collect receivables in a shorter period of time than the full payment term offered. This instrument was classified as a de-stimulant because the higher the discounts and rebates offered, the more conservative the strategy used. In the analysis of credit policy instruments, the collateral used was also treated as a de-stimulant, which encouraged recipients to pay their liabilities on time. The audit covered all dairy cooperatives that conducted business activity in 2016 and were required to have their financial statements audited. Source data on dairy cooperatives were obtained from individual annual financial statements for 2016, prepared in accordance

with the Accounting Act [Accounting Act 1994], from the EMIS Intelligence database, as well as from the National Court Register responsible for the registered office of a given dairy cooperative. An interview was sent to 68 dairy cooperatives from which the financial statements were obtained. Finally, 18 dairy cooperatives were selected for the study, in which the managers agreed to conduct an interview questionnaire with employees from the accounting and trade departments. The interview questionnaire was conducted between January and June 2017, and the data obtained constituted information as of 31.12.2016.

RESULTS

Informed management of credit policy is crucial for the operational sphere of dairy cooperatives, as well as for the continuous monitoring and adaptation to changing conditions in the dairy sector. Figure 1 shows the development of liquidity in the cooperatives studied, depending on the trade credit policy adopted. No significant differentiation in the level of financial liquidity was observed, depending on the adopted strategy. The highest level of current liquidity was recorded by cooperatives defined as conservative and moderate providers, where the indicator was equal to 3.0. The managers of entities defined as conservative recipients achieved current liquidity at a level of 2.5. Dairy cooperatives classified as moderate recipients
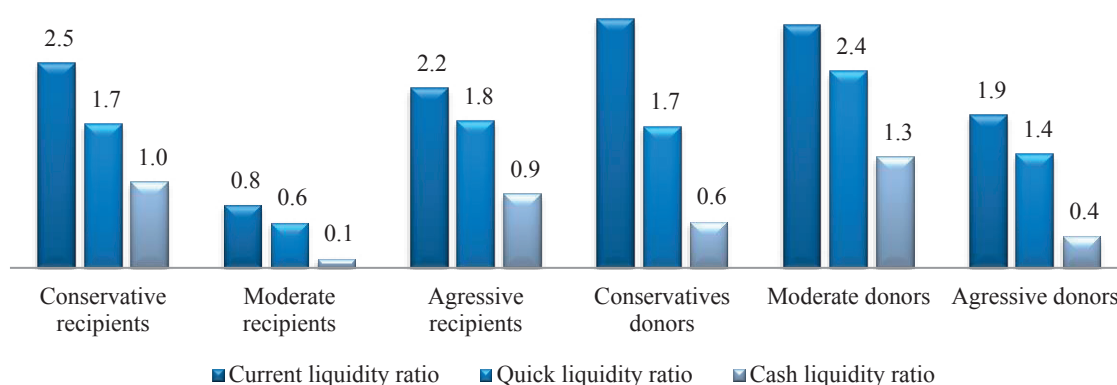

Fig. 1. Development of liquidity in the cooperatives studied depending on the trade credit policy adopted
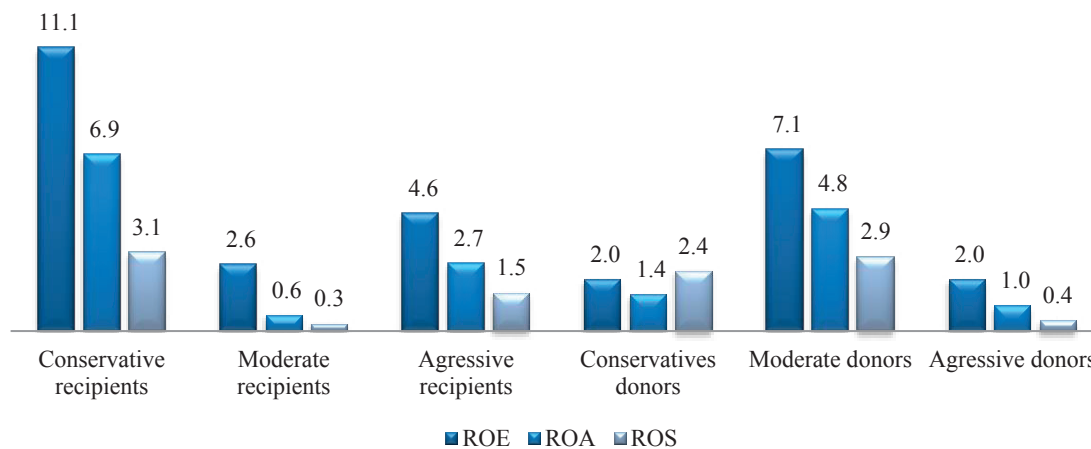Source: Own study.

Fig. 2. Return on assets, equity and sales ratios in depend on trade credit strategy

Source: Own study.

had the lowest level of current liquidity (0.8). This situation may have been due to the fact that the managers of these entities did not optimize their trade credit management policy. In dairy cooperatives, the phenomenon of faster repayment of liabilities than receivables was also visible, given that most of the current liabilities concerned farmers, suppliers, and owners of cooperatives.

The highest level of second-degree (quick) liquidity was found in cooperatives categorized as moderate providers (2.4), aggressive recipients (1.8), and conservative recipients (index at 1.7). The majority of cooperatives maintained their quick liquidity ratio at an optimal level, except for the group of moderate recipients, where liquidity in this area was 0.6. Notably, the group of cooperatives categorized as moderate recipients had the lowest level of liquidity in terms of current, quick, and immediate liquidity. This may have meant that the managers of these entities used funds from receivables to immediately meet current liabilities due to a lack of sufficient liquid assets. In the case of cooperatives following a conservative trade credit strategy, significantly higher differences were found between current and accelerated liquidity, indicating a higher share of inventories in the current asset structure. Significantly lower differences were found in the case of cooperatives categorized in groups applying an aggressive trade credit strategy, which aims to stimulate sales.

The return on assets, equity, and sales ratios in the surveyed dairy cooperatives were at a relatively low level, regardless of the strategy pursued and credit position – which was directly related to the specific nature of the cooperative entities' activities in the milk market (Fig. 2).

The highest level of ROE was found among entities categorized as conservative recipients, where the indicator was 11.1%, as well as in the group of moderate providers (7.1%). The strategy followed by cooperatives that made more use of trade payables financing contributed to a positive leverage effect. The lowest level of profitability indicators was found among aggressive and conservative providers and moderate recipients. In terms of return on sales, the lowest level was found in the moderate recipient group at 0.3% and in the aggressive provider group at 0.4%. Cooperatives following a conservative trade credit strategy had a higher level of return on sales compared to those classified as aggressive providers. This may have been due to the level of discounts and rebates granted, but it could also have been influenced by other non-financial aspects of the business. It is worth noting that dairy cooperatives, regardless of the trade credit strategy followed, were characterized by low levels of profitability. It is worth noting that dairy cooperatives, regardless of the trade credit strategy used, were characterized by low levels of profitability due to the unique nature of their business – maximizing member and owner farmer satisfaction over maximizing financial results.
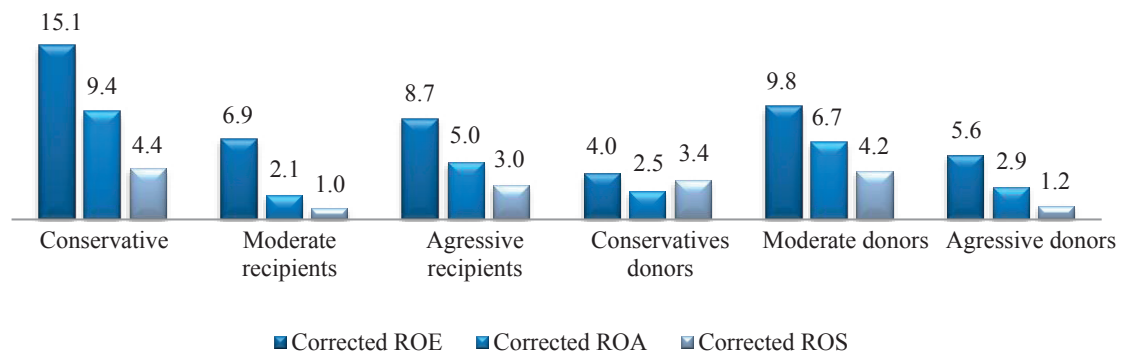
Fig. 3. Corrected return on assets, equity and sales ratios in depend on trade credit strategy
Source: Own study.

The adjusted profitability ratios (with share fund surcharges), developed by Dworniak [2010], showed similar relationships to the traditional return on assets, capital, and sales ratios, but their level was higher (Fig. 3).

The group of cooperatives classified as conservative recipients showed the highest adjusted return on equity at 15.1%, which deserves a positive assessment. Moderate providers exhibited an adjusted ROE of 9.8%, while aggressive recipients had an ROE of 8.7%. The lowest levels in terms of adjusted return on assets and sales were found in the groups of co-

operatives defined as moderate recipients (adjusted ROA of 2.1%, adjusted ROS of 1%), conservative providers (adjusted ROA of 2.5%, adjusted ROS of 3.4%), and aggressive providers (adjusted ROA of 2.9%, adjusted ROS of 1.2%). The other groups of cooperatives, distinguished by trade credit position and strategy, demonstrated relatively higher levels of adjusted ROA and sales ratios.

Figure 4 shows the development of the general debt, equity, and long-term debt ratios. The dairy cooperatives, regardless of their position and trade credit strategy, had
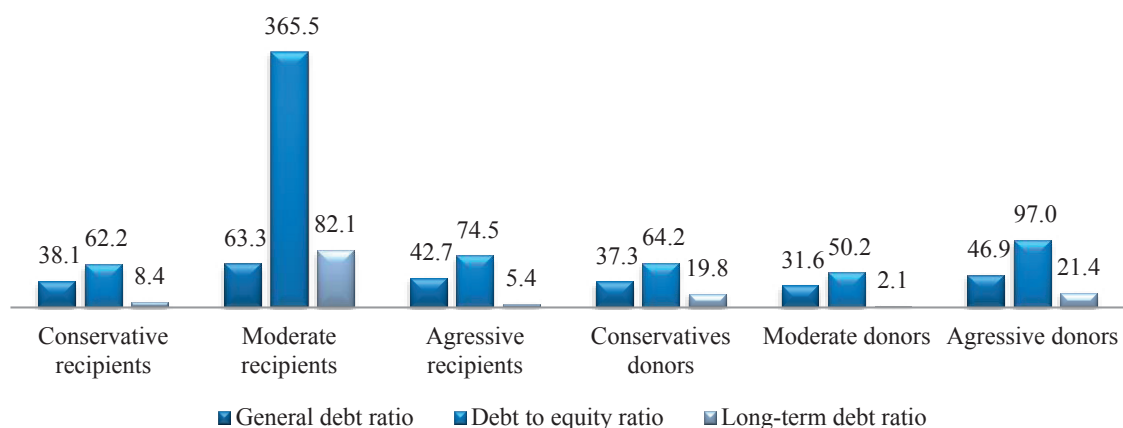
Fig. 4. General debt, equity and long term debt ratio depend on trade credit strategy
Source: Own study.
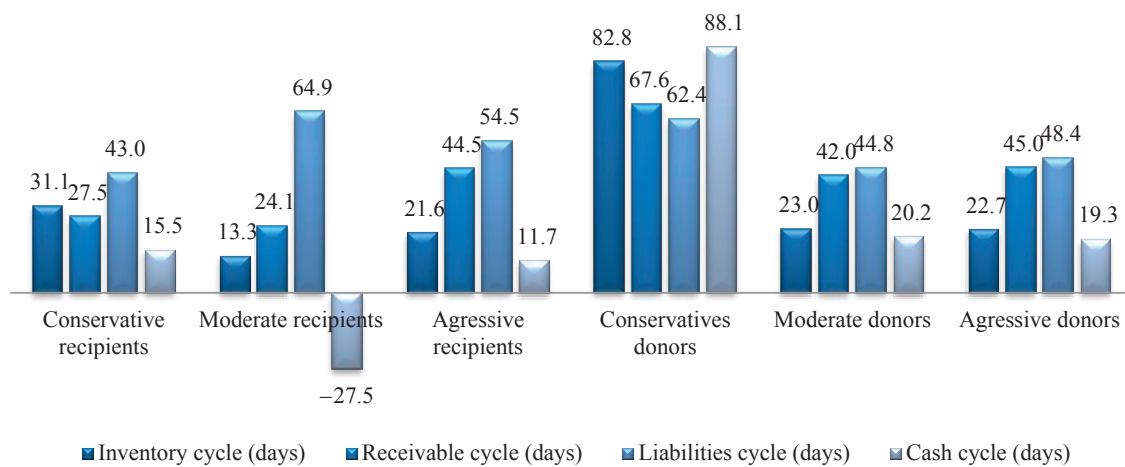
Fig. 5. The management efficiency indicators of the studied cooperatives according to position and trade credit strategy
Source: Own study.

similar debt levels, except for moderate recipients. This group had the highest level of equity debt at 365.5%, total debt at 63.3%, and a long-term debt ratio of 82.1%.

The high debt-to-equity ratio indicated that the cooperative was using debt to finance its growth. Cooperatives in the moderate recipient group invest large amounts in assets, which was the reason for such a high debt-to-equity ratio. At the same time, their high level of indebtedness had a negative impact on the liquidity risk and efficiency of their operation and influenced the adoption of a trade credit recipient position. The cooperatives following an aggressive strategy (both recipients and providers) had the lowest level of long-term debt ratio, which could be due to the fact that the managers of these entities financed a large part of their trade credit with short-term liabilities. The management efficiency indicators of the studied cooperatives according to position and trade credit strategy are presented in Figure 5.

The longest cycles of inventories, receivables, payables, and cash were those of entities categorized as conservative providers (82.8 days, 67.6 days, 62.4 days, and 88.1 days, respectively). The managers of these cooperatives paid off short-term liabilities first and then received receivables for the products sold.

The long inventory cycle may have been due to sales problems and may have also occurred in cooperatives manufacturing products with a long shelf life (e.g., ripened cheeses). Relative to the level of inventory turnover, receivables, and payables ratios, conservative providers showed an unfavorable level of the cash cycle. The group of cooperatives classified as moderate recipients showed the shortest inventory turnover cycle (13.3 days) and a negative cash cycle (–27.5 days). This could mean that managers of entities in this group sought to shorten the inflow of receivables and lengthen the payment terms of liabilities due to liquidity problems.

CONCLUSION

The research carried out enabled the following conclusions to be drawn:

1. Irrespective of the trade credit strategy employed, cooperatives had favorable liquidity ratios. The highest level of liquidity was observed in the conservative and moderate provider group. This may be because managers of these cooperatives maintain high liquidity levels due to their liberal receiv-

ables regulation policy. In contrast, cooperatives classified as recipients had relatively lower levels of liquidity. This could be attributed to their use of extended liability settlement periods and repayment from received receivables.

2. Cooperatives in the conservative recipient and moderate provider groups demonstrated the highest returns on assets, equity, and sales, both in classic and adjusted terms. The lowest return on sales was observed in the case of entities classified as moderate recipients and aggressive providers. This suggests that the position and trade credit strategy significantly influence the profitability levels of dairy cooperatives.

