

**PIOTR KUŁYK**

**The imperfections  
of a credit market  
in agriculture**

**1. Introduction**

The transformations emerging on the global market as an effect of the process of the liberalization of financial markets generate the need for considering how it influenced the sources of financing the economic activity. It is possible to expect that it should contribute to the decrease of the costs of obtaining a credit and the increase of its accessibility for farms. The specificity of agricultural production, which is usually characterized by an elongated production cycle, requires implementing the external financing, which creates a natural relation of this sector of economy with the financial market. On the other hand numerous crisis phenomena emerging on the financial market, typical of the current period of global transformations, sudden flows of resources between states as well as the increase of interdependences between domestic markets were creating a big number of imperfections in the area of credits for agriculture. The imperfections of market allocation generate the additional costs of transactions and break the conditions of a market exchange. Understanding these costs allows us to evaluate the efficiency of the market allocation. Imperfections also create the chance of obtaining profits for business entities which can reduce these costs.

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Therefore it is worth posing a question whether the increase of the meaning of a market mechanism will contribute to the greater flexibility in the flow of financial impulses between particular domestic markets. It is a significant problem within the ability of a market structure to provide the arbitrage of the price relations and to diminish their amplitude of fluctuations. The work consists of three parts. In the first were presented current research results included in the literature, the other contained the her methodical rationale and in the third were presented the own study. The purpose of this article is to demonstrate the relationship between liberalizing the light of globalization and the financing flows resulting from the inclusion of credit capacity of agricultural activity.

## 2. The sources of imperfections on the market of credits for agriculture

The deliberations related to the imperfections of the market of credits for agriculture need to be started from the explanation of the relations appearing between the market of credits and agriculture, presenting their specificity at the same time. Then the transformations emerging on the market of global finances will be described with the final presentation of the character of emerging imperfections.

The interdependences of agriculture with the credit market result from at least few relations (Thompson 1984, pp. 592-596): a relatively high relation of capital-work as well as capital-production<sup>1</sup>, the interest rate becomes the indicator of the alternative cost of keeping livestock, appearing relations between interest rates and the value of farm land, the dependence of the agricultural activity on investment and working capital credits, relatively high debt of farms (which becomes a secondary effect), a long period of return of capital (particularly in plant production), high variability of obtained production effects. The imperfections of the credit market play an essential role for the development of farms, first of all through the influence on investment processes (Petric 2004; Latruffe 2005). The indicated long period of the return of capital not only brings the need for obtaining external resources, of such a transaction for both sides of the contract on the credit market. Moreover the development of farms requires the implementation of modern technologies for obtaining the growth of the productivity of implemented factors as well as the reduction of costs. It allows to keep a competitive position on the global market and also to satisfy constantly growing food needs. Therefore the activity of farms requires the involvement

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1 Substitution of works in favour of material capital and organizational-technical progress became one of the significant sources of the social-economic development. It allowed to move a part of production factors to non-agricultural activities. However it required the increase of resources for financing the indicated process of substitution as well as fixed asset, one of whose element is credits.

of substantial financial resources in a relatively short period of time (Woś 2004).

