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**RETURN ON ASSETS IN FARMS AND THE CONTEXT  
OF ECONOMIC RATIONALITY IN POLAND  
AND SELECTED EUROPEAN UNION COUNTRIES<sup>2</sup>**

Key words: farm, CAP, rationality, income, ROA, Poland, UE-25

**ABSTRACT.** The main aim of the article is to evaluate the rate of return on assets in farms from the perspective of economic rationality. The research concerned farms covered by the FADN system in Poland and 25 European Union countries. The temporal scope of the analyses referred to the period 2010-2020. As a general rule, in the EU countries, the market rate of return is higher compared to that achieved on average by farms. This is especially true for smaller farms. From the perspective of the neoclassical approach, this would indicate an irrational operation. Farmers implement a multi-criteria objective function. In doing so, they agree to achieve relatively lower agricultural income in exchange for diversification of risk, an increase in asset value, or meeting household needs (not only consumption). Agricultural producers become more wealthy due to the increase in land prices. Hence, from this perspective, farmers' actions could be seen as rational, which is more in line with the classical view in economic theory, where the aim of subjects to maximize wealth by units was emphasized. Therefore, the achievement of low rates of return by agricultural producers in a situation where agricultural income does not provide a fee for the farm family members' own labor should not be evaluated unequivocally as a manifestation of a lack of rationality.

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## INTRODUCTION

When managing a farm, farmers aim to generate income that will allow them to satisfy certain consumption needs of their household members, as well as possibly investment needs in the farm. The extent to which these needs are met is related not only to the function of maximizing agricultural income, but also to the scale of the resource, the life cycle of the farm (generational issues), or non-agricultural economic activity. The complexity of this matter results from the very essence of the agrarian issue [Czyżewski, Matuszczak 2023, Wilkin 1986]. In farms, a multi-criteria objective function is realized. So, in addition to the mentioned maximisation of the income of the farming family, also the provision of work for family members, the succession of the farm, and the upbringing of offspring. It is also about the strong fusion of the household and farm (through self-consumption of produced products, as a rule, long, multi-generational functioning, use of own labor resources), community of family interests, affirmation of family and local values, rootedness in traditional values [Gałąj 1973, Tomczak 2005]. Although in the case of small, family-run non-agricultural enterprises (e.g., handicrafts) we could also talk about the fusion of the household with a certain economic activity, nevertheless, in the case of agriculture, it has a more culturally and historically integrated character, a more widespread reach (consumption of food goods), as well as is often associated with the creation of positive externalities [Grzelak 2022]. In addition, for the functioning of a significant group of farms, there is the so-called logic of survival [Scott 1976]. The survival is an important imperative, hence the agricultural producer values security and stability. The introduction of innovations by farmers is carried out with caution and skepticism and requires a relatively long time or generational changes. In the case of farmers, it would be adequate for most of their behavior to say “People dislike losses more than they like gains” [Samson 2014]. Hence, the existence of a multi-criteria function of the farmer’s goals makes it possible to reduce the risk of pursuing only the goal of maximising agricultural income.

Nowadays, in explaining the development mechanisms of agriculture, a strong emphasis is placed on the capital factor due to the increased importance of commercialization of economic and social processes, globalization. However, this does not mean that land is losing its importance due to the recognition of its new functions related to environmental and climate issues, the formation of externalities and the creation of public goods [Matuszczak 2020].

The main aim of the article is to evaluate the rate of return on assets (ROA) in farms from the perspective of economic rationality. Then, with the help of empirical illustration, the rates of return on assets on farms in European Union (EU) countries and in the cross-section of economic size for units in Poland are analysed and an attempt is made to relate

this to the evaluation of farm rationality. The considerations undertaken in the article are in line with a research gap. This is because so far, analyses of the ROA in agriculture have mainly referred to the perspective of the Du Pont model. Meanwhile, in the article, ROA is integrated with an attempt to use economic rationality.