3. Regardless of the trade credit strategy, dairy cooperatives exhibited similar levels of debt, except for moderate recipients. This group had the highest levels of equity, general debt, and long-term debt. This indicates that cooperative managers primarily use long-term debt to finance their growth. The moderate recipient group heavily invests in assets, resulting in a high debt-to-equity ratio. Cooperatives following an aggressive strategy (both recipients and providers) had the lowest long-term debt ratio, possibly because their trade credit was largely financed using short-term liabilities.

Trade credit management is a challenging and complex process that requires a comprehensive and multifaceted approach. Further research could focus on determining the loan portfolio of dairy cooperatives and conducting an in-depth analysis of receivables management methods in these entities (such as statistical measurement of the relationship between trade credit strategy and financial condition).

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ZRÓŻNICOWANIE SYTUACJI FINANSOWEJ WYBRANYCH SPÓŁDZIELNI MLECZARSKICH W ZALEŻNOŚCI OD POLITYKI KREDYTU HANDLOWEGO

STRESZCZENIE

Cel: Celem badania jest zbadanie sytuacji finansowej spółdzielni mleczarskich w odniesieniu do ich pozycji kredytowej i strategii kredytu kupieckiego. **Metody:** Za pomocą syntetycznego wskaźnika autorskiego określono pozycję i strategię udzielania kredytu kupieckiego oraz oceniono poziom rentowności, płynności, zadłużenia i efektywności zarządzania w odrębnych grupach podmiotów (konserwatywni, umiarkowani, agresywni odbiorcy kontra konserwatywni, umiarkowani i agresywni dostawcy). Badania przeprowadzone w zakresie zarządzania kredytem kupieckim w spółdzielniach mleczarskich pozwoliły na ustalenie, że sytuacja finansowa badanych podmiotów była zróżnicowana w zależności od ich sytuacji kredytowej i strategii kredytu kupieckiego. **Wyniki:** Najwyższy poziom pod względem ROE odnotowano w grupie podmiotów zaliczonych do konserwatywnych odbiorców, gdzie wskaźnik ten wyniósł 11,1%, a także w grupie umiarkowanych dostawców (7,1%). Najniższy poziom w tym zakresie odnotowano we wskaźniku rentowności sprzedaży, który wyniósł odpowiednio 0,3 i 0,4% w grupie odbiorców umiarkowanych i dostawców agresywnych. Wyższy poziom zwrotu ze sprzedaży w porównaniu ze spółdzielniami zaklasyfikowanymi do grupy agresywnych dostawców stwierdzono w spółdzielniach stosujących konserwatywną strategię kredytu kupieckiego. **Wnioski:** Badania przeprowadzone w zakresie zarządzania kredytem kupieckim w spółdzielniach mleczarskich pozwoliły ustalić, że sytuacja finansowa analizowanych podmiotów różniła się w zależności od ich sytuacji kredytowej i strategii kredytu kupieckiego. Rentowność aktywów, środków i sprzedaży, a także poziom płynności różniły się wśród wyróżnionej grupy spółdzielni pod względem pozycji i strategii kredytowej w tym samym czasie.

Słowa kluczowe: kredyt handlowy, pozycja kredytowa, spółdzielnie mleczarskie

CAN SUBSIDIES DISPLACE THE NEED TO IMPROVE PRODUCTIVITY AS A SOURCE OF INCOME MAXIMIZATION? EVIDENCE FROM POLAND

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ABSTRACT

Aim: The article addresses the fundamental issue of agricultural producers' choice regarding two sources of income maximisation, i.e. economic rent resulting improving labour productivity and political rent as an expression of the institutional conditions in force. In particular, attention is focused on the possible substitutability between economic and political rents. **Methods:** The effect of displacement of economic rent by political rent was measured for Polish farms by economic size class in the period 2008–2015, using inverse probability of treatment weighting, based on a counterfactual approach. **Results:** The study indicated that despite the fact that farms with improved labour productivity achieved higher incomes, in some years there was a significant displacement effect of the economic rent by the political rent. This meant that significantly higher incomes were earned by inefficient farms whose operations linked to production were supported by agricultural policy instruments than by unsubsidised farms where labour productivity increased. As farm size increased, the need to improve productivity was thus replaced more often and on a larger scale by the use of agricultural policy mechanisms. **Conclusions:** The results confirmed the conclusions of studies carried out in other countries, thus indicating the possible contribution of agricultural policy to undermining the need to improve productivity as a source of maximising agricultural income. So while farm incomes should be supported, if only because of the persistent disparity between incomes from agriculture and those from other sectors of the economy, there is still room for improvement in the efficiency of public expenditure allocation.

Keywords: economic rent, political rent, labour productivity, agricultural policy, counterfactual method, inverse probability of treatment weighting

JEL codes: D04, D24, Q18, C31

INTRODUCTION

One of the basic policies implemented in the European Union (EU) is the Common Agricultural Policy (CAP), which provides the framework for the institution-al environment of agriculture. The justification for active and multifaceted state intervention, including through EU policies in the agricultural sector, is market failure. This concept grew out of Keynesian theory and welfare economics. Economic theory points to six different caus-

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es of this failure that can make an economy inefficient in the Pareto sense: imperfect competition, failure due to the existence of public goods, failure due to externalities, incomplete markets, failure due to incomplete information, and unemployment and other macroeconomic distortions [Stiglitz 2004]. In the case of agriculture, attention is primarily focused on the first three forms of failure. While the CAP has the advantage of great stability over budget programming periods, the disadvantage is the decision-making mechanism itself, involving the European Commission, the EU Agriculture Council, the European Parliament, and COPA-COGECA (the Committee of Professional Agricultural Organisations and the General Confederation of Agricultural Cooperatives). This can lead to internal conflicting objectives and transfer inefficiencies, manifested, among others, in rent-seeking.

The concept of political rent refers to the meaning of the term "rent" used in the economic literature, which, as Wilkin [2012] points out, is not clearly defined. In classical terms, rent is the benefit derived from the possession of a scarce resource [Schoemaker 1990]. Obtaining this type of surplus is, therefore, due to having limited inputs that are used for productive activities. The economic rent here is the difference between the income from a given factor of production and the minimum amount that induces its owner to use the resource in that particular way. The excess of income over the cost of maintaining a resource in its current use, and thus also over its opportunity cost, is obtainable in the short term [Mahoney 1995, McChesney 1998].

The economic rent is then the result of an increase in the marginal productivity of a given factor of production that has not yet been reflected in the price of that factor in the market (its remuneration). In economic theory, there is a reduction in marginal costs in the long run due to the pursuit of allocative efficiency. Thus, there is an optimal allocation of resources, which results from equating factor of production remunerations with their marginal productivities. Thus, in this case, the economic rent theoretically disappears [Czyżewski 2013]. According to Wilkin [2012], since in a free-competitive economy, any excess of price over marginal cost can be considered a rent, in the modern economy, rent is identified with the income earned by using factors of production for income-oriented activities in excess of the cost level. Therefore,

even a non-zero profit is considered an economic rent. Rent-seeking as a result of improved production efficiency refers to the concept of rent, according to Ricardo or Schumpeter. It is a kind of natural form of rent that is derived from the price mechanism and production activity [Tollison 1982]. Thus, in this context, economic rent has the incentive function of encouraging producers to use production factors efficiently, promoting economic development.

The concept of rent has also carried over into political economy due to the significant role of state aid programs in shaping income and, thus, farm operations. In this case, there is only a transfer of funds from one entity to another within the functioning mechanisms of political power. It is, therefore, both an economic and political transaction [Czyżewski and Matuszczak 2016a]. Therefore, the fact that political rent is created artificially is emphasized [Hindmoor 1999]. In the case of rent obtained through political mechanisms, on one hand, it is said that the supply of rent is produced by political institutions that can "sell" regulations, among other things, in exchange for the support of the electorate. According to Acemoglu and Robinson [2006], the political replacement effect applies here, whereby political elites are reluctant to initiate economic and institutional changes for fear of losing power (replacement). Political elites will, therefore, block favorable economic and institutional changes if they could increase the likelihood of destabilizing the current arrangement and thus losing political power and future rents. On the other hand, we are dealing here with the submission of demand for desired regulations (demand for political rent) by interest groups in the form of associations of producers or consumers, for whom a given regulation will bring tangible benefits, such as the protection of the internal market, price maintenance, or increased income [Czyżewski and Matuszczak 2016b].

In simple terms, two sources of income growth for agricultural producers are considered, which are related not only to market activities, but also to interventionism. A rational agricultural producer chooses factor involvement to achieve the highest possible outcomes, which is the same as optimizing agricultural income. The allocation of production factors can be determined through typical production activities that result in new products or services, or it can be influenced by specific institutional conditions that aim to achieve benefits. As a result,

agricultural producers may face a choice between two methods of achieving their income objective, taking into account the utility of economic and political rents in relation to the cost of obtaining the income effect. Therefore, the purpose of this paper is to examine whether rent-seeking through political mechanisms still motivates agricultural producers to take actions aimed at increasing labor productivity, or if it weakens this need. This leads to the question of measuring the effect of displacement (substitution) of economic rent by political rent[1].

MATERIALS AND METHODS

The study uses microdata from the Polish FADN (Farm Accountancy Data Network) for the years 2008–2015, which covers the implementation of the Rural Development Programme 2007–2013. The FADN focuses on farms with an area used for agriculture of at least 1 ha, or farms that, if their area of arable land does not exceed 1 ha, deliver an appropriate part of their production to the market or produce more than a certain volume of production. The observation field of the FADN includes commodity farms, i.e., farms that produce more than 90% of the standard output[2] (SO) in a given region or country. Each year, over 10,000 farms are included in the Polish FADN sample. To account for the diversity of farms in Poland, a stratified selection of units from the observation field of FADN is applied. The sampling frame is divided into layers based on three criteria: regional location, economic size, and agricultural type.

The degree of substitutability between economic rent and political rent was assessed by comparing the income from family farms (per full-time family work-er) in two groups of farms. Family farm income per family full-time worker was calculated by adding net value added to the balance of investment subsidies and taxes and subtracting the cost of external factors. This income was only calculated for farms with non-zero own labor inputs [Floriańczyk et al. 2018].

The first group consisted of farms that received political rent, which means they received subsidies for their operating activity but did not show an increase in labor productivity in a given year[3]. In the surveyed sample, the size of this group ranged from 2,507 to 6,190 farms. The second group, on the other hand, included farms that received economic rent. These farms experienced an increase in labor productivity but did not receive support for their operating activity in a given year. The size of this group was much smaller, ranging from 96 to 264 farms (see Table 1). Subsidies for operating activity include payments for crop and livestock production, rural development (environment-related), intermediate consumption, external factor costs, single-area payments, and other subsidies. An increase in labor productivity was measured as the year-on-year change in the ratio of total production to total labor input. Due to the limitations of the study sample, calculations could only be performed separately for each year covered by the analysis.

In order to answer the question of whether subsidies may replace or limit the need for productivity improvement in farming in the pursuit of income maximization, an essential part of the analysis was comparing the income situation between potentially homogeneous groups. These groups would differ only in terms of the support they received under the CAP and their production efficiency. To accomplish this, the study utilized the inverse probability of treatment weighting (IPTW)

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[1] It should be noted that agricultural policy instruments also include those aimed at improving labor productivity on farms. These are mainly investment support measures. However, measures of this type focus on increasing the capital factor on the farm rather than improving the allocation of all factors of production.

[2] This category defines the average five-year value of production for a specific agricultural activity (plant or animal) obtained from 1 ha or from 1 animal during the year, under average production conditions for a given region.

[3] Murphy, Shleifer, and Vishny [1993] pointed out that political rent-seeking can lead to the capture of benefits by low--productivity farms and, consequently, the unproductive use of available inputs. This ultimately results in lower social welfare at the economy-wide level. Our definition of political rent refers to this approach. However, it should be mentioned that Teng [2013] challenges the approach that links political rent-seeking to a decline in productivity. Teng proposes a theory of complementarity, where the rent seekers must be producers, and the products are also inputs in the rent-seeking effort. As Czyżewski and Matuszczak [2016b] acknowledge, it is challenging to apply this concept to agriculture. However, it may be applicable if one assumes that one of the production outputs is public goods.

Table 1. Number of farms in the sample of the Polish FADN and in the research sample

	2008	2009	2010	2011	2012	2013	2014	2015
Polish FADN sample	12 305	12 263	11 004	10 890	10 909	12 117	12 123	12 105
Research sample	6 338	6 268	2 771	2 868	3 598	5 190	5 676	6 250
including:								
Farms with political rent*	6 190	6 079	2 507	2 621	3 341	5 094	5 536	6 014
Farms with economic rent**	148	189	264	247	257	96	140	236

*farms which received subsidies for operating activities in a given accounting year and at the same time in which there was no increase in labor productivity, **farms which did not receive subsidies for operating activities in a given accounting year but in which there was an increase in labor productivity.

Source: Own study based on Polish FADN data.

based on a counterfactual approach. The counterfactual state refers to the hypothetical value of the outcome variable (in this case, income from the family farm) that would have been achieved if the unit had been in a different state than it actually was [Rosenbaum and Rubin 1983]. For the farms that achieved a political rent (which make up the experimental group in the study), the counterfactual state is the hypothetical value of the income that the same farms would have obtained if the income effects achieved had resulted from the acquisition of an economic rent. The value of the substitution effect between political rent and economic rent among the farms was determined based on the formula of the average treatment effect on treated (ATT) [Imbens 2004, Pan and Bai 2015]:

$$\tau_{ATT} = E(Y_1|D = 1) - E(Y_0|D = 0)$$

where: $E(Y_1|D = 1)$ – the expected value of family farm income among farms that obtained a political rent, $E(Y_0|D = 0)$ – the expected value of family farm income among farms that obtained an economic rent. The estimation of the counterfactual state is made based on available data, with the selection of an appropriate comparison (control) group being crucial due to two key assumptions of the counterfactual approach, collectively referred to as a condition of strong ignorability[4]. All assumptions of the counterfactual method were met in this study. They were verified using the unpaired *t*-test (for continuous variables) or chi-square test (for nominal or ordinal variables) and the Kolmogorov-Smirnov test. Balance between the experimental and control groups was achieved for all observable characteristics considered.

The more variables used to assign an individual (i.e., a farm) in the experimental group to its counterpart in the control group, the more accurate the estimate of the counterfactual state. As a solution to this multidimensional matching problem, Rosenbaum and Rubin [1983] proposed selecting the control group not based on multiple characteristics but only on the propensity score, which is defined as the probability of treatment assignment conditional on observed baseline covariates. When using the IPTW method, the selection of individuals for the control group consisted of weighting the nontreated group according to the formula:

$$w_{i,ATT} = d_i + \frac{(1 - d_i)PS(X_i)}{1 - PS(X_i)}$$

where: $d_i = \{1\}$ for farms in the experimental group or $d_i = \{0\}$ otherwise, $PS(X_i) = P(d_i = 1|X_i)$ – propensity score (i.e., the probability of a farm being in the experimental group), estimated on the basis of selected

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[4] The first is the assumption of conditional independence [Barnow 1980]. When determining ATT, meeting this assumption means that the family farm income (per full-time family worker) in the control group should not depend on whether the farm is seeking political or economic rent, considering the propensity score vector. The second is the overlap condition, which states that the distribution of observable characteristics of farms in the experimental group should be similar to the distribution of these characteristics in the control group [Guo and Fraser 2015].

economic and financial characteristics, such as: own labor input, agricultural area included and excluded from production, animal stock, crop, animal and other production, internal and indirect consumption, depreciation, cost of external factors of production, subsidies and taxes on investment activity, fixed and current assets, short- and long-term liabilities, investments, cash flow, and the age and education of the farmer.