The presented interdependences become highlighted as an effect of the specificity of agriculture and resources connected with it. Considering the relations with the credit market it is possible to divide them into two groups: concerning production processes and the abilities to create guarantees for obtained resources. First of all it is necessary to pay attention to the structure of entities in agriculture, often excessively fragmented, the connection of the function of a household and a business entity and also weak relations with market. These factors also contribute to the limitations emerging in decision processes in relations with the credit market. Thus there is the unwillingness to obtain credit resources by farmers, indicated in many publications, which also results from the lack of knowledge and information (Kata 2010, p. 153-154). Therefore a distinctive phenomenon becomes the preference of own resources by farmers within financial resources (Barry, Bierlen, Sotomayor 2000). At the same time the possibilities to obtain external resources with help of the financial market are limited, among the others through the market of stocks or other capital instruments, as a result of the domination of family farms with relatively small ranges of activity in a trans sector comparison. A part of resources and means of production is specialist, which means the emergence of high barriers of exit and substantial decrease of their value in non-agricultural use. It leads to the limited mobility of resources. In the poorly-developed countries credits are often inaccessible for a big part of farms, in particular small entities, for regard of the lack of guarantee (Bhattacharyya 1996, p. 222). It indicates a different situation within the relations with the credit market of farms from countries with a different level of the economic development. These interdependences increase in case of well-developed countries where the rate of the capital intensity of agriculture proves a higher level. In those states there is also an additional indirect relation, which is the effect of used instruments for supporting agriculture (Czyżewski, Kułyk 2010), whose value increases with the economic development according to so called a developmental paradox (Barett 1999, Kułyk 2010). The increase of the retransfer system to agriculture changes these circumstances raising first of all the value of farm land. However it has at least two unfavourable consequences. Firstly it raises the rate of the rents of land increasing the costs of farms. Moreover it leads to excessive real investments in agricultural holdings. Then appears a displacement in the structure of the risk of the activity. We obtain an additional stream of incomes allowing to finance a credit. And appears the mechanism of combining public and private resources which permanently breaks relations between

capital and work. There is also the emergence of the excessive financially-income disproportions between farms and non-agricultural entities, which makes the appearance of the exclusion effect as well as the loss of the abilities to obtain credit resources for running the enlarged reproduction in farms, and also inflexibility of methods and productive structures in agriculture. The presented phenomena contribute to the high sensitivity of economic entities in agriculture to the changes emerging on financial markets.

The processes of globalization and liberalization cause that the accessibility of financial resources needs to be considered in an international scale. The internationalization of the financial market increased the existing ones or highlighted new areas in relation of agriculture-credit institutions creating a sort of a new platform for these deliberations. The changes appearing in the global environment cause the increase of the number of external factors, but also the possible reactions of markets to the transformations taking place on domestic and international financial markets. As a consequence agriculture is becoming more and more sensitive to the transformations appearing in interest rates. The liberalization of financial markets was first of all to provide better allocation of resources, allowing to obtain better profits from the used capital. It should contribute to the increase of the accessibility of financial resources also in agriculture. A part of elaborations indicated that liberalization led to a faster economic development and reaching a higher level of development (Bekaert, Harvey, Lundblad 2005; Almeida, Wolfenzon 2004; Galindo, Micco, Ordoñez 2002). This factor appeared to be the displacements of financial resources between economic sectors and between entities (Galindo, Schiantarelli, Weiss 2007, p. 563). At the same time liberalization increased the capital liquidity making its displacement between different markets. This mobility causes however substantial changes within consumption and investments, influencing the profits obtained by business entities. Increasing the sensitivity of domestic credit markets to foreign resources in relation to guarantee, their volume has three effects (Faia 2011, p. 121): wealth effect, substitution effect, evaluation effect. Liberalization, while increasing the size of credits, causes the growth of wealth in entities. It creates the possibility of further increase of debt. Therefore numerous elaborations join a credit market for agriculture with the prices of land (Hughes, Penson, Bednarz 1984, p. 757-758, OECD 2008). They indicate that they influence the value of fixed asset in agriculture. Moreover there appears a relation in this area with subsidies dedicated to agriculture which both support credits directly and also increase indirectly the amount of financial resources in farms.

The internationalization of the finance markets as the effect of the process of globalization in relation to agriculture increased the meaning of such issues as (Stannoulis, Chalfant, Rausser 1985; Saghaian S.H., Reed M.R., Marchant M.A. 2002; Czyżewski, Kułyk 2009): the parity of interest rates, the mechanism of money creation, "overshooting" of interest rates and exchange rates or premiums for risk. A special meaning is attributed to the high instability of the financial markets. In this case states of imbalance can cause sudden displacements in the flow of capital changing macroeconomic indicators. There also appears a need for moderating the effects of transformations of the emerging adjustments on the global market, in particular those ones which are not the result of the decisions made by domestic economic entities. Therefore the instability of macroeconomic conditions is often treated as main reasons for imperfections in allocation on the credit market as well as causes of the improper redistribution of incomes by the market mechanism. As a result of the increasing instability of the environment it is necessary though to expect the increase of the variability of the income of farms as the effect of the change of the exchange rate, regardless of the economic situation of the agricultural sector. The conducted research proves the appearance of the substantial deviations of the exchange rate from the parity value (Cashina, Ceśpedes, Sahay 2004, pp. 239-240). In case of homogenous products, in case of which the key meaning in the international trade exchange is taken by comparative costs there is a change of the assessment of resources involved in agriculture in the situation of their limited mobility. It influences the amount of income in farms at the same time.