## THE RATIONALITY IN A LIGHT OF SELECTED APPROACHES IN ECONOMIC THEORY

Rationality plays an important role in economics. It is generally assumed (neoclassical approach) that an agricultural producer seeks to maximize agricultural income based on his resources and his best knowledge and experience. In this way, he acts rationally. If, in addition, he fulfills other goals related to the functioning of the household, then the situation becomes more complicated in terms of economic rationality. Economic processes and accompanying decisions will be seen as rational when they are consciously planned with consideration of opportunity costs and benefits. It also involves a tendency to follow logically sound reasons in one's actions. These principles are the basis of the so-called mainstream approach to economics and the idea of *homo economicus* [Mill 1962]. This approach is negated by representatives of heterodoxy, e.g. Veblen (institutionalism). He pointed out that human attitudes are not always rational and based on profit and loss calculations or wealth maximization. What is important are institutions, i.e. customs, norms of conduct, the sphere of politics.

As, for example, Paul Krugman and Robin Wells [2012] pointed out, sometimes the search for the best solution before economic units is a costly operation. Hence, entities apply limited rationality, thus saving their time, reducing transaction costs by making decisions that are not perfect, but good enough. At the same time, rational action does not eliminate the making of mistakes due to, for example, asymmetry of information, or adaptive expectations of actors. This is pointed out by many streams in economics (those of the heterodoxy). Constraints of the behavioral type [Mankiw, Taylor 2009], or the so-called animal instincts in human behavior [Keynes 2003] are also emphasised. In the case of farmers, the so-called cultural rootedness plays an important role, including neighborhood relations, the importance of non-economic incentives [Zawisza 2002]. On the other hand, from a Keynesian perspective, the expected return on investment is shaped by producers' expectations of the future level of costs, demand as a "state of confidence" in relation to macroeconomic operating conditions [Szarzec 2012]. This would mean, from this perspective, that agricultural producers are rational in their actions if they are guided by a correct evaluation of future agricultural prosperity (but in the short term), which should be stabilised by the state. This indirectly draws attention to the issue of actors' expectations in the context of rationality. For the expectations of actors in economic

policy analyses are one of the channels of transmission of economic (agricultural) policy impulses and thus affect rationality [Muth 1961]. On the other hand, Harvey Leibenstein [1988] created the concept of selective rationality. Non-maximizing behavior can also be rational. As Helena Hansson et al. [2020] demonstrate, based on the experience of dairy farms in Sweden, there can also be rational inefficiency. This includes the fact that, to some extent, lower efficiency (in the DEA sense) is not due to inappropriate production choices, but may be due to the implementation of a higher animal welfare standards.

## BACKGROUND OF RATIONALITY PROCESSES IN AGRICULTURE

The functioning of some farms is accompanied by an adjustment servo-mechanism, which consists in farmers taking actions to eliminate or offset unfavorable changes in external farming conditions [Czyżewski 1986]. It consists in adjusting the level of consumption by the farmer's household as a result of substitution of natural consumption and income from the sale of agricultural production, and, above all, reducing the fee of own labor in the income obtained under unfavorable economic conditions. As a result, a group of farms with a small scale of production, based on family labor resources can operate for a long time in a situation of decapitalization of assets, or narrowed reproduction of fixed assets [Makinen et al. 2009, Wojewodzic, Musiał 2018]. In addition, the not unusual emotional attitude of farmers to land can undermine economically rational decision-making [Wilkin 2016]. This indicates that evaluation the rationality of agricultural producers is not one-dimensional.

The sense of self-reliance and individuality, limited trust makes, for example, cooperation in team activities among farmers in Poland, not high [Fałkowski et al. 2017]. This limits the achievement of more favorable economic results, a higher rate of return on invested capital, or a reduction in fixed costs. Thus, for example, actions that come down to the farmer's ownership of agricultural equipment (e.g., tractor, harvester) could be considered irrational at an undersized scale of operation. A Veblenian demonstration effect may appear here, due to the desire to impress the neighbors. On the other hand, however, if the purchase of this equipment was carried out within the framework of the support funds of the Common Agricultural Policy (CAP), then the assessment of rationality may be positive. In such a situation, the agricultural producer benefits from an attractive opportunity to increase value of his assets using budget support. Similarly, it is more rational in many situations to lease agricultural land than to purchase it outright, due to the lower financial burden [Mioduszewski, Niedzielski 2012].