Farms in the experimental group were, therefore, given a weight of 1. The higher the similarity between farms that received an economic rent (control group) and farms that received a political rent (experimental group), the higher the weight. Parametric methods, such as logistic regression, are usually used to estimate a propensity score from available data [Holmes 2014, McCaffrey 2013]. However, this requires a priori choice of a functional form for the relationship between the probability of achieving political rent (because of the definition of the experimental group in this study) and farm characteristics. It also limits the number of regressors in the propensity score model due to the decreasing number of degrees of freedom. To address these limitations, the nonparametric generalized boosted models (GBM) method proposed by McCaffrey et al. [2013] for use in observational studies was used to estimate the propensity score.

Table 2. Basic descriptive statistics on income from a family farm per full-time family worker (in PLN/FWU, at constant 2007 prices)

	2008	2009	2010	2011	2012	2013	2014	2015
Polish FADN sample								
Mean	42 977.41	45 425.14	49 010.78	43 153.47	48 340.92	40 585.42	42 484.83	40 076.33
Median	24 603.08	24 304.47	29 228.85	25 454.90	24 576.60	23 146.55	24 208.40	22 380.02
Sd	83 524.02	87 144.05	80 330.35	87 871.28	36 5045.21	118 698.09	80 019.62	125 431.72
Research sample								
Mean	32 290.57	34 115.30	32 874.89	30 914.28	29 753.51	33 894.35	32 696.30	32 874.14
Median	19 490.43	19 293.90	18 507.12	17 393.93	17 906.23	19 005.60	18 999.15	19 405.44
Sd	46 972.46	58 229.49	52 352.05	48 632.37	53 136.92	54 014.93	55 364.15	54 200.99
including:								
Farms with political rent*								
Mean	31 665.95	33 149.01	31 764.22	30 682.38	29 523.63	33 774.01	32 579.49	32 490.07
Median	19 349.81	19 073.72	17 899.79	17 146.84	17 840.68	18 941.21	18 901.53	19 230.07
Sd	45 444.70	55 289.16	51 788.06	48 457.15	53 962.74	54 100.73	55 646.14	54 017.60
Farms with economic rent**								
Mean	58 415.25	65 195.27	43 422.03	33 375.05	32 741.99	40 280.00	37 315.11	42 661.18
Median	31 500.07	32 789.89	28 104.57	19 086.66	21 291.83	24 797.50	25 228.61	23 638.92
Sd	86 384.68	114 884.81	56 456.89	50 490.09	40 877.67	49 082.35	42 646.01	57 949.09

*farms which received subsidies for operating activities in a given accounting year and at the same time in which there was no increase in labor productivity, **farms which did not receive subsidies for operating activities in a given accounting year but in which there was an increase in labor productivity.

Source: Own study based on Polish FADN data.

Table 3. Estimation of the effect of displacement of economic rent by political rent (in PLN/FWU, at constant 2007 prices) by economic size

	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Small (8 000≤ EUR <25 000)	1 248 (2 108)	5 411*** (1 999)	−300.3 (1 892)	2 832** (1 167)	−1 259 (1 628)	3 316 (2 531)	2 122 (1 748)	3 503** (1 659)
Medium–small (25 000≤ EUR <50 000)	730.3 (5 418)	−259.2 (2 392)	−278.8 (2 777)	−2 904 (5 824)	−4 806 (2 929)	11 363*** (4 040)	−3 076 (3 046)	691.7 (2 025)
Medium–large (50 000≤ EUR <100 000)	854.6 (5 225)	−6 949 (4 682)	−3 353 (4 098)	10 107** (4 057)	2 916 (4 312)	−2 242 (6 399)	−2 901 (5 315)	13 083*** (4 123)
Large (100 000≤ EUR <500 000)	37 206*** (11 412)	27 006* (15 274)	20 159 (14 375)	−790.7 (13 324)	16 442 (12 572)	−10 352 (28 576)	28 635* (15 448)	−50 056* (29 394)

The table presents values τ_{ATT} with the estimation error and the level of significance of the estimation: *** – p-value <0.01, ** – p-value < 0.05, * – p-value <0.1.

Source: Own calculations based on Polish FADN data.

RESULTS

In the group of farms from the sample of the Polish FADN, the average agricultural income (per full-time family worker) remained at a similar level throughout the entire analyzed period, ranging from approximately 40,100 to 49,000 PLN/FWU (see Table 2). However, the median income from a family farm was significantly lower, indicating a relatively high skewness in the income distribution of the entire sample. Among the selected farms that received an economic or political rent, which constituted the research sample, the average agricultural income was lower, ranging from about 29,800 to about 34,100 PLN/FWU. The income of farms benefiting from agricultural policy mechanisms fluctuated around a similar level, amounting to approximately 29,500–33,800 PLN/FWU. On the other hand, there was a noticeably higher average agricultural income in farms where there was an improvement in labor productivity. In this group, during the analyzed period, the average income from a family farm (per full-time family worker) varied from about 32,700 to about 65,200 PLN/FWU.

The substitution effect between political and economic rent was determined for farms in Poland based on their economic size. Table 3 presents the results of estimating the ATT, along with the standard error (values in brackets), in constant 2007 prices and the significance level of the estimation. A positive value of the ATT estimate indicated that, on average, higher income was achieved by subsidized farms where labor productivity had not increased. This positive value indicated the effect of crowding out economic rent by political rent. On the other hand, a negative value of the ATT estimate indicated that higher income was achieved on average by farms that improved their labor productivity over the year, but did not receive support under the agricultural policy. The negative value, thus, indicated a preference for income effects associated with economic rent over those associated with political rent.

On the smallest farms, higher incomes were typically achieved by agricultural producers who received CAP payments compared to farms that improved labor productivity, especially in 2009, 2011, and 2015. Subsidized farms then had approximately 2,800–5,400 PLN/FWU more income than farms that increased labor productivity without agricultural policy support. In farms with an economic size between EUR 25,000 and EUR 50,000 SO, the only significant difference between the experimental and control groups occurred in 2013, when agricultural producers receiving support for their operating activities had about 11,400 PLN/FWU more income than farms in the comparison group. The effect of displacing economic rent with

political rent in farms with an economic size between EUR 25,000 and EUR 50,000 SO was at a similar level, especially in 2011 and 2015. Farms receiving subsidies for operating activities achieved about 10,100–13,100 PLN/FWU higher income than farms with improved production techniques. In the largest farms, higher income was made possible by agricultural policy mechanisms, especially in 2008–2009 and 2014. Agricultural producers benefiting from the analyzed CAP payments then achieved about 27,000–37,200 PLN/FWU more income than the comparison group. Importantly, in 2015, higher incomes were instead achieved by farms that increased labor productivity without support for their operational activities. As farm size increased, the need to improve productivity was more frequently and extensively replaced by the use of agricultural policy mechanisms. However, towards the end of the analyzed period, there was a shift in preferences among the largest farms regarding the sources of maximizing income, and the effects resulting from pursuing political rent were replaced by those resulting from economic rent.

DISCUSSION AND CONCLUSIONS

In this study, we examined the concept of economic and political rent as two sources of income maximization for agricultural producers. We addressed the problem of how agricultural policy influences the improvement of production techniques on farms, specifically focusing on the substitution effect between these two rents. To assess the extent to which CAP payments may weaken the need for labor productivity improvement as a source of increasing income for agricultural producers, we analyzed data on commodity farms from the Polish FADN database. The prevailing belief in theoretical studies on the impact of agricultural policy on farm performance is that subsidies weaken the motivation of agricultural producers to improve production techniques, as they increase income [Hennessy 1998, Ciaian and Swinnen 2009]. The negative impact of subsidies on farm productivity may also be attributed to inefficient allocation of production factors, soft budget constraints, and the subsidization of less productive farms [Rizov et al. 2013]. Support is often directed towards economically

weaker farms, which delays the decision to reallocate production factors. Bergström [2000] reaches similar conclusions, arguing that payments can have a negative effect on farm productivity for at least two reasons. Firstly, subsidies increase farm incomes, reducing the incentive for agricultural producers to improve production techniques [Giannakas 2001]. Secondly, subsidies often help inefficient farms survive, postponing the decision to reallocate production factors and improve productivity. Guyomard et al. [2004] emphasize that the negative impact of payments on farm efficiency is also observed at the agricultural sector level, as less efficient farms are enabled to remain on the market. Previous empirical studies, although varying in methods and scope, generally reach similar conclusions. Latruffe et al. [2009] find a negative effect of direct payments on farm efficiency in France, focusing on selected plant and animal specializations. Similar conclusions are drawn in the works by Latruffe [2010], Sckokai and Moro [2009], and Zhu and Lansink [2010], considering all CAP instruments together. The findings of Mary [2013] suggest that although some CAP instruments have a negative impact on farm productivity in France, unlike previous studies, this impact was not significant for all CAP payments. Conversely, Ratinger, Medonos, and Hruska [2013] show a positive effect of subsidies on labor productivity in medium-sized farms in the Czech Republic. This study aimed to contribute empirically and methodologically by using a counterfactual approach to evaluate agricultural producers choices in maximizing sources of income. The study assessed the effect of agricultural policy instruments on agricultural income in relation to labor productivity, allowing for the determination of the "crowding out effect" of political rent on economic rent. Throughout the analyzed period spanning the CAP financial perspective from 2007 to 2013, Polish farms that improved labor productivity without receiving agricultural-policy support achieved noticeably higher incomes. However, the study also found a significant displacement effect (substitution effect) of economic rent by political rent in some years when examining the relationship between agricultural policy and productivity growth's impact on agricultural income. As farm size increased, the utilization of agricultural policy mechanisms increasingly replaced

the need to improve productivity. However, towards the end of the analyzed period, preferences regarding income maximization sources shifted in the group of largest farms. The effects resulting from seeking political rent were replaced by the effects resulting from seeking economic rent.

Therefore, despite the fact that farms with improved labor productivity achieved higher incomes, some years demonstrated a significant displacement effect of economic rent by political rent. This meant that inefficient farms supported by agricultural policy instruments (mainly payments under Pillar I of the CAP) obtained significantly higher incomes compared to unsubsidized farms with increased labor productivity. These findings align with studies conducted in other countries, indicating the potential undermining contribution of agricultural policy to the necessity of productivity improvement as a source of maximizing agricultural income. While it remains important to support farm incomes, particularly due to the persistent income disparity between agriculture and other sectors of the economy, there is still room for improving the efficiency of public expenditure allocation.

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CZY SUBSYDIA MOGĄ ZASTĄPIĆ POTRZEBĘ POPRAWY PRODUKTYWNOŚCI JAKO ŹRÓDŁA MAKSYMALIZACJI DOCHODU? ANALIZA DANYCH Z POLSKI

STRESZCZENIE

Cel: W artykule podjęto fundamentalną kwestię wyboru producenta rolnego odnośnie do dwóch źródeł maksymalizacji dochodu, tj. renty ekonomicznej wynikającej z poprawy produktywności pracy i renty politycznej stanowiącej wyraz obowiązujących uwarunkowań instytucjonalnych. W szczególności uwagę skupiono

na ewentualnej substytucyjności między rentą ekonomiczną a polityczną. **Metody:** Pomiaru efektu wypierania renty ekonomicznej przez rentę polityczną dokonano dla polskich gospodarstw rolnych w podziale na klasy wielkości ekonomicznej w okresie 2008–2015, przy wykorzystaniu metody ważenia odwrotnością prawdopodobieństwa poddania oddziaływaniu, opartej na podejściu kontrfaktycznym. **Wyniki:** Przeprowadzone badania wskazały, iż pomimo osiągania wyższych dochodów przez gospodarstwa rolne, w których nastąpiła poprawa wydajności pracy, w niektórych latach odnotowano istotny efekt wypierania renty ekonomicznej przez rentę polityczną. Oznaczało to, że znacząco wyższe dochody uzyskiwały nieefektywne gospodarstwa, których działalność operacyjna wspierana była przez instrumenty polityki rolnej niż niesubsydiowane gospodarstwa, w których nastąpił wzrost wydajności pracy. Wraz ze wzrostem wielkości gospodarstw potrzeba poprawy produktywności była więc częściej i na większą skalę zastępowana przez wykorzystanie mechanizmów polityki rolnej. **Wnioski:** Uzyskane wyniki potwierdziły wnioski z badań przeprowadzonych w innych krajach, wskazując tym samym na możliwy wpływ polityki rolnej na osłabianie potrzeby poprawy produktywności jako źródła maksymalizacji dochodów rolniczych. O ile więc dochody gospodarstw rolnych powinny być wspierane, choćby ze względu na utrzymujące się dysproporcje między dochodami z rolnictwa a dochodami z innych sektorów gospodarki, to wciąż istnieje pole do poprawy efektywności alokacji wydatków publicznych.

Słowa kluczowe: renta ekonomiczna; renta polityczna; wydajność pracy; polityka rolna; metoda kontrfaktyczna; ważenie odwrotnością prawdopodobieństwa

THE IMPACT OF TRADE LIBERALIZATION ON THE PERFORMANCE OF TANZANIA'S EXPORT SECTOR – A TIME SERIES ANALYSIS FROM 1980 TO 2019

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ABSTRACT

Aim: This article aims to enhance understanding of the impact of trade liberalization on Tanzania's export performance. As many studies conducted, both in developing and developed countries, have yielded mixed results and the relationship varies across different nations, it is difficult to provide a definitive answer to the question of whether trade liberalization affects Tanzania's export sector without first conducting an empirical analysis. **Methods:** This study employs a quantitative research methodology because it allows for a larger sample size, greater objectivity, and accuracy. Due to the nature of the study and the data used, a statistical study design was chosen. Macroeconomic data spanning 1980 to 2019 was obtained from the World Bank and the Tanzania Bureau of Statistics to analyze the effects of trade liberalization on export performance using vector error correction and autoregressive distributed lag models. **Results:** The results reveal a significant positive correlation between trade liberalization and subsequent export performance, as well as the interdependencies between trade liberalization and foreign direct investment (FDI) strategies. There is a reciprocal relationship between trade liberalization and exchange rates, implying the significance of competent exchange rate management in enhancing export competitiveness. **Conclusions:** The study concludes that trade liberalization, FDI, and export performance have a long-term positive correlation. This implies that a carefully executed trade liberalization policy is crucial not only for the expansion of the export industry sector and the influx of capital, but also for the transformation and development of the nation.growth.

Keywords: international trade, trade liberalization, Vector Error Correction Model (VECM), Autoregressive Distributed Lag (ARDL), international economics, economic growth

JEL codes: B17, F43

INTRODUCTION

The majority of nations, both those with strong and weak economies, have made improving export performance one of their macroeconomic goals [Ocampo 2004, Manamba 2016, Güneri 2019, Cramer et al. 2020, Nguyen 2020]. Tanzania made the decision to implement a number of trade and fiscal policy reforms beginning in the early 1990s by offering incentives to promote exports and balance trade terms [Rwenyagila 2013, Kingu 2014a, Manamba 2016]. One of these incentives was the adoption of trade liberalization

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policies, which were meant to give countries the opportunity to grow their economies, increase exports, and promote overall development [Kanaan 2000, Kazungu 2009, Manamba 2016, Modeste 2019].