Monetary shocks, which are one of the signs of crises on financial markets, cause the increase of money supply on domestic markets and lead to the change of the prices of agricultural products in relation to the prices of non-agricultural articles (Henderson 2009, p. 1209). It means the change of incomes in agricultural holdings. It is an element of a wider view including the meaning of macroeconomic factors influencing the functioning of farms. One of the impact channels is a credit market. As Shane and Liefert (2000, p. 686) indicate in the conditions of financial crises there appeared the deformation in interest rates and as a consequence transformations in the amount of income. They also caused deformations in the trade balance contributing to the displacement between agricultural products and non-agricultural ones in its structure.

It is worth paying attention to the relations taking place between credit markets for agriculture and the agricultural policy. The increase of the retransfers of the economic surplus to agriculture diminished the dependence on credits, therefore interest rates. As a consequence it causes the changes in the structure

of financing the activity of farms and also in the character of relations with the financial market. Retransfers dedicated to agriculture often became a substitute of credits. They allowed to obtain resources with relatively low costs and on average a stable quantity in a time perspective. It also became a kind of threat of undertaking excessively risky decisions in farms, for regard of the reduction of risk. The increase of the state involvement creates also the threat of the growth of interest rates as the effect of the increase of demand for credit money by the state. High interest rates become a limitation for the budget as they increase the cost of obtaining the money. Moreover in some countries there are direct subsidies for credit. There is also a clear reduction of disproportions between particular countries reducing the profits from the diversification of the allocation of resources in various economic areas.

The long-term effects of financial crises include (Nicita 2009): the restriction of the abilities of financial markets to securitizations and their results for commercial credits financing delivered agricultural products; the collapse of housing markets and the change of the value of agricultural land; the emergence of partner's risk in transactions mainly for agricultural producers; there is a change in the accessibility of the assessing mechanisms; the sudden changes of the incomes of business entities. The presented effects prove the depth and a long-term result of the financial crisis in agriculture. Moreover the financial crisis is not an isolated phenomenon. It causes the displacements in many macroeconomic quantities between different markets, also not directly involved in crisis phenomena. It concerns the groups of entities restricting the possibilities of the spatial diversification of risk.

The imperfections of the market allocation lead to the improper evaluation of risk by agricultural holdings, and as a consequence it causes the limitation of the amount of financial resources for farms or their excessive and improper allocation. One of the imperfections is the asymmetry of information between the sides of the contract. It results from both the inappropriate knowledge of financial institutions about the specificity of agricultural production and also the accessibility and knowledge about the results of transformations on financial markets of farmers themselves. It restricts the access to a credit and raises the costs of obtaining credit resources. In contrast to many elaborations, Ciaian and Swinnen (2009, p. 1124-1125) indicate that households can even benefit as a result of combining budget subsidies and the imperfections of a credit market. This phenomenon emerges because subsidies decrease the need of farms for credit money and therefore increase the marginal productivity of land and demand for land in a long perspective. It causes the growth of the prices of agricultural land.