In a light of the above, a question may arise regarding the economic rationality of agricultural producers, at least from the perspective of the rate of return on farm assets. The body of neoclassical economics suggests that the rate of return on assets should be

higher than current market interest rates (e.g., the interest rate on long-term government bonds). A risk premium for profit volatility would have to be added to this. Due to the cyclical nature of fluctuations in the economy, comparisons of this type are justified over a period of several years. Thus, if the rate of return on profit assets would be comparable or lower in a given farm than existing interest rates on low-risk financial instruments (e.g., government bonds) then, according to neoclassical logic, an agricultural producer could be expected to stop farming operations. He will sell the resources used so far, or rent them to those producers who achieve higher rates of return. However, practice shows that this problem is complex. So are farmers economically irrational?

Assuming, following John Clark [1899], that equilibrium is achieved through the equalisation of the marginal productivity of productive factors and their market price, one would have to give a positive answer to the above question. However, in the case of agriculture, it is difficult to say that there is equalisation of marginal wages of production factors due to the fact that land lacks mobility (in the physical sense). Possible substitution of these constraints through different agricultural uses of land (different crops, or method of agricultural use – meadows, arable land) can only compensate for this to a small extent. In addition, there are the relatively high transaction costs associated with the eventual sale of such assets. A stream of research within neo-institutional economics, the so-called economy of transaction costs [Williamson 1979], points out, among other things, that these costs increase with the specialisation of resources, which is the case with agricultural production. At the same time, the farmer, acting simultaneously as a producer and consumer, counting on future income from invested capital, takes first into account in his utility function the satisfaction of his family's consumption needs. Only the realisation of these needs determines the possibilities of investment from current income. Therefore, he receives only partial, and not total, compensation in the form of a percentage of capital for the period between the use of capital and its effects, as pointed out by the representative of the Austrian school Eugen Böhm-Bawerk [1884]. Besides, the neoclassical approach to the assessment of rational behaviour is subject to criticism due to, for example, its detachment from the real world, excessive assumptions [Keen 2017] and irrational perception of reality, the so-called cognitive error [Kahneman et al. 2008].

## MATERIAL AND RESEARCH METHODOLOGY

In the study, FADN data for farms were employed. Such data refer to the mean of the average farm for a given group of farms (for example country). On the other hand, one should be aware of the research limitations of using these data. The point here is that the nuanced motives of agricultural producers related to rationality cannot be captured at the aggregate level. Hence, necessarily, assessments are associated with a certain

generalisation. Return on assets has been defined as the ratio of farm profits to asset value. This is consistent with the managerial perspective and is known in the literature as the ROA (ang. return on assets) [Gloy, LaDue 2003]. On the other hand, Jindřich Špička and Ondřej Machek [2015] suggest that this indicator is not a good proxy for farms' economic viability because assets include not only own but also hired assets (e.g. land). However, the majority of farms in Europe have family forms, in which the farm's assets have a dominant role in shaping economic and productive performance. Situations where an agricultural producer manages assets that are not included in the balance sheet only apply to certain units in a small number of countries for example in Slovakia or in the Czech Republic. Moreover, this problem is not so important in the case of Poland where the share of rented land is relatively low. The temporal scope of the analyses referred to the period 2010-2020. This was due to the availability of the data at the time of the analysis (2020 for data from the Eurostat FADN database), on the other hand, to the intention to show the studied processes in the second decade of the 21st century.

It was assumed that the rate of return may be affected by all production resources managed by farmers. Also, subsidies within the CAP impact farm profitability [Vozárová et al. 2020, Kryszak et al. 2021]. Therefore, subsidies were included in the calculation of profit.

Return on assets was defined as the ratio of the farm's profits to the value of assets. Profit was calculated as agriculture income minus the fee of the farmer's family members (one's own labour cost) engaged in agriculture. The last one was based on the cost of hired labour in farms. In this way, only part of the agricultural income was included, remaining after the separation of the contractual consumption (fee of farmer's family members) of the farmer's family. These can be attributed to the operation of the farm. This approach made it possible to assess the profit created from the assets managed by the farmer.