Thindwa and Seshamani [2014] and Vassilyeva [2017] both claim that trade liberalization is a key factor in improving export performance, as well as boosting growth and supporting overall development. Additionally, despite some year-to-year fluctuations, Tanzania's export performance has shown an upward trend from 1990 to 2019, in line with the World Bank's observations. For example, exports were USD 0.54 billion in 1990, increased to USD 1.30 billion in 1996, dropped to USD 1.30 billion in 1997, and then increased again to USD 1.45 billion in 2000. After that, export growth slowed until it reached USD 9.79 billion in 2019, the highest annual total ever [World Bank 2021].

Furthermore, different researchers have found conflicting results regarding the relationship between export performance and trade liberalization. Some studies suggest a positive correlation between trade liberalization and export performance in certain countries, while others suggest a negative correlation. According to [Penelope 2005, Utouh et al. 2016, Shobande 2019], trade liberalization enhances the export performance of liberalized economies by providing access to new technologies from trading partners that can stimulate growth in other sectors. On the other hand, Ahmed et al. 2014 and Thindwa and Seshamani [2014] argue that trade liberalization has a negative impact on export performance, and that liberalizing trade does not necessarily improve an economy's exports. Furthermore, Babatunde [2009] suggests that trade liberalization only has a minor impact on improving export performance in sub-Saharan African nations. Based on the discussions above, it is clear that ongoing debates exist in the fields of economics and globalization regarding the relationship between export performance and trade liberalization. Additionally, numerous studies have been conducted in various economies, both developed and developing, and the relationships between nations vary, despite contradictory findings in this area. While studies on trade liberalization and export performance have been conducted in Tanzania, they tend to focus more on agricultural exports than other types. These

factors highlight the need to study how trade liberalization specifically affects Tanzania's export performance and its overall economy.

THEORETICAL FOUNDATIONS

The Trade Liberalization Theory, which Neo-Liberals [Krueger 1974] promoted as an outward-looking strategy rather than an inward-looking one, serves as the foundation for the main argument of this paper. This is because an outward-looking strategy focuses on producing for both the domestic and international markets. Neo-Liberals also claimed that trade liberalization is a crucial element for economic growth, export performance, increased import capacity, capital imports for development, and the alleviation of balance of payments issues in liberalized countries [Kitole and Utouh 2023].

The theory was based on the parent theory of international trade put forth by classical economists like A. Smith in 1776 when he established the theory of absolute advantage, and the Ricardian theory of comparative advantage in 1817, which explains the idea of free trade as an engine of economic growth for many nations. However, [Grossman and Helpman 1991, Edwards 1998, Kingu 2014b, Utouh et al. 2016] have criticized both theories of absolute advantage and comparative advantage for assuming perfect competition among trade partners and ignoring matters like trade barriers among trade partners, which are both significant and realistic. Nowadays, when we discuss trade, we primarily refer to large corporations that source components and raw materials from around the world and then market them internationally. And it was the development of technology and trade liberalization that made those corporations possible.

In their studies, Kingu [2014a], Razzaque et al. [2003], Santos-Paulino and Thirlwall [2004] contend that the trade liberalization theory presupposes that countries that liberalize trade may experience economic growth through favorable spillover effects from trade partners. The theory further assumes that under favorable spillover conditions, the nation will increase export performance and generate more job opportunities. In addition to the presumptions made

above, the theory also assumes that through government intervention, a nation may be able to lessen the issue of illegal and unproductive black-market activities. This is because the liberalization policy restricts government intervention, allowing trade partners to import and export freely without too many restrictions [Santos-Paulino and Thirlwall 2004].

Additionally, Hinkle and Montiel [1999] argued that neo-liberals like Cline [1997] were against trade liberalization – especially in developing countries – by arguing that there is little chance for trade liberalization to improve their export performance as it was supposed to because the exports of low-income nations are concentrated in a small number of products with relatively little domestic supply response, and trade reforms that alter relative prices won't have much of an impact.

This theory has been applied in various studies with varying results. Jenkins [1996] examined trade liberalization and export performance in Bolivia and found that export performance in Bolivia is primarily influenced by stable exchange rates rather than trade liberalization. Thus, trade reforms had a negative impact on Bolivia's export performance, proving that some countries are less affected by trade reforms than others. Despite the criticisms of the theory and inconsistent results, the theory of trade liberalization is useful in this study because it is anticipated to shed light on how trade reforms affect Tanzania's export performance.

EMPIRICAL REVIEWS

This section examines the study's supporting literature to identify any gaps that need to be filled. Many empirical studies have been carried out, and different findings have been made using various methodologies, variables, and data sets.

Ahmed [2000] used VAR and VECM to analyze the impact of trade liberalization on Bangladesh's export performance using time series data from 1974 to 1995. The variables used were real GDP, interest rate, a dummy variable, and real exchange rate. The findings demonstrated that Bangladesh's exports increased as a result of trade liberalization. Additionally, it was found that the dummy variable had no impact on export effectiveness. Furthermore, the significance of VECM was identified, pointing to a shift in the variables' direction toward long-term

equilibrium. Majeed and Ahmad [2006] used panel data for 75 countries and time series data from 1970 to 2004 to examine the factors influencing exports in developing countries. The real exchange rate, the size of the overall labor force, GDP, and FDI were the variables used in the study. The findings demonstrate that all variables were statistically significant export determinants, except for FDI, which showed positive but statistically insignificant results. This means that because it largely depends on each country's motivation, the influence of FDI in many developing countries continues to be a contentious issue.

Manni et al. [2012] used time series data analysis to examine the effects of trade liberalization on the economy of Bangladesh from 1980 to 2010. GDP, the rate of inflation, exports, imports, and trade openness were the variables used. Ordinary Least Squares (OLS) was one of the methodologies used in the study. The empirical findings demonstrate that trade liberalization had a positive impact on GDP growth while having no impact on inflation. Additionally, a quantitative result demonstrates that economic growth increases with openness. Moreover, trade openness and export and import growth go hand in hand, but trade liberalization policies appear to boost exports, leading to higher economic growth after the 1990s.

Using time series data from 1970 to 2010, Kingu [2014a] examined how Tanzanian clove exports responded to trade liberalization by using econometric techniques like cointegration, the error correction model (ECM), and trend analysis on the variables world price, exchange rate, and clove export earnings. The results of the ECM show a long-term relationship between the variables. The global price increased year over year while remaining positive and statistically significant at 5%, whereas the actual exchange rate was discovered to be positive but statistically insignificant. Ahmed et al. [2014] investigated the impact of various factors, including foreign direct investment (FDI), trade openness, currency value, and inflation on Pakistan's economic development. The study utilized time series data collected from 1980 to 2011. The authors employed co-integration and Dynamics Ordinary Least Square (DOLS) techniques for estimation, as well as tests such as the ADF, PP, and DF-GLS to assess stationarity in the variables. The results of the cointegration analysis revealed a long-term relationship

between the variables. Notably, trade openness was found to have the most significant negative impact on Pakistan's economic growth compared to the other factors. In conclusion, the study highlights the importance of trade and FDI, but not trade openness, in enhancing and influencing Pakistan's economic growth. In Wahab's [2020] research, the focus was on examining the effects of trade liberalization policy on the relationship between FDI in the services sector and economic growth in Nigeria from 1981 to 2018. The study utilized time series analysis and incorporated policy scenarios both with and without a structural break to account for shift dummies in the series. The findings indicated a long-term relationship between services FDI and economic growth. However, it was observed that services FDI promotes growth excluding policy shifts, whereas it slows down growth when policy shifts are included. Under the scenario without the break, the short-run estimate showed a statistically significant positive association with growth. Conversely, under the scenario with the break, the

relationship was deemed unimportant and negative. The report suggests that, considering the level of trade liberalization, services FDI can significantly contribute to Nigeria's economic development. Furthermore, despite the widespread adoption of trade liberalization as a means to boost exports and stimulate economic growth, the findings from researchers in various countries have been conflicting. Scholars like Thindwa and Seshamani [2014] and Vassilyeva [2017] argue that trade liberalization plays a pivotal role in positively influencing export performance and contributing to overall development. On the other hand, Ahmed et al. [2016] and Thindwa and Seshamani [2014] propose that trade liberalization might not necessarily lead to an improvement in export performance and that its impact may be relatively minor, particularly in sub-Saharan African nations [Babatunde 2009]. Therefore, this study seeks to address the ongoing debates surrounding the connection between trade liberalization and export performance, with a specific focus on Tanzania's economy. While previous studies have examined this
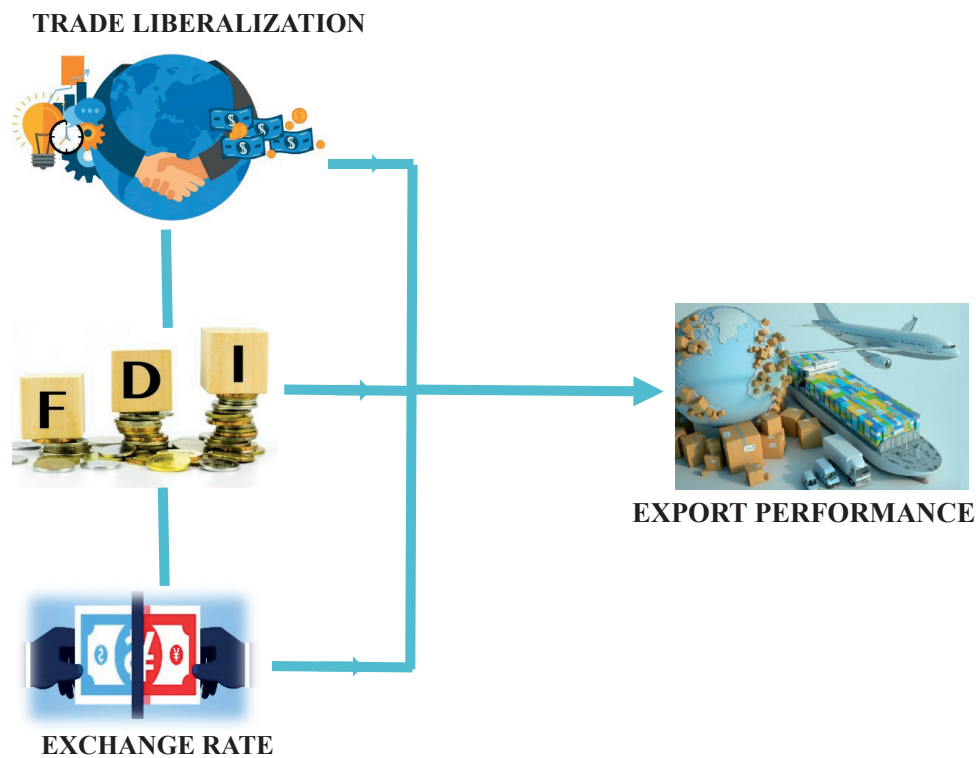
TRADE LIBERALIZATION

Fig. 1. Conceptual framework
Source: Own elaboration.

relationship in various economies, this research aims to fill a critical gap in the existing literature by providing a comprehensive analysis of trade liberalization's impact on Tanzania's export performance. By exploring the intricate dynamics between trade liberalization measures and export trends, this study aspires to shed new light on the subject and offer valuable insights for policymakers, economists, and stakeholders involved in international trade. In addition, reviews have revealed that Tanzania has little empirical data on the effects of trade liberalization on export performance, and the available literature is dated. This study fills the gap by evaluating the impact of trade liberalization on Tanzania's export performance (Fig. 1).

METHODS AND DATA

This study's research method is quantitative, which is thought to be the best method to use because it allows for the use of a larger sample, greater objectivity and accuracy, and is more cost-effective. The study's study design, based on this research, is a statistical study design. The statistical study design was chosen because of the nature of the study and the data used

[Kitole et al. 2022a, b, Kitole and Sesabo 2022]. The data used in this study were sourced from the World Bank [WB 2022] and the Tanzania Bureau of Statistics [NBS 2022]. The need to merge these two sources of data is based on the fact that one source of the data may occasionally have some discrepancies over the years and the other source can be used to correct these discrepancies [Dimoso and Andrew 2021].

The choice of these variables (macroeconomic components) aligns with Tanzania's economic structure, which is built upon the agriculture sector. This sector requires massive transformation, heavy investment, and an improved global infrastructure system that will facilitate the smooth export of raw materials. Thus, trade liberalization is one of the components that facilitate trade and enhance the development of the export sector. On the other hand, trade liberalization indicates the major trade reforms that have been done in Tanzania from 1980 to 2019 to foster economic development and, more specifically, export sector performance [Utouh and Rao 2016]. Consider Tanzania's economic structure presented in Figure 2, which shows its economic dependence on major economic activities.
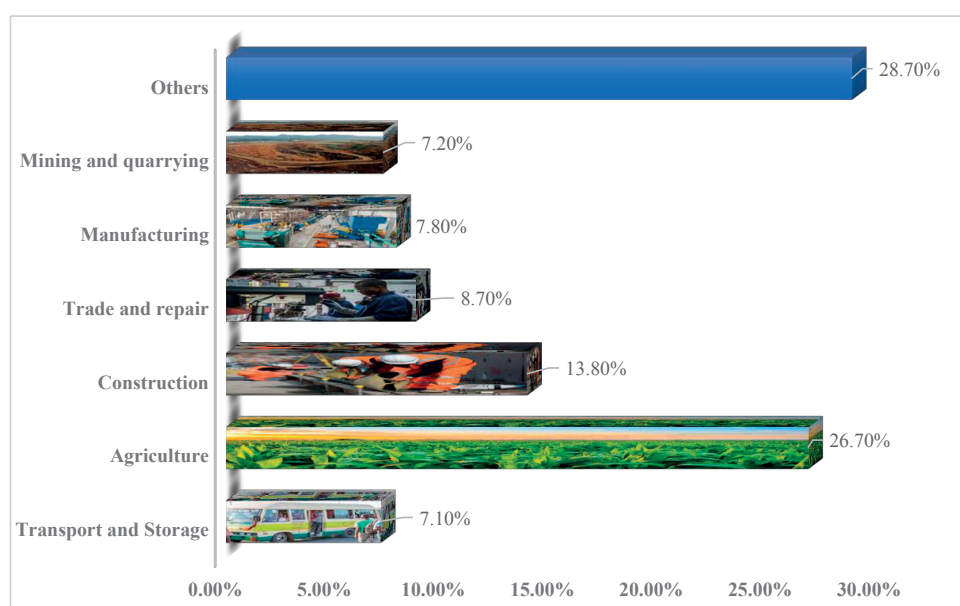

Fig. 2. Economic structure of Tanzania
Source: [Kitole and Utouh 2023].

Therefore, the macroeconomic data obtained from these sources (Table 1) were export performance (EP), exchange rate (EXR), foreign direct investment (FDI), and trade liberalization, which is measured by trade openness as a proxy. In a nutshell, export performance was measured in terms of the values of real exports, which represents the ratio of export to import value to the export-import price index. The choice of this variable is based on the fact that real exports represent the movement of exports and imports in real terms by eliminating the influence of price changes. On the other hand, the exchange rate herein presents the relative price of Tanzania's currency in terms of the dollar. For both small and large open economies, the exchange rate is an important economic variable in any international trade policy [Kitole and Utouh 2023]. Furthermore, foreign direct investment (FDI) used in this study represents an integral driver of economic growth and includes all investments made by foreign entities or individuals in Tanzania from 1980 to 2019.

The Autoregressive Distributed Lag Model (ARDL) was used in this study to examine and analyze the effects of trade liberalization on export performance in Tanzania. The model was developed by Pesaran and Shin [1999] and later enhanced by Pesaran et al. [2001] to examine the possibility of coin-tegration between variables. This model has several benefits. The first is that it can handle variables with a mixture of stationary and non-stationary time series, such as integrated orders of 1(0) or 1 (1). Second, because it involves only a single equation arrangement, the model is simple to use and interpret. The ability to assign different lag lengths to the model's variables is the third benefit. Another benefit is that it favors small sample sizes and is more adaptable because it can be used even before the cointegration test. Thus, even with the inclusion of the dynamic in the model and regardless of whether the regressors are endogenous, Appling's method will provide an unbiased estimate of the long-run and a valid t-test.

The following equation can be used to represent the general ARDL model:

$$\Delta lnTE_t = \alpha + \sum_{i=1}^{k+d} \beta \Delta lnTE_{t-1} + \sum_{i=1}^{k+d} \gamma \Delta lnTO_{t-1} +$$
$$\sum_{i=1}^{k+d} \varphi \Delta lnFDI_{t-1} + \sum_{i=1}^{k+d} \theta \Delta lnEXR_{t-1} + \lambda_1 lnTO_{t-i} +$$
$$\lambda_2 lnFDI_{t-i} + \lambda_3 lnEXR_{t-i} + \mu_t \qquad (1)$$

Where: $\Delta lnTE_t$ represents the first difference of the natural logarithm of total exports at time t, α is a constant term. Moreover, β, γ, φ, and θ are coefficients

Table 1. Description and measurement of variables

S/N	Variables	Variable prefix	Description	Measurement	Source
Dependent Variable					
1	Export performance (Real export)	EP	Ability to leverage its resources, goods, and services in an international market at a given point of time.	Real export value	World Bank
Independent Variables					
1	Exchange rate	EXR	Rate at which one currency will be exchange for another	Price index	World Bank
2	Foreign direct investment	FDI	investment owned by one country but entity based in another country	Net inflow of FDI (USD)	NBS
3	Trade Liberalization (Trade openness)	TO	Sum of import and export divided by gross domestic product	Total trade/GDP	World Bank

Source: Own elaboration.

representing the short-run effects of lagged variables on the dependent variable, while λ_1, λ_2, and λ_3 are coefficients representing the long-run effects of lagged variables on the dependent variable, μ_t is the stochastic error term, k is the optimal lag order, and d is the maximum order of integration of the variables. Additionally, this equation helps us understand how changes in the natural logarithm of total exports ($\Delta ln\ TE$) are influenced by past changes in total exports, trade openness ($\Delta lnTO$), foreign direct investment ($\Delta lnFDI$), and exchange rates ($\Delta lnEXR$). The model considers both short-run and long-run relationships, with lagged variables and error terms (μ_t) accounting for variations.

On the other hand, the long-run ARDL model is presented in equation 2:

$$lnTE_t = \beta_0 + \lambda_1 lnTO_{t-i} + \lambda_2 FDI_{t-i} + \lambda_3 EXR_{t-i} + \mu_t \tag{2}$$

Where: $lnTE_t$ represents the natural logarithm of total exports at time t, β_0 is a constant term, λ_1, λ_2, and λ_3 are coefficients representing the long-run effects of lagged variables on the outcome variable ($lnTE_t$), and μ_t is the stochastic error term. This equation focuses on the long-term relationship between the natural logarithm of total exports (TE) and its determinants, including trade openness (TO), foreign direct investment (FDI), and exchange rates (EXR). It provides insights into the sustained effects of these factors on total exports.

As a result, after obtaining the long run, the next step is to obtain the short run using an error correction model (ECM). The ARDL-ECM model can be stated as follows:

$$\Delta lnTE_t = \theta_0 + \theta_1 \Delta lnTE_t + \theta_2 \Delta lnTO_{t-1} + $$
$$\theta_3 \Delta lnFDI_{t-1} + \theta_4 \Delta lnEXR_{t-1} + \delta ECM_{t-1} + \varepsilon_t \tag{3}$$

Where: θ_0 represents a constant term, $\theta_1, \theta_2, \theta_3$, and θ_4 are coefficients representing the short-run dynamic effects, δ is the coefficient for the error correction term (ECM), ECM_{t-1} is the lagged error correction term, ε_t is the stochastic error term. The ECM term (δECM_{t-1}) measures the speed of adjustment in the short run, indicating how quickly the system corrects deviations from the long-run equilibrium. A negative sign for δ implies a correction towards equilibrium. The ARDL-ECM model explores short-run adjustments in total exports (TE) concerning its determinants. Changes in total exports are explained by short-term dynamics such as changes in trade openness (TO), foreign direct investment (FDI), exchange rates (EXR), and the error correction term (ECM). The error correction term captures the speed at which the system corrects deviations from the long-run equilibrium. In simpler terms, these equations help us understand how various factors impact total exports in both the short and long run, considering adjustments over time.

The coefficients $\theta_1, \theta_2, \theta_3$, and θ_4 are the short-run dynamic coefficients of the model's convergence to equilibrium.

Furthermore, in this study, the Granger causality test is used to determine the direction of estimated causality between variables, as well as the existence of causality within the variables [Granger and Engle 1987]. The Granger causality test is conducted when two pairs of model variables have achieved co-integration and are stationary [Pesaran et al. 2001]. It is used to determine the direction of estimated causality between variables and the presence of causality within the variables. To determine the direction of causation and identify which variable acts as a predictor for another variable, the Granger causality Wald test is applied.

Table 2. Descriptive Statistics Outcome Summary

Variable	Observation	Mean	Std. Dev	Min	Max
LnTE	40	21.32583	1.129003	19.78986	22.99107
LnTO	40	12.64377	0.5119562	11.39519	13.2507
LnFDI	40	18.74243	2.296862	12.10071	21.46323
LnEXR	40	5.939875	1.798576	2.104134	7.741968

Source: Own elaboration.

Table 3. Unit Root Test Outcomes by ADF-test and PP at level

Level form	Dickey-Fuller test		Phillips-Perron test		Conclusion
Variables	**test statistics**	**critical value**	**test statistics**	**critical value**	
Total export (TE)	–3.288	–3.544	–3.217	–3.544	not stationary
Trade Openness (TO)	–1.284	–3.544	–1.824	–3.544	not stationary
FDI	–4.166	–3.544	–4.251	–3.544	stationary
Exchange rate	–0.857	–3.544	–1.009	–3.544	not stationary
After first difference					
Level form	**Dickey–Fuller test**		**Phillips–Perron test**		**Conclusion**
Variables	test statistics	critical value	test statistics	critical value	
Total export (TE)	–4.767	–3.548	–4.836	–3.548	stationary
Trade Openness (TO)	–4.973	–3.548	–4.990	–3.548	stationary
FDI	–11.772	–3.548	–12.410	–3.548	stationary
Exchange rate	–3.722	–3.548	–3.691	–3.548	stationary

Source: Own elaboration.

This is accomplished by testing and estimating the Vector Error Correction Model (VECM), where the significance or insignificance of the independent variable at any lag indicates the presence or absence of a causal relationship from that variable to the dependent variable.

RESULTS

The descriptive statistics results in Table 2 are based on a 40-year observation period that spans from 1980 to 2019. Based on the export performance (lnTE) as the targeted variable, the maximum value is 22.99107, the minimum value is 19.78986, the mean value is 21.32583, and the standard deviation is 1.129003. It can be concluded that the export performance dataset is closely centered around the mean. Trade openness (lnTO) has a maximum value of 13.2507, a minimum value of 11.39519, and a mean value of 12.64377, all of which are close to the mean. FDI has a maximum value of 21.46323 and a minimum value of 12.10071, with a mean value of 18.74243. The exchange rate (lnEXR) has a maximum value of 7.741968 and a minimum value of 2.104134, with a mean value of 5.939875. These values are all relatively close to the mean.

On the other hand, to avoid the issue of erroneous regression, the Dickey-Fuller Test and PP Test were specifically used to determine whether the variables have a unit root [Dickey and Fuller 1981]. The outcomes of the unit root tests, specifically the Dickey-Fuller test and the Phillips-Perron test, were analyzed to assess the stationarity of the variables in the study, as presented in Table 3. The results show that at the level form, the test statistics for "Total export" (TE), "Trade Openness" (TO), "FDI", and "Exchange rate" were observed to be –3.288, –1.284, –4.166, and –0.857, respectively – with a critical value of –3.544 for all variables. None of the variables met the criterion for stationarity at the level form, indicating that "Total export", "Trade Openness", "FDI", and "Exchange rate" were non-stationary in this context. However, after first differencing, the test statistics for "Total export", "Trade Openness", "FDI", and "Exchange rate" were observed to be –4.767, –4.973, –11.772, and –3.722, respectively, with a critical value of –3.548 for all variables. As a result, all variables achieved stationarity after first differencing, providing a suitable foundation for reliable time-series analysis in the study.

Another important step was the selection of the optimal lag, which comes after testing for unit stationary. The lagged observations may be observed in both de-

Table 4. Lag length Selection Order Criterion

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	37.3951				1.1e-07	−1.85115	−1.77445	−1.62896
1	144.516	214.24	25	0.000	1.0e-09	−6.54377	−6.08356	−5.21061*
2	177.235	65.438	25	0.000	7.1e-10*	−6.98484	−6.14113*	−4.54072
3	203.953	53.436	25	0.001	8.3e-10	−7.083*	−5.85579	−3.52792
4	228.087	48.269*	25	0.003	1.5e-09	−7.03356	−5.42284	−2.36751

Note: asterisk sign (*) indicates lag order selected by the criterion

Source: Own elaboration.

Table 5. Outcomes of ARDL Model Regression

lnTE	Coefficient	Std. Err	T	$P>|t|$	[95% Confidence Interval]	
lnTE						
L1.	0.6246592	0.1257865	4.97	0.000	0.3655971	0.8837213
L2.	0.1973698	0.1125668	1.75	0.092	−0.0344658	0.4292054
LnTO						
---	0.6681393	0.1250368	5.34	0.000	0.4106150	0.9256637
L1	−0.4697486	0.1226511	−3.83	0.001	−0.7223533	−0.2171439
LnFDI						
--	0.0094394	0.0163574	0.58	0.569	−0.0242492	0.0431280
L1.	0.0831708	0.0180024	4.62	0.000	0.0460942	0.1202473
L2.	−0.0458935	0.0255117	−1.80	0.084	−0.0984359	0.0066488
LnEXR						
--.	−0.1593041	0.2554223	−0.62	0.538	−0.6853563	0.3667480
L1	0.9098248	0.3130098	2.91	0.008	0.2651690	1.5544810
L2	−0.5747903	0.1811779	−3.17	0.004	−0.9479332	−0.2016474
Constant	0.0004146	0.08749319	0.00	1.000	−1.8015410	1.802371

Source: Own elaboration.

pendent and independent variables. The ideal lag length is chosen using the command "varsoc". Table 4 shows the outcomes of selecting the ideal lag length. The study established the appropriate lag length for the model to be estimated before moving on to test for cointegration. This is important because the chosen number of lags can significantly impact cointegration analysis. The test was run by allowing a linear deterministic trend in the data and using lag 1 for a differenced endogenous variable.

Table 4 displays the results for the ideal lag length of the ARDL model. Four lags – FPE, AIC, HQIC, and SBIC – were chosen. AIC recommends 3 lags, SBIC recommends 1 lag, and FPE and HQIC recommend 2 lags. As a result, the majority of the selection criteria recommend that the study have two lags in this regard.

The results for the ARDL model presented in Table 5 were obtained based on the maximum lag selection of 2.

Moreover, the results indicate that the overall outcomes of the model are statistically significant from zero.

The results in Table 5 show that the lnTE is statistically significant at lags one and two at 1% and 10% levels of significance. The lnTO is statistically significant at lag one at a 1% level of significance. The lnFDI is statistically significant at lags one and two at 1% and 10% levels of significance. Lastly, the lnEXR is statistically significant at lags one and two at a 5% level of significance. The constant in the model indicates a positive impact and represents variables that are not included in the model but still affect Tanzania's export performance.

To estimate the long-run relationship between these macroeconomic variables, the ARDL bound test was employed. The bound test is based on the alternative hypothesis, which states that variables co-integrate (have a long-run relationship). It is accepted if the *F*-value is higher than the critical values at I(1). The co-integration justifies the use of the Error Correction Model (ECM) and ARDL. Therefore, the results in Table 6 show that there is a co-integrated relationship between the variables, given that the *F*-value is 5.432, which is greater than the critical values. Thus, we proceeded to estimate the ECM and ARDL models.

Table 6. Smith/Shin/Pesaran (2000) ARDL Bound Test Result

Test Statistics	Value	Critical Values	
	5.432	**I(0)**	**I(1)**
		2.45	3.52
F-test		2.86	4.01
		3.25	4.49
		3.74	5.06

Source: Own elaboration.

Additionally, to determine whether there is short-run or long-run equilibrium among variables, the ARDL bound test for cointegration was used. The results show that the lnTE indicates that the coefficient of trade openness is statistically significant and has a positive effect on export performance (lnTE) in the long run, with a coefficient of 1.114736 at a 1% level of significance (Table 7).

Furthermore, the coefficient of FDI is also statistically significant and has a positive effect on export performance in the long run, with a coefficient of 0.2624956 at a 5% level of significance. Lastly, the coefficient of exchange rate (lnEXR) is also statistically significant.

Table 7. Outcomes of ARDL bound test (Long run results)

Long run model coefficient		
Regressor	**Coefficient**	***P*-value**
Constant	0.0004146	1.000
LnTO	1.114736	0.008
LnFDI	0.2624956	0.049
LnEXR	0.98741	0.003

Source: Own elaboration.

Moreover, for the results presented in Table 8, in the short run, trade openness was found to have a positive sign (0.4697486) and was statistically significant at a 5% level of significance. FDI had a positive sign (0.0468935) and was statistically significant at a 10% level of significance. The exchange rate had a positive sign (0.5747903) and was statistically significant at a 1% level of significance. The Error Correction Mechanism (ECM) had a negative sign as expected (–0.177971). This indicates that the current year has adjusted for about 17% of the discrepancy from the previous year.

Table 8. Outcomes of ARDL bound test (Short run results)

Regressor	Coefficient	***P*-value**
LnTO		
D1	0.4697486	0.001
LnFDI		
D1	–0.0372772	0.164
LD	0.0468935	0.084
LnEXR		
D1	–0.3350345	0.157
LD	0.5747903	0.004
ECM	–0.1779710	0.000

Source: Own elaboration.