Return on farm assets was compared with the so-called market rate of return. It was determined as the sum of interest rate (EMU convergence criterion bond yields) and premium for risk for the agricultural producer. The risk premium was calculated based on the standard deviation for 2010-2020 from the ratio profit/assets ratio. The use of standard deviation to determine the risk premium can be found in many studies [Aleknėvičienė et al. 2018, Dahl, Wilson 2018]. This approach made it possible to set return on assets, which ensures the farmer achieves returns higher than bond yields because adjusted for the volatility of this parameter in the long term (2010-2020). Thus, the adopted rate was a benchmark for the evaluation of surveyed agricultural holdings in Poland. It means achieving returns on assets above the rate in safe financial assets available on the market and allows a pre-evaluating of economic rationality from a neoclassical perspective. However, this may raise some doubts because many central banks applied low-interest rate policies in the second decade of the 21st century [Kiley, Roberts 2017, Blanchard

2019]. On the other hand, however, the conditions of credit availability that determine the possibility of obtaining long-term investment credits for the development of farms constitute the possibilities of their development under the existing economic conditions in the market. Due to the existing peculiarities of agricultural operation, including especially the barriers to entry, satisfactory rates of return encourage potential successors to continue and develop of farms [Šimpachová-Pechrová 2017].

## EMPIRICAL ILLUSTRATION

The rate of return on assets, from a profit perspective, shaped average below the market rate of return in the EU countries over the 2010-2020 period (Table 1). Only in farms in Bulgaria and Hungary the ROA was average higher, and only in the latter the level of income per working member of an agricultural family being relatively high and above parity level. There is a considerable variation in of the ROA in farms between member countries. This is due to the production resources, used production techniques, directions of production, scale of production, as well as the use of external inputs. In half of the surveyed EU countries, the rate of return on assets oscillated around zero or was lower. This indicates low profitability of agricultural production. The surveyed farms in Poland were classified in this inferior group of countries, which, combined with the relatively a low scale of production, makes low their average market competitiveness from a neoclassical perspective. One of the reasons for this phenomenon is the large number of small-scale farms (with a standard production value of up to EUR 25,000) – 86%, in which agricultural production is not a primary source of income for the farmer's household. On the other hand, there are farms in Poland with high profitability, as will be discussed later in the article. No clear differences were seen between the “old” and “new” EU member states in terms of the rate of return. However, they are visible between farms in the south and north. A more favorable situation was noted for farms from the south of Europe.

This is due to the relatively higher profitability of fruit production, including grapes as well as vegetables, which are important in agricultural production these countries. On the other hand, however, the scale of production is average not high in farms in these countries. Even the high level of farm investment in relations to assets did not ensure achievement at least a market rate of return. At the same time, farms in the EU countries on average make little use of leverage. Only in Danish farms the value of assets was on average more than twice as high as the value of equity. It is noteworthy that the positive return on assets is achieved with a significant contribution from subsidies. If it is excluded from profit then the ROA would be average negative in farms in the vast majority of the studied countries.

Table 1. Return on assets in farms covered by the agricultural accounting system FADN in the EU-25 countries as compared to selected data (2010-2020)

Member States	Profit/assets [%]*	(Profit – total subsidies)/assets	Interest rates + premium for risk [%]**	Income/ 1 working family member [EUR thous.]	Assets/equity	Net investment/assets [%]
Belgium	2.2	-1.29	2.7	32.6	1.35	1.99
Bulgaria	5.7	-5.09	4.5	11.8	1.28	2.39
Czechia	3	-9.20	3.2	32.3	1.38	1.89
Denmark	0	-1.50	2.1	50.7	2.42	0.45
Germany	0.3	-3.73	2.1	29.2	1.28	1.18
Ireland	-0.1	-2.22	3.2	23.0	1.03	0.39
Greece	3.5	-2.44	9.5	11.2	1.01	-2.22
Spain	3.9	0.40	4.3	30.6	1.03	-0.36
France	1.7	-5.45	3.0	36.3	1.70	-0.02
Italy	2.4	0.09	4.1	27.8	1.01	-0.67
Cyprus	0.4	-2.58	5.9	9.6	1.03	-0.36
Latvia	1.6	-9.72	4.4	11.8	1.48	4.33
Lithuania	2.2	-7.96	5.9	9.7	1.20	3.70
Luxembourg	0.9	-4.69	1.9	34.5	1.31	2.03
Hungary	7.4	-1.74	5.7	30.1	1.20	1.14
Malta	-2.4	-4.21	3.2	8.4	1.04	0.31
Netherlands	0.6	-0.14	1.8	46.1	1.49	0.88
Austria	-0.5	-4.70	2.6	18.7	1.15	0.83
Poland	-0.5	-4.15	4.7	6.5	1.06	-0.46
Portugal	4.3	-3.65	6.2	13.9	1.04	0.78
Romania	1.4	-4.24	7.4	4.8	1.03	-1.59
Slovenia	-2.2	-6.08	3.2	5.3	1.03	0.61
Slovakia	0.3	-14.54	5.3	25.3	1.47	0.72
Finland	-2.1	-13.42	1.9	21.5	1.39	0.36
Sweden	-3.1	-7.13	2.0	16.4	1.40	1.45

\* Profit was calculated as: income minus fee of farmer's family members based on the cost of hired labor,

\*\* Interest rate: EMU convergence criterion bond yields; risk premium was calculated based on the standard deviation of the ROA for 2010-2020 from profit/asset ratio for risk premium

Source: own elaboration based on FADN and EUTOSTAT data



The above results indicate that agricultural production does not ensure profitability at least at the level of the market rate of return. It is important to be aware of the considerable variation in the economic situation of farms also within member states or regions. However, this does not fundamentally change the picture of the situation of agriculture as a whole and its competitiveness from the perspective of the rate of return on assets. It is worth noting here, however, that the price of agricultural land shows a significant, above-average increase, which causes a decrease in the rate of return on assets and generates pressure on the increase in the scale of production. The dynamic increase in the price of agricultural land is due to constraints on the functioning of the agricultural land market, the increasing importance of the environmental functions of agriculture. It is also about the capitalisation of subsidies in the price of agricultural land, non-agricultural uses of land, or pressure for non-agricultural uses. Farmers thus become more wealthy (in terms of asset value), but this does not generate adequate agricultural income [Grzelak 2022].

Let us take a look, in this part of the article, at how profitability developed in farms in Poland by economic size (Table 2). We can see that profitability increased with the growth of economic size. This is also confirmed by the results of other studies, which show that as the scale of production increases, ROA improves [Wolf et al. 2016]. Only for farms with an economic size at least value of 25 thousand EUR of standard production, it was positive, and only from the fourth class (Table 2) comparable or higher than the market rate of return. Larger farms thus benefit both from the fact that they achieve higher profitability and that they carry out activities with a larger scale of production. This manifests itself in higher labour profitability. Smaller units achieve such low incomes that they are unable to pay for the involvement of family members in the farm from agricultural incomes and

Table 2. The ROA and income level per working family member in farms in Poland covered by the FADN system by economic size of agricultural holdings (averages for the period 2010-2020)

No.	Specification (classes of economic size) [EUR thousand]	ROA [%] (profit/assets)	Income/AWU [PLN thousand]
		Economic size of the agricultural holding (by standard production value)	
1	2 to < 8	-4.8	7.3
2	8 to < 25	-1.4	15.4
3	25 to < 50	2.2	31.8
4	50 to < 100	4.6	57.9
5	100 to < 500	7.0	131.9
6	> 500	6.3	728.1

Source: opracowanie własne na podstawie danych FADN

hence the loss of profit and negative profitability. Agricultural income has a complementary importance here<sup>3</sup>.

In light of the above, this would imply that farming on low-scale farms is irrational from the perspective of the neoclassical approach, i.e. the maximisation of agricultural income (profit). On the other hand, however, there is no rapid transfer of productive resources from economically weaker to economically stronger units. As indicated by Aleksandr Czajanov [1966], or Władysław Grabski [1910], there are limitations in the structural transformation in agriculture, which make structures inefficient from the point of view of the effect/input relationship, which can operate for years. In addition, it should be noted that the reason for the reduction of ROA on farms is the increase in the price of agricultural land. It is an open question, beyond this study and unresolved in the literature, which is more rational under these conditions: to increase the intensity of production or to discontinue agricultural use [Levins, Cochrane 1996, Müller et al. 2021].