As a result, both variables are statistically significant and have both long- and short-term effects. The results of the ARDL bound test for cointegration also demonstrate that there is cointegration between the variables. With a *P*-value of 0.000 and a value for the Durbin-Watson test, the test for ARDL for error

Table 9. Granger Causality Test Results (VECM)

Independent Variables	Dependent Variables				Direction of causality
	–0.1173183	0.1299629	1.040848	0.0860158	
	(0.472)	(0.538)	(0.472)	(0.466)	
	0.2399275*	–0.0760433	1.699654	–0.3068741**	TO TE, TO EXR
	(0.082)	(0.670)	(0.165)	(0.032)	
	–0.0173805	–0.0456064**	–0.6531577***	0.0734417***	FDI TO, FDI EXR
	(0.347)	(0.017)	(0.000)	(0.000)	
	0.2968853*	0.8441512***	–0.0444925	0.7495153***	EXR TE, EXR TO,
	(0.089)	(0.000)	(0.977)	(0.000)	
	–0.0971593***	–0.0361717	0.0253654	0.0610701***	
	(0.000)	(0.247)	(0.906)	(0.000)	
Constant	0.0601617	–0.953106	0.0772432	0.0071788	
	(0.269)	(0.236)	(0.792)	(0.764)	

Note: *, ** and *** = significant at 10, 5 and 1% respectively

Source: Own elaboration.

correction model regression also demonstrates that the model is stable (1.929962).

Moreover, to determine whether a relationship between variables used in the study has a long- or short-term impact, the study uses the vector error correction model (VECM), whose results are presented in Table 9. Starting with export performance for each equation, the findings demonstrate that the error correction term ECT (t-1) is statistically significant at a 1% level with a *P*-value of 0.000, indicating the presence of a long-run causal effect on export performance. Findings for short-term causal effects indicate that trade openness (TO) is statistically significant at a 10% level with a *P*-value of 0.082, suggesting that TO contributes to export performance (TE) in the short term. Results for the second TO equation indicate that the error correction term, ECT (t-1), is statistically insignificant, indicating that TO has no long-term causal effect. However, the short-term data demonstrate that foreign direct investment (FDI) causes TO significantly at a 5% level of significance (*P*-value = 0.017). Additionally, the exchange rate (EXR) causes export performance and is statistically significant at a 1% level with a *P*-value of 0.000. However, results for the third equation of FDI show that the error correction term ECT (t-1) is statistically insignificant, indicating that neither a long-term nor a short-term causal effect of FDI on export performance exists.

The results for the fourth equation indicate that the error correction term ECT (t-1) is statistically significant at a 1% level with a *P*-value of 0.000, suggesting the existence of a long-run causal effect in the EXR at a 1% level of significance. And for the short term, *P*-values of 0.002 and 0.000 demonstrate that TO and FDI cause EXR at a 1% level of significance. Certain variables, such as trade openness (TO) granger cause export performance (TE), exchange rate (EXR) granger cause export performance (TE), FDI granger cause trade openness (TO), and FDI granger cause exchange rate (EXR), show a unidirectional relationship in the direction of variables, while the exchange rate (EXR) to TO is discovered to have a bidirectional relationship.

On the other hand, the study conducted an analysis to assess the presence of serial correlation in the model using the Durbin-Watson test. The obtained Durbin-Watson d-statistic of (4, 39) = 1.929962 indicates that there is no significant serial correlation present in the model. Consequently, the model is considered free from the issue of serial correlation, as supported by the results presented in Table 10 for the Breusch and Godfrey LM test for autocorrelation, which yielded a *P*-value of (0.8388). Thus, the evidence suggests that the model does not exhibit significant serial correlation, reaffirming the reliability and validity of the results obtained from the analysis.

Table 10. Durbin-Watson test

Test statistic	*P*-Values	dL (Lower Critical Value)	dU (Upper Critical Value)
1.929962	0.01	1.142	1.524
	0.05	1.329	1.473

Source: Own elaboration.

Since the calculated d-statistic of 1.929962 in Table 10 falls within the range of the critical values (1.142 to 1.524 at the 0.01 significance level and 1.329 to 1.473 at the 0.05 significance level), it indicates that there is no significant serial correlation in the model. Thus, the study's results suggest that the model is free from the problem of serial correlation.

Table 11. Results for Breusch-Godfrey LM test for Auto correlation

Lags (p)	Chi²	Df	Prob > Chi²
1	0.041	1	0.8388

Ho: no serial correlation

Source: Own elaboration.

Additionally, for heteroscedasticity, the White test was performed, and the results clearly demonstrate that the model is statistically significant, indicating that there is no issue with heteroscedasticity, as shown in Table 11. The *P*-value of 0.0141 is lower than the 5% level of significance.

Table 12. Outcomes of White's Test

Chi² (9)	=	20.68
Prob > Chi²	=	0.0141

Ho: Homoscedasticity; Ha: unrestricted heteroscedasticity

Source: Own elaboration.

Additionally, by taking into account the *P*-value of 0.0451 in the model, Cameron and Trivedi's Decomposition demonstrates that the model is free from heteroscedasticity. Tables 12 and 13 make this very evident.

Table 13. Outcomes of Cameron and Trivedi's Decomposition of LM-Test

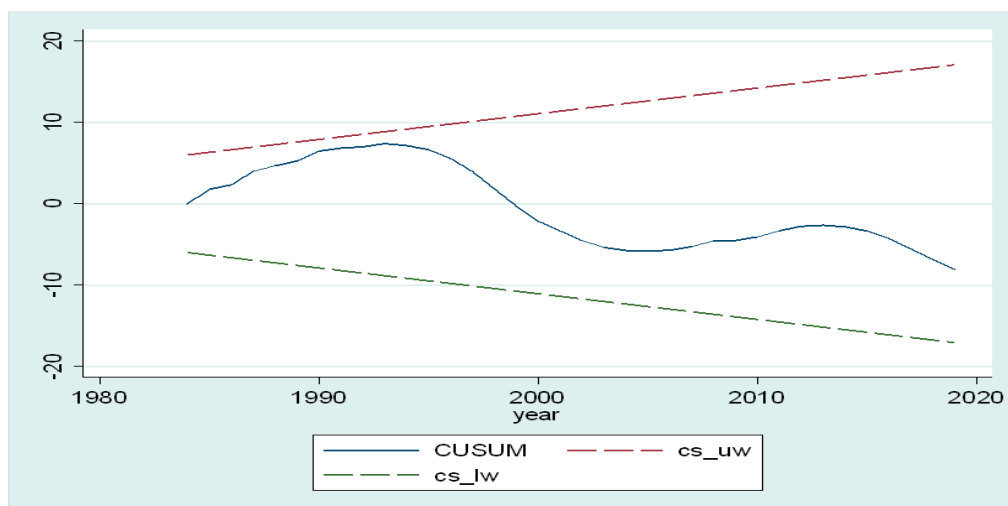| Source	Chi²	*df*	*P*
Heteroscedasticity Skewness Kurtosis	20.6	9	0.0141
	1.98	3	0.5775
	0.07	1	0.7980
Total	22.73	13	0.0451

Source: Own elaboration.

Fig. 3. Results for a CUSUM test
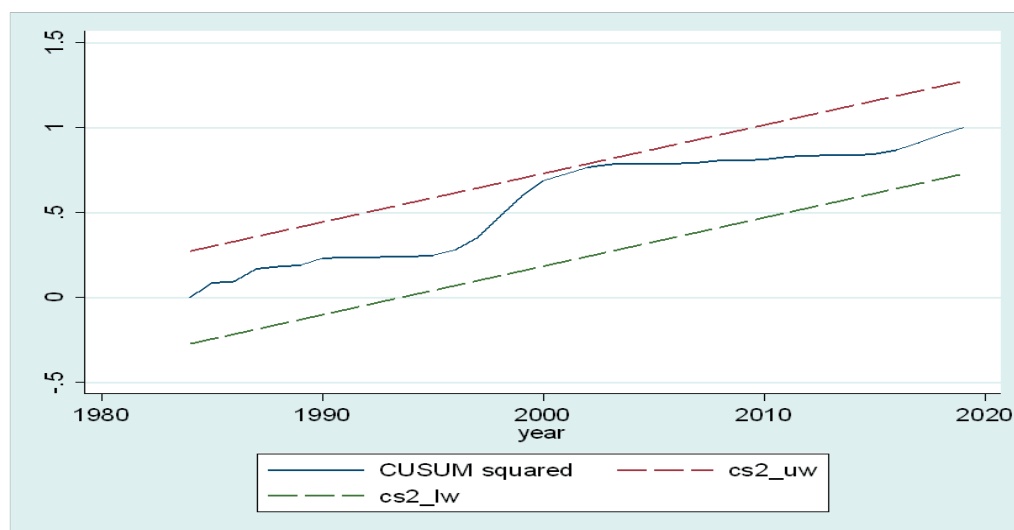
Source: Own elaboration.

Fig. 4. Results for a CUSUM SQUARE test

Source: Own elaboration.

Generally, it is essential to ensure the stability, correct functional form specification, and avoidance of serial correlation and heteroscedasticity of the model in order to ensure the strength of the results. It is accurate to say that the Durbin Watson, Breusch-Godfrey, and LM tests are used to test for serial correlation, and Cameron and Trivedi's Decomposition of the LM test confirms the absence of serial correlation. The diagnostic test results indicate that there is neither serial correlation nor heteroscedasticity.

The model is stable, and there are no issues with functional specification, according to the findings of the model stability test. The CUSUM result shows that the models used in this study are stable at a 5% level of significance, as both the CUSUM (Fig. 3) and the CUSUM square (Fig. 4) fall within the 5% level of significance.

DISCUSSION

The findings of the study have shown that the F-statistics are higher than the critical value, and the results of the ARDL bound test show that there is a long-term relationship between export performance, trade openness, FDI, and the exchange rate. As a result, the results contradict the null hypothesis, according to which there is no correlation between export performance, trade openness, FDI, and the exchange rate.

The results of the ARDL bound test showed that export performance, trade openness, FDI, and the exchange rate all have a long-term relationship. The F-statistics is higher than the critical value. Consequently, the results contradict the null hypothesis, according to which there is no correlation between export performance, trade openness, FDI, and the exchange rate.

Trade openness, FDI, and the exchange rate all show positive trends over the long term and are statistically significant, which suggests that a 1% rise in any of these factors improves export performance. The long-run association finding is consistent with prior research such as Ismail and Lwesya [2021], Mohsen and Chua [2020], Hassan et al. [2016], and Ahmed et al. [2014], which found long-run links between export performance, trade openness, FDI, and the exchange rate.

All variables display positive signs in the short term as expected, while ECM also exhibits a negative sign as anticipated. Assuming other factors are constant, this suggests that factors are swiftly changing from the short run to the long run (equilibrium). At a 5% level of significance, the error term is statistically significant and has a negative sign (–0.177971). This outcome is consistent with those reported by Iheanacho [2017], Kingu [2014b], and Ahmed [2000]. The conclusion of a short-run association confirms the findings of past studies that export performance, trade openness, FDI, and the exchange rate exhibit long-run relationships [Chaudhry et al. 2010, Ahmed et al. 2014, Iheanacho 2016].

The VECM results in Table 9 demonstrate that there are both long- and short-term causal relationships between the variables, with trade openness having a 10% significance impact on both short- and long-term export performances. The exchange rate (EXR) and FDI both contribute to trade openness, with the former being statistically significant at a 5% level of significance with a P-value of 0.017 and the latter at a 1% level with p-values of 0.000. According to the FDI data, the error correction term ECT (t-1) is statistically negligible, suggesting that there is no short- or long-term causal effect on FDI. The findings of the fourth equation indicate that the error correction term ECT (t-1) is statistically significant at a 1% level with a P-value of 0.000, suggesting the existence of a long-run causal effect in the exchange rate at a 1% level of significance. The findings in Table 9 using VECM indicate a long-run and short-run causal relationship between variables. Specifically, trade openness causes export performance at a 10% level of significance in both the short run and long run. FDI also causes trade openness, and this relationship is statistically significant at a 5% level of significance with a P-value of 0.017. The exchange rate (EXR) has a causal effect on trade openness and is statistically significant at a 1% level with a P-value of 0.000.

The results for FDI indicate that the error correction term is statistically insignificant, suggesting no long-run causal effect of FDI and no short-run effect either. On the other hand, the results for the fourth equation show that the error correction term is statistically significant at a 1% level with P-values of 0.000, indicating the presence of a long-run causal effect of the exchange rate at a 1% level of significance.

Furthermore, the short-run data demonstrate that trade openness and FDI have a significant impact on the exchange rate at a 1% level of significance, with P-values of 0.002 and 0.000, respectively. These findings are supported by the granger causality results in Table 9, which suggest that the VECM model is appropriate. Moreover, the results from the VECM indicate a unidirectional causal relationship between the variables. Specifically, trade openness influences export performance but does not affect trade openness, FDI influences trade openness but does not affect FDI, and the exchange rate influences export performance but does not affect the exchange rate. However, there is a bidirectional causal relationship between trade openness and the exchange rate, with trade openness affecting the exchange rate and the exchange rate affecting trade openness. These findings are consistent with previous studies by Ratnaike [2012], Ghani [2011], Babatunde [2009], Malik [2007], Bashir [2003], and Ahmed [2000], which hypothesized both unidirectional and bidirectional causality between the variables.

The implementation of trade liberalization policies has led to a reduction in trade barriers, attracting investors from various nations. The empirical findings of the ARDL bound test also demonstrate that FDI has a positive and statistically significant impact in both the long and short term. Specifically, Tanzania's export performance increases by 4% in the short term and by 26% over the course of a year for every 1% increase in FDI. These findings align with previous studies by Ismail and Lwesya [2021], Iheanacho [2016], Manamba [2016], and Ahmed et al. [2014], which found a positive relationship between FDI, trade openness, and export performance. This suggests that as trade barriers are reduced, more investors, capital, and advanced technology are encouraged to invest, leading to the production of high-quality products that can be exported, thus boosting a country's export performance.

CONCLUSIONS

Using a time series analysis methodology, the primary objective of this study was to examine the impact of trade liberalization on Tanzania's export performance since its inception in 1980. The study's findings shed light on the intricate interplay between trade liberalization, foreign direct investment (FDI), exchange rates, and export performance in the context of Tanzania.

The analysis indicates a significant positive correlation between trade liberalization and subsequent export performance. Over time, trade liberalization has played a crucial role in facilitating a significant increase in export quantities. This has enabled businesses in Tanzania to effectively engage with global markets and exploit new opportunities. These findings underscore the importance of continuous government support for trade liberalization policies, which are essential for fostering economic growth and enhancing Tanzania's competitive edge in the global marketplace.

Furthermore, the research highlights the significant impact of FDI on export expansion. Increased FDI inflows not only facilitate the production of high-quality products but also attract both domestic and foreign buyers, stimulating export expansion. To maximize the potential benefits of FDI, the government must create an investor-friendly climate by liberalizing markets and implementing policies that provide incentives for both novice and diaspora investors. The establishment of Investment Promotion Agencies is considered a strategic measure to attract foreign investors and increase FDI inflows, fostering export sector expansion. Therefore, the government should finance these agencies to improve their performance and attract more foreign investors.

Additionally, the research demonstrates the interdependencies between trade liberalization and FDI strategies, emphasizing the need for effective collaboration between these two factors to optimize export outcomes. Trade liberalization is more effective when accompanied by complementary policies that support FDI. An integrated approach to these policies has the potential to spark investor interest, promoting sustainable export growth and Tanzania's economic development. The study revealed a reciprocal relationship between trade liberalization and exchange rates, emphasizing the importance of competent exchange rate management in enhancing export competitiveness. The government can stimulate export-driven growth in Tanzania by maintaining a favorable exchange rate, making Tanzanian exports more appealing to international buyers. To further support the expansion of export-oriented industries, policymakers must carefully consider exchange rate policies and ensure their alignment with trade liberalization efforts.