### CONCLUDING REMARKS

The answer to the question regarding the rationality of farms from the perspective of the rate of return on assets is complex. Referring this to an evaluation from the perspective of the rate of return on assets and the neoclassical approach, one would have to give a negative assessment. As a rule, in the EU countries, the market rate of return is higher compared to that achieved on average by farms. Therefore, the use of long-term resources in farms with a low ROA contradicts the neo-classical (Marshallian) assumption regarding the equalisation of the price of the agricultural resource. If subsidies were excluded the picture would be less favourable. Could it be, then, that farmers are irrational? A deeper analysis of this problem leads one to think that the perspective of this evaluation should be broadened. This is because farmers perform a multi-criteria objective function due to the integration of the farm and household and, in addition, they often obtain income from outside the agricultural activity. In this way, they accept to earn a relatively lower income from agriculture in exchange for risk diversification and increased household financial stability. At the same time, it is worth noting that farmers' entitlement to the area and other subsidies allows them to optimise liquidity and sustain the economic viability of rural areas. This is particularly true for smaller farms. In the larger ones, the rate of return is higher than the market rate. On the other hand, the flow of the land factor from smaller to larger units is a slow process, regionally differentiated, as well as related to high transaction costs and demographic factors. Therefore, a rapid abandonment of farming in weaker units cannot be expected due to the low rate of return on assets. In addition,

<sup>3</sup> This may also be indicated by the data from the PSR 2020, which shows that in households with a farm user, agricultural activity was the main source of livelihood in about 30% of such households, hired work about 33%, and pensions 15% [GUS 2021].

farmers are becoming more wealthy due to the increase in land prices. Thus, the price of agricultural land is ‘disconnected’ from its productivity and rate of return. From this perspective, farmers’ actions could be evaluated as rational, which is more in line with the classical view, where the actors’ desire for wealth maximisation (e.g. also through the purchase of another tractor co-financed by subsidies) was emphasised. Therefore, the achievement of low rates of return by agricultural producers in a situation where the agricultural income does not provide for the payment of the farm family members’ own labour should not be evaluated unequivocally as a manifestation of a lack of rationality. The logic of the functioning of farms is far more complex than it would appear from the commonly used economic models, which excessively reduce reality due to the context of tradition, culture, environmental conditions and the accompanying background of social factors. An interesting direction of future research in the analysed topic could be to assess, at the level of agricultural producers, the prospects of further activity, its motives, investment sphere depending on the level of the ROA.

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## STOPA ZWROTU Z AKTYWÓW W GOSPODARSTWACH ROLNYCH A KONTEKST RACJONALNOŚCI EKONOMICZNEJ W POLSCE I WYBRANYCH KRAJACH UNII EUROPEJSKIEJ

Słowa kluczowe: gospodarstwo rolne, WPR, racjonalność, dochód, ROA, Polska, UE-25

**ABSTRAKT.** Głównym celem badań była ocena stopy zwrotu z aktywów w gospodarstwach rolnych z perspektywy racjonalności ekonomicznej. Badania dotyczyły gospodarstw rolnych objętych systemem FADN w Polsce i w 25 krajach Unii Europejskiej. Zakres czasowy analiz odnosił się do okresu 2010-2020. Z reguły, w krajach UE rynkowa stopa zwrotu jest wyższa w porównaniu do tej osiągananej przeciętnie przez gospodarstwa rolne. Dotyczy to w szczególności mniejszych gospodarstw rolnych. Z perspektywy ujęcia neoklasycznego, wskazuje to na nieracjonalne działanie. Rolnicy realizują wielokryterialną funkcję celu i w ten sposób godzą się na osiągnięcie względnie niższych dochodów z rolnictwa w zamian za dywersyfikację ryzyka, wzrost wartości aktywów i zaspokojenie potrzeb (nie tylko konsumpcyjnych) gospodarstwa domowego. Producenci rolni stają się bardziej zamożni z uwagi na wzrost cen ziemi. Dlatego z tej perspektywy, działania rolników można ocenić jako racjonalne, co jest bardziej zbieżne z ujęciem klasycznym w teorii ekonomii, gdzie podkreślano dążenie podmiotów do maksymalizacji bogactwa. Dlatego osiągnięcie przez producentów rolnych niskich stóp zwrotu w sytuacji, gdy dochód rolniczy nie zapewnia opłaty pracy własnej członków rodziny rolniczej, nie należy oceniać jednoznacznie jako przejaw braku racjonalności.

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