Based on empirical evidence, several practical recommendations can be made to policymakers, regulatory bodies, and entrepreneurs. To encourage the expansion of exports and economic diversification, policymakers need to prioritize and strengthen trade liberalization measures. Additionally, the government must create an environment that attracts foreign direct investment and facilitates the transfer of technology and knowledge. Investment promotion agencies, on the other hand, can significantly contribute to attracting foreign investors and establishing strategic partnerships, thus boosting export performance.

In conclusion, this study provides a comprehensive understanding of the positive effects of trade liberalization on Tanzania's export performance, underscoring the importance of collaboration among policymakers, regulatory bodies, and business owners. Tanzania has the potential to achieve consistent economic growth, enhance its export competitiveness, and establish a stable position in the global market through strategic utilization of trade liberalization and foreign direct investment (FDI).

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WPŁYW LIBERALIZACJI HANDLU NA WYNIKI SEKTORA EKSPORTOWEGO W TANZANII – ANALIZA SZEREGÓW CZASOWYCH 1980–2019

STRESZCZENIE

Cel: Celem artykułu jest lepsze zrozumienie konsekwencji liberalizacji handlu dla wyników eksportu Tanzanii. Ponieważ większość przeprowadzonych badań – niewielka liczba w krajach rozwijających się i część w krajach rozwiniętych – przyniosła mieszane wyniki, a relacje różnią się w zależności od kraju, niemożliwe jest udzielenie ostatecznej odpowiedzi na pytanie, czy liberalizacja handlu ma wpływ na sektor eksportowy Tanzanii bez uprzedniego przeprowadzenia analizy empirycznej. **Metody:** W badaniu zastosowano ilościowe metody badań, ponieważ pozwalają one na większą liczebność próby oraz lepszą obiektywność i dokładność. Ze względu na charakter badania i wykorzystane dane wybrano metodę badania statystycznego, w ramach którego uzyskano dane makroekonomiczne za lata 1980-2019 z Banku Światowego i Biura Statystycznego Tanzanii w celu analizy wpływu liberalizacji handlu na wyniki eksportu za pomocą wektorów korekcji błędów i autoregresyjnego rozproszonego opóźnienia. **Wyniki:** Przeprowadzone analizy ujawniają istotną dodatnią korelację pomiędzy liberalizacją handlu a wynikami eksportu oraz współzależności pomiędzy liberalizacją handlu a strategiami bezpośrednich inwestycji zagranicznych (BIZ). Istnieje wzajemna zależność pomiędzy liberalizacją handlu a kursami walutowymi, co wskazuje na znaczenie umiejętnego zarządzania kursami walutowymi w zwiększaniu konkurencyjności eksportu. **Wnioski:** Z badania wynika, że liberalizacja handlu, BIZ i wyniki eksportu wykazują pozytywną, długoterminową korelację. Skrupulatnie realizowana polityka liberalizacji handlu jest kluczowa nie tylko dla rozbudowy sektora przemysłu eksportowego i napływu kapitału, ale także dla transformacji i rozwoju narodu.

Słowa kluczowe: handel międzynarodowy, liberalizacja handlu, model wektorowej korekcji błędów (VECM), autoregresyjne rozproszone opóźnienie (ARDL), ekonomia międzynarodowa, wzrost gospodarczy

INSTRUMENTS MITIGATING THE NEGATIVE EFFECTS OF THE COVID-19 PANDEMIC IN AGRICULTURE

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ABSTRACT

Aim: The aim of the study is to identify and characterize agricultural policy instruments employed to mitigate the adverse effects of the COVID-19 pandemic in Poland. It also aims to propose new and modified state policy instruments to counter the pandemic's negative consequences in agriculture. **Methods:** We employed a qualitative approach using expert reviews to refine agricultural policy instruments aimed at mitigating the adverse effects of the COVID-19 pandemic. Fifteen independent experts critically evaluated our internally formulated instrument proposals, providing in-depth feedback and assessments. These expert assessments were conducted in June-July 2023. **Results:** The primary entities that provide public financial support for agriculture in Poland are the Agency for Restructuring and Modernisation of Agriculture (ARiMR), the Agricultural Social Insurance Fund (KRUS), and the National Support Centre for Agriculture (KOWR). The study developed and refined a range of instruments to counteract the detrimental effects of pandemics on agriculture. These tools, refined through expert insights, address key challenges such as market access, labor availability, logistical issues, and health risks in farming activities. The Integrated Agricultural Platform (IAP), Anti-Crisis Agricultural Fund (ACAF), and other state-supported initiatives constitute a comprehensive strategy designed not only to alleviate immediate impacts, but also to strengthen long-term resilience. **Conclusions:** This proactive and multifaceted approach is essential to ensure the stability and sustainability of the agricultural sector in the face of potential future health crises, including pandemics.

Keywords: COVID-19 pandemic, agriculture, agricultural policy, public support, support instrument

JEL codes: H20, Q10, Q14

INTRODUCTION

The COVID-19 pandemic has posed a worldwide challenge, requiring attention from researchers, policymakers, and governments across various dimensions that extend well beyond the health and well-being implications of the pandemic [Lambert et al. 2020]. The outbreak of the coronavirus disease 2019 (COVID-19) in early 2020 significantly impacted the global economy [Baldwin and Tomiura 2020, Czech et al. 2020]. The COVID-19 pandemic precipitated an unprecedented global crisis, with profound implications across all sectors of the economy. Agriculture, a cornerstone of global food security and a major economic driver in many countries, was not immune to these disruptions. COVID-19 has had a significant impact on agriculture and food systems, affecting aspects ranging

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from production and production costs to food security [Siche 2020, Jędruchniewicz and Wielechowski 2023].

The immediate effects included labor shortages due to mobility restrictions, the closure of food markets, and changes in consumer demand patterns, resulting in both food wastage and increased food insecurity [Torero 2020]. The pandemic also highlighted the fragility of the global food system, emphasizing the need for greater resilience and sustainability in agricultural practices [Béné 2020]. In response to these challenges, governments worldwide deployed various public support instruments aimed at mitigating the negative impacts of the pandemic on agriculture. These measures ranged from providing financial assistance to making policy adjustments, aiming to stabilize markets, ensuring the continuity of food supply, and safeguarding the income of farmers. The reason for such interventions was based on the strategic importance of agriculture for national and global food systems, as well as its role in rural development and environmental stewardship.

The aim of the study is to identify and characterize agricultural policy instruments used to mitigate the adverse effects of the COVID-19 pandemic in Poland and formulate proposals for new and modified state policy instruments to counter the negative consequences of the pandemic in agriculture. The paper is structured as follows: following this introduction, the next section provides the literature review. The subsequent section presents the materials and research methods used. The results section reports the empirical findings. Finally, the paper offers our conclusions.

LITERATURE REVIEW

The COVID-19 pandemic has required the use of various public support measures to mitigate its negative impact on agriculture. These measures have played a crucial role in meeting the immediate needs of the agricultural sector and laying the foundation for recovery and resilience. Governments worldwide have been urged to enhance public awareness and implement region-specific mitigation strategies to safeguard food security and support smallholder farmers [Gostic et al. 2020; Kent et al. 2022]. Studies have emphasized the importance of coordinated public-private sector approaches in managing the pandemic's effects on sustainable development and the global economy [El Keshky et al. 2020]. Evidence indicates that less strict interventions can lead to increased fatalities, while more severe responses may reduce them, providing guidance for policymakers [Chisadza et al. 2021]. The effectiveness of government policy responses is crucial in controlling the spread of the virus and ensuring the sustainability of agricultural systems [Padhan and Prabheesh 2021].

One of the primary forms of support has been financial assistance and subsidies. Many governments have provided direct payments to farmers to compensate for lost income and help them maintain their operations. These payments have been crucial in enabling farmers to continue producing food despite the disruptions caused by the pandemic [OECD 2021]. Studies evaluating these measures have found that while they provided immediate relief and supported agricultural production, their effectiveness varied depending on the targeting and distribution mechanisms [Barrett 2020]. In some cases, there have been criticisms concerning the equitable distribution of funds and the adequacy of support provided [Glauber et al. 2020].

Policy adjustments have also been significant forms of support. Measures such as loan deferrals, tax reliefs, and amendments to existing agricultural policies have been implemented to provide relief to farmers and agribusinesses. Market stabilization efforts, including the purchase of surplus produce and the facilitation of distribution to areas in need, have helped address the imbalances caused by sudden changes in demand. However, the effectiveness of these interventions has relied on timely implementation and the ability to reach the most impacted segments of the sector [OECD 2021].

Interventions to maintain the functionality of supply chains have been another critical area of support. These have included measures to ensure the movement of agricultural goods across borders and to protect the health of workers in the food supply chain. Investments in logistics and infrastructure to adapt to changing conditions have also been part of the re-

sponse [FAO 2021]. The facilitation of cross-border movement of agricultural goods and the protection of supply-chain workers have helped prevent severe food shortages. However, the long-term effectiveness of these measures will likely depend on continued investment in supply-chain infrastructure and the adoption of more flexible and resilient supply-chain models [Laborde et al. 2021].

The pandemic has accelerated the adoption of technology and innovation in agriculture. Public support has been provided for digital solutions that connect producers with consumers, for the adoption of precision agriculture technologies, and for research into more resilient agricultural practices. The promotion of technological solutions has yielded mixed effectiveness. While technology has the potential to transform agriculture, the adoption rates and impact of such innovations have varied significantly across regions and types of farming operations. The digital divide continues to be a significant barrier to the widespread adoption of technology in agriculture [Badiane et al. 2021, Dayioglu and Turker 2021].

The effectiveness of these public support instruments is the subject of ongoing evaluation. While they have provided essential relief to the agricultural sector, there is a need to assess their long-term impact on sustainability and resilience. Studies are starting to emerge that analyze the results of these interventions and offer recommendations for future crises [Schmidhuber et al. 2020]. The long-term impact of support measures on the sustainability and resilience of the agricultural sector is still being evaluated. Some scholars argue that although the support measures were necessary, they must be aligned with sustainable development goals to ensure that the agricultural sector can withstand future shocks [Vos et al. 2022].

The COVID-19 pandemic has highlighted the vulnerability of agricultural workers and the need for protective resources [Chicas et al. 2021], as well as the importance of a farming systems approach to understanding the impacts on livelihoods and social well-being [Middendorf et al. 2021]. The lessons learned from the crisis could inform the development of sustainable agro-policies and decision-making to enhance the resilience of agricultural systems to future pandemics [Kumar et al. 2020].

The literature on public support instruments for agriculture during the COVID-19 pandemic has identified several research gaps. While the socioeconomic and finance-related impacts of the pandemic have been recognized as areas needing immediate research with strong policy importance [Narayan 2021], a need for a conceptual framework to discuss the impact of COVID-19 on agriculture and rural livelihoods [Morton 2020] has also been emphasized. In addition, the biodiversity crisis caused by agriculture, which is a leading factor in the emergence of COVID-19, suggests that a global effort similar to the Paris Agreement is necessary to prevent future pandemics [Baudron and Liégeois 2020].

MATERIAL AND METHODS

In this study, we used a qualitative approach called expert review to refine agricultural policy instruments intended to mitigate the adverse effects of the COVID-19 pandemic. This method involves gathering opinions, comments, and ratings from individuals with specialized knowledge in a specific field. It is a form of qualitative research where experts evaluate the proposal based on their knowledge and experience. The process began with a comprehensive literature review and a survey-based study that used standardized interview questionnaires. This initial phase involved a group of 50 experts from agricultural organizations and economic agricultural advisors, with the goal of developing preliminary proposals for the instruments. These self-developed proposals were then evaluated by 15 independent experts, each providing detailed assessments and feedback. The experts, chosen through purposive sampling, included 9 from various agricultural organizations and 6 academic experts specializing in issues related to the agri-food sector. This enabled us to gather opinions from a wide range of experts, both practitioners and theorists. In the document containing proposals for new instruments addressing the main problems in Polish agriculture related to the pandemic, experts provided either positive or negative assessments and

were also able to submit comments and suggestions. Throughout the study, experts were encouraged to freely express their opinions and comments, which allowed us to gather detailed and specialized information. This information was then used to further develop and refine the proposed support instruments. We distributed the proposed instruments to 15 experts via email for evaluation, and received their assessments through the same channel. With the input from these experts, we revised the instruments, making necessary corrections to enhance their relevance and applicability. This methodological approach was instrumental in developing well-informed and expert-validated policy instruments that are essential for addressing the challenges faced by the agricultural sector during future crises, including pandemics. The experts' assessment was conducted in June-July 2023. Furthermore, the study employed various research methods, including critical literature analysis, a descriptive approach, the comparative method, and verbal logic.

RESULTS AND DISCUSSION

In the period of 2020–2021, the agricultural sector in Poland faced significant challenges due to the COVID-19 pandemic. Efforts to mitigate the negative economic impact of the crisis on this sector involved the allocation of financial assistance from various sources. In response to the COVID-19 pandemic, the Polish government increased its support for agricultural holdings and introduced new instruments while modifying some of the previously used ones [Jędruchniewicz 2022b, Jędruchniewicz and Wielechowski 2022].

The primary entities providing public financial support for agriculture in Poland were the Agency for Restructuring and Modernisation of Agriculture (ARiMR), the Agricultural Social Insurance Fund (KRUS), and the National Support Centre for Agriculture (KOWR). ARiMR played a crucial role in coordinating and distributing financial resources to farm producers, offering them tailored support programs designed to address the unique needs of the sector. At the same time, KRUS provided assistance in insurance and social benefits, while KOWR was involved in in-

itiatives to stabilize agricultural markets. Importantly, agricultural producers not only received sector-specific aid but also had access to broader business-oriented support measures at the national level. The following is an overview of the state aid programs and instruments provided to Polish agriculture, including an examination of the extent and composition of this support, categorized by the supporting entity.

In response to COVID-19, financial support for agriculture in Poland, funded by the Agency for Restructuring and Modernisation of Agriculture (ARiMR), was implemented through the Rural Development Programme for 2014–2020 and national aid instruments.

Under the Rural Development Programme for 2014–2020, the measure M21 – Exceptional Temporary Support for Farmers, Micro-Enterprises, and Small- and Medium-Sized Enterprises particularly affected by the COVID-19 crisis (Support for Farmers Particularly Affected by the COVID-19 Crisis) – was implemented. This support was aimed at farmers specializing in the production of beef, milk, pork, poultry for slaughter and breeding, and ornamental plants cultivated under cover. The objective was to compensate for losses caused by COVID-19 and to encourage the continuation of production. The aid was provided as a one-time lump sum payment [ARiMR 2022a, b].

Under the national aid framework, funds were allocated through five actions from the Temporary State Aid Framework Programme:
- Polish anti-crisis measures – COVID-19 – interest rates subsidies (for farmers). Assistance was provided in the form of interest subsidies, with a total budget execution amounting to 0.51 million PLN in 2020 and 2021 [European Commission 2020d];
- COVID-19: Aid scheme for agricultural producers who are at risk of liquidity loss as a result of agricultural market restrictions due to COVID-19. Support was provided in the form of direct grants, with the total budget implementation reaching PLN 396.73 million for the years 2020 and 2021 [European Commission 2020c];
- Aid for producers of ornamental plants (chrysanthemums) threatened by a loss of liquidity due to restrictions on the agricultural market caused by the

COVID-19 epidemic. Support was provided in the form of direct grants, with the total budget implementation reaching 70.33 million PLN for the years 2020 and 2021 [European Commission 2020b];

- Aid for pig producers who are threatened with a financial liquidity loss due to restrictions on the agricultural market caused by the COVID-19 outbreak. Support was provided in the form of direct grants, with the total budgetary execution amounting to 127.83 million PLN in 2021 [European Commission 2020a];

- Aid for pig sow producers who are threatened with a loss of financial liquidity due to restrictions on the agricultural market caused by the COVID-19. Support was provided in the form of direct grants. There is a lack of data regarding budget execution, which stood at 88 million euros [European Commission 2022].

During 2020–2021, Polish farmers received the largest financial support from ARiMR as a result of the COVID-19 pandemic under the Rural Development Programme (RDP) 2014-2020. This support amounted to 1.2 billion PLN, which accounted for two-thirds of the total assistance provided by ARiMR for COVID-19. Under the RDP, around 195,000 applications for support were submitted by agricultural producers in Poland who were affected by the COVID-19 crisis during 2020–2021, and the number of unique beneficiaries was approximately 180,000. The remaining support amount, PLN 595 million , came from the aforementioned five actions under national aid, with the largest expenditure being under the action "COVID-19: Aid Programme for Agricultural Producers at Risk of Losing Liquidity Due to Restrictions in the Agricultural Market Related to COVID-19", totaling almost PLN 397 million.

- Throughout the COVID-19 pandemic, KRUS introduced and adapted various support instruments for farmers. These included [Jędruchniewicz 2022a] among others:

- exemption from paying social security contributions;

- COVID-19 related benefits. Several new benefits and modifications to existing benefits were introduced in response to the pandemic, including:

- COVID-19 related caregiving benefits;
- benefits for mandatory quarantine, epidemiological supervision, or hospitalization due to COVID-19;
- COVID-19 related sickness benefits;
- post-COVID-19 rehabilitation.

During the years 2020–2021, KRUS allocated a total of nearly 365 million PLN for actions directly related to COVID-19. In 2020, which was the period of the pandemic's highest activity, KRUS disbursed the largest amount of COVID-19 related benefits to farmers, amounting to PLN 213.2 million. In 2021, expenditures on these benefits totaled PLN 151.6 million. The value of the care benefits paid by KRUS in relation to COVID-19 constituted over two-thirds of the total funds dedicated to actions directly associated with the coronavirus pandemic. Expenditures on benefits related to quarantine, epidemiological supervision, or hospitalization due to COVID-19 amounted to PLN 114.1 million. Meanwhile, the total amount of sickness benefits related to COVID-19 paid out in 2020–2021 was PLN 3.3 million.

A significant part of the activities of the National Support Centre for Agriculture (KOWR) in 2020 and 2021, directly or indirectly, involved public support actions aimed at limiting the negative effects of the pandemic in agriculture. However, as asserted by the KOWR board, the number of actions exclusively related to the occurrence of COVID-19 and combating the pandemic was limited. The activities of KOWR directly related to mitigating the effects of COVID-19 in 2020–2021 primarily included [KOWR 2021, 2022]:

- support for producers of ornamental plants (chrysanthemums) threatened with financial liquidity loss due to market restrictions in agriculture caused by the COVID-19 epidemic;
- management of movable property from registered pledges;
- analytical work.

A critical review of the literature and the qualitative approach in the form of expert reviews allowed for the identification of the following five key areas in relation to the occurrence of the COVID-19 pandemic:

- restrictions on the sale of agricultural products, leading to a reduction in farm incomes;

- challenges with worker availability;
- logistical issues and the availability of production resources;
- illnesses, quarantine, or isolation affecting farmers;
- heightened risk in agricultural activities.

In light of these specified issues, initial drafts were established for new and adjusted instruments aimed at reducing the negative consequences of future pandemics in the agricultural sector. These drafts were presented to 15 experts from academic circles and agricultural organizations. In general, the proposed instruments received a positive assessment. Simultaneously, the experts provided their reflections, inquiries, and objections. All feedback was thoroughly examined. Integrating the experts' feedback and hesitations led to the development of the final version of instruments aimed at mitigating the adverse effects of future pandemics in agriculture. These instruments would complement a broad spectrum of existing instruments in agricultural policy.

To address the obstacles related to the first area, namely restrictions in the sale of agricultural products and/or reduction of farm incomes, the following instruments were proposed:
- The Integrated Agricultural Platform (IAP) was created by a government institution. The module of this platform would serve to match agricultural producers' offers with the demand of food buyers. It would enable transactions and contain only information for direct contact with producers;
- The Anti-Crisis Agricultural Fund (ACAF) would be financed half by agricultural producers through mandatory contributions (e.g., 0.5% of direct payments) and half by the state budget. Producers would be compensated for losses incurred due to the pandemic from this fund. Once ACAF reached a certain value, the payment of contributions would be suspended. The resumption of paying contributions would occur when the Fund decreased to a specified minimum value;
- The accelerated and expanded emergency procurement of agricultural products would take place during the pandemic, subject to the approval of the European Commission. It would be implemented

in all sectors particularly affected by the pandemic and would concern a specified amount of agricultural produce per hectare. It would be initiated after a drop in sales in sectors beyond a previously determined percentage;
- Legal regulations are being implemented to promote wider liberalization of rules concerning the processing and direct sale of products by farmers or smaller processors.

To address the problem related to the availability of workers, the following instrument proposals would be useful:
- The Integrated Agricultural Platform (IAP) was created by a government institution. This platform's module is designed to match the labor demands of agricultural farms with individuals seeking seasonal or long-term employment. The information in this module should be linked with data held by District Labor Offices;
- A regularly updated list of countries with preferences for temporary employment in agriculture would be included as an element of the Integrated Agricultural Platform. This list would inform which countries can send people to work in agriculture during the pandemic, based on simplified procedures for issuing short-term work permits;
- State co-financing during the pandemic would cover costs related to employment in an agricultural farm. This co-financing would apply to workers employed under a contract for specific work, which is concluded for the period of a farmer's inability to work, as well as to individuals working in the farm who are members of his family, and persons employed under an employment contract. The inability to work of these individuals would have to result from the pandemic.

For more effective coping by agricultural producers with logistical problems and the availability of means of production during the pandemic, the following instrument proposals could be used:
- Crisis reserve of agricultural production resources. The minimum level of essential agricultural production resources and sanitary supplies would be jointly managed by the Government Strate-

gic Reserves Agency and the Material Reserves Agency. These resources, along with straightforward rules for their activation, would be available in every voivodeship;

- Financial support for direct sales of agricultural products. Increased funding during the pandemic would be allocated to farmers to support the necessary activities for initiating and conducting direct sales, such as co-financing the purchase of equipment.

Another significant problem during the pandemic is the illness, quarantine, or isolation of farmers. In this case:

- The Integrated Agricultural Platform (IAP) could help in addressing this problem. One module of this platform would serve to provide information about farmers and their family members who are ill, in quarantine, or in isolation, which can disrupt agricultural production on the farm. Government agencies equipped with resources would provide the necessary technical assistance. The information in this module should be linked with the data held by the Sanitary Inspection and the Agricultural Social Insurance Fund.

Meanwhile, to reduce the fifth problem (increasing the risk of agricultural activities), the following instruments were proposed:

- An information package on sanitary safety in agriculture would be an essential component of the Integrated Agricultural Platform. This package would be regularly updated and provide guidelines for ensuring the safe organization of work on farms and the sale of agricultural products during the pandemic, specifically focusing on sanitary safety measures;
- Free training on risk management in agricultural activities would be conducted by government agencies. This training would encompass the implementation of risk management strategies in farm activities. It could be included as part of a broader training program on agricultural producers' economics.

Support for agriculture during the pandemic, in addition to new and modified agricultural policy instruments, would also include state actions: providing assistance to agricultural producers in implementing new sanitary safety rules, supporting exporters in maintaining access to international markets, supporting the expansion of warehouses and storage systems for agricultural products, promoting cooperation with local agricultural organizations and regional and local food solutions, facilitating rapid improvement of liquidity for agricultural farms during the pandemic, expanding and improving infrastructure within the so-called "privileged corridors" to ensure the flow of goods and agricultural production means, supporting farmers in applying risk management strategies, and launching programs to increase agricultural productivity and the ability to sell agricultural products using modern technologies.

The effectiveness of proposed agricultural policy instruments in mitigating the adverse effects of the COVID-19 pandemic has been extensively studied globally. Our research partially aligns with the findings of Baležentis et al. [2021], who emphasize the importance of alleviating financial burdens through measures such as credit payment deferral, particularly in agricultural supply chains. This approach corresponds to our proposal of the Anti-Crisis Agricultural Fund (ACAF). Both proposals aim to increase the financial resilience of farms during the crisis. The proposal of Baležentis et al. [2021] focuses on leaving more financial resources on farms. However, our proposal focuses on the direct provision of funds by ACAF to farmers during crises caused by the pandemic. Furthermore, the significance of enhancing resilience and sustainability in the agricultural sector, as suggested by Bochtis et al. [2020], supports our recommendation for the Integrated Agricultural Platform (IAP). This platform can facilitate physical distancing and promote hygiene practices among agricultural workers, addressing the challenges identified in our survey. Lioutas and Charatsari [2021] highlight the role of resilience-promoting policies and smart farming technology in mitigating the impacts of major crises. This insight underpins our proposal for crisis reserves of means for agricultural production and financial support for direct sales, which aim to foster resilience in the Polish agricultural sector. In the context of the United States, Johansson et al. [2020] describe policy measures implemented by

the USDA to support farmers and ranchers during the pandemic. This example provides a benchmark for our proposed instruments, suggesting that similar strategies could be effective in the Polish context. Lastly, Abid and Jie [2021] underscore the need for developing new online resources and investing in technology to prevent food crises. This aligns with our proposal for the IAP and the information package on sanitary safety in agriculture, which are designed to leverage technology for effective crisis management.

CONCLUSIONS

Public support instruments have played a crucial role in mitigating the negative effects of the COVID-19 pandemic on agriculture. The range of implemented measures reflects the complex challenges faced by the sector. As the situation evolves, it is necessary to continuously assess and adapt these instruments to ensure the long-term health and sustainability of global agriculture. Between 2020 and 2021, the agricultural sector in Poland faced significant challenges due to the COVID-19 pandemic, which required diverse financial support measures. Key entities such as the Agency for Restructuring and Modernisation of Agriculture (ARiMR), the Agricultural Social Insurance Fund (KRUS), and the National Support Centre for Agriculture (KOWR) played pivotal roles in this regard. ARiMR coordinated and allocated funds through the Rural Development Programme and national aid instruments, with a focus on sectors such as beef, milk, pork, poultry, and ornamental plants. On the other hand, KRUS disbursed substantial COVID-19 related benefits, including care, quarantine, and sickness benefits, while KOWR implemented various support actions to mitigate the pandemic's impact on agriculture. During this period, ARiMR provided the largest financial support under the Rural Development Programme, amounting to PLN 1.2 billion, with additional support from national aid measures. This comprehensive response highlights the concerted effort to stabilize and support the agricultural sector during an unprecedented crisis.

In conclusion, the comprehensive literature review and expert surveys have led to the development of innovative and practical tools to mitigate the adverse impacts of pandemics on the agricultural sector. These tools, refined through expert feedback, aim to address critical challenges such as restrictions in agricultural product sales, workforce availability, logistical hurdles, and the increased risk in agricultural activities due to illness or quarantine. The proposed solutions, including the Integrated Agricultural Platform (IAP), Anti-Crisis Agricultural Fund (ACAF), and various state-supported initiatives, reflect a multifaceted approach. They not only aim to alleviate immediate pandemic-related distress but also seek to strengthen the sector's resilience against future crises. These measures, which include both policy and practical interventions, represent a proactive and comprehensive strategy to safeguard the agricultural sector, ensuring its stability and sustainability in the face of unprecedented challenges posed by global pandemics. The integration of these tools into existing agricultural policies demonstrates a dynamic and responsive approach to crisis management, which is essential for the continued prosperity and health of the agricultural sector.

Despite extensive research, there are still significant gaps in our understanding of the full impact of the COVID-19 pandemic on agriculture and the effectiveness of policy responses. One limitation of this study is that we have not empirically verified the effectiveness of the proposed state-supported public support instruments aimed at mitigating the negative effects of the COVID-19 pandemic on agriculture in Poland. Therefore, examining the effectiveness of these proposed measures poses a challenge for our future research.

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INSTRUMENTY OGRANICZAJĄCE NEGATYWNE SKUTKI PANDEMII COVID-19 W ROLNICTWIE

STRESZCZENIE

Cel: Celem artykułu jest identyfikacja i ocena instrumentów polityki rolnej wykorzystywanych do ograniczania niekorzystnych skutków pandemii COVID-19 w Polsce oraz sformułowanie propozycji nowych i zmodyfikowanych instrumentów polityki państwa przeciwdziałającej negatywnym konsekwencjom pandemii w rolnictwie. **Metody:** Zastosowano zmodyfikowaną metodę ekspercką do udoskonalenia instrumentów polityki rolnej mających na celu złagodzenie negatywnych skutków pandemii COVID-19. Piętnastu niezależnych ekspertów dokonało krytycznej oceny wewnętrznie opracowanych propozycji instrumentów, dostarczając dogłębnych opinii i ocen. Ocena ekspertów została przeprowadzona w czerwcu-lipcu 2023 roku. **Wyniki:** Głównymi podmiotami zapewniającymi publiczne wsparcie finansowe dla rolnictwa w Polsce były Agencja Restrukturyzacji i Modernizacji Rolnictwa (ARiMR), Kasa Rolniczego Ubezpieczenia Społecznego (KRUS) oraz Krajowe Ośrodek Wsparcia Rolnictwa (KOWR). Badanie opracowało i udoskonaliło szereg instrumentów mających na celu przeciwdziałanie szkodliwym skutkom pandemii w rolnictwie. Te narzędzia, udoskonalone dzięki wglądom ekspertów, radzą sobie z kluczowymi wyzwaniami, takimi jak dostęp do rynku, dostępność siły roboczej, kwestie logistyczne oraz ryzyko zdrowotne w działalności rolniczej. Zintegrowana Platforma Rolnicza (IAP), Antykryzysowy Fundusz Rolniczy (ACAF) oraz inne inicjatywy wspierane przez państwo stanowią kompleksową strategię, mającą na celu nie tylko złagodzenie bezpośrednich skutków, ale także wzmocnienie długoterminowej odporności. **Wnioski:** Zastosowane proaktywne i wieloaspektowe podejście jest niezbędne dla zapewnienia stabilności i zrównoważonego rozwoju sektora rolnego w obliczu potencjalnych przyszłych kryzysów zdrowotnych, w tym pandemii.

Słowa kluczowe: pandemia COVID-19, rolnictwo, polityka rolna, wsparcie publiczne, instrument wsparcia

CONTENTS
SPIS TREŚCI

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