### 3. The methodology of the research proceeding

Conducting the evaluation of assessing the changes on the credit market in relation to agriculture it was assumed that the main factor is a real interest rate. While the amount of the rate was defined by deflating a long-term (for regard of the elongated cycle of production in agriculture) nominal standardized interest rate with the index of the prices of agricultural products. Thus the rate was accepted as agricultural holdings "feel" as a result of transformations appearing being the effect of price relations. It assumes the influence of nominal changes on real amounts. This rate became a dependent variable. As independent variables, on the basis of the models presented in the quoted literature the following were included: real exchange rate, terms of trade (ToT), Consumer Price Index, economic growth, resources of agricultural land (permanent land – as a sign of the direct involvement in the process of agricultural production) per one active farmer as well as the amount of the support of agriculture (measured with the Nominal Rate of Protection indicator) per one active farmer. The assessment of the amount of the support of agriculture was conducted with the methodology of the evaluation of this area suggested by the Group of the World Bank. It is based on the assumptions of the sub balance describing the transformations appearing in the retransfers of the economic surplus flowing between agriculture and the remaining segments of economy. One of the major indicators describing these relations is Nominal Rate of Protection (NRP). NRP assesses benefits resulting directly from tariff protection and/or non-tariff production. Calculations take into consideration all policies which raise prices obtained by domestic producers. It is defined as a percentage difference between total income from the support of the production unit, which is a market price obtained by producers and enlarged with all subsidies or diminished by taxes in relation to production. The effects of other restrictions of foreign trade are ignored. The research period referred to the years of 1990-2010. Ten highly-developed countries were accepted for the evaluation, thus with a similar economic situation (for regard of indicated differences between highly-developed and developing countries): Australia, Island, Japan, Canada, South Korea, Germany, Norway, New Zealand, Switzerland, USA. OECD countries were included for regard of guaranteeing the comparability of the systems of gathering and aggregation of data by member states of this organization. In order to conduct the evaluation of the relations appearing between the interest rate and macroeconomic factors the panel estimation of least squares was used (table 1). Regression was used for the evaluation of interdependence between macroeconomic indicators and the



amount of agriculture support. Calculations were conducted in Gretl program. The evaluation of heteroskedasticity with help of White's test was also carried out in order to evaluate the selected variables describing the model.

#### **4. The analysis of interdependence on the credit market in the conditions of globalization**

While observing changes taking place on the credit market it is possible to notice that in the period of 1990-2010 there were substantial changes in the volume of nominal and real long-term interest rates. In all analyzed countries interest rates were reduced<sup>2</sup> (in total from the level of 4,99% in the period of 1990-1992 to 1,55% in the period of 2008-2010) altogether with the reduction of inflation rates but also as a result of the changes of the monetary policy (Czyżewski, Kułyk 2010). Taking into consideration interest rates deflated with the indicator of the growth of agricultural prices, the range of changes was much wider (the reduction from 6,64% to 0,35% respectively). As a result, the growth of the money creation appeared. It allowed to diminish the costs of investment processes in agricultural holdings with the use of a credit mechanism and combining public resources with the private ones. The ability to regulate a supply side with help of the budget expansion also increased because the costs of obtaining financial sources were reduced at the same time. The reduction of interest rates contributed to the increase of the capital intensity of agriculture. The course of inflation processes and also the changes within interest rates were not similar. According to expectations in countries with higher inflation rates a higher level of interest rates variability appeared. It was not substantially correlated with only this aspect because it also resulted from other factors, including the conducted monetary policy as well. Therefore there were distinct preferences in relation to agriculture for the capital accumulation (the rate of return from capital is not included). The reduction of inflation rates in particular countries contributed to the increase of the possibilities to obtain resources in agriculture with a credit mechanism.

In highly-developed countries, which make use of the high level of macroeconomic stability, the retransfer of the economic surplus increased through a credit channel thanks to the reduction of interest rates. In lower-developed countries there was a reverse phenomenon. The level of macroeconomic stability changed the costs of obtaining financial resources by farms with help of credits.

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2 The exception is Switzerland.



**Table 1. Panel estimation of least squares with use of 168 observations  
10 units of cross-sectional data for dependent variable were included.  
(st.proc.def.CPI.food)**

Variable	Coefficient	Standard error	Statistics of t-student	p value
Constant	12,8308	3,14984	4,073	7,27e-05 ***
Agriculture support	27,4655	8,65398	3,174	0,0018 ***
ToT	-0,104769	0,0309781	-3,382	0,0009 ***
Exchange rate	-0,002071	0,000678238	-3,055	0,0026 ***
Economic growth	0,180255	0,0814882	2,212	0,0284 **
Permanent lands/ economic activity	-0,011125	0,00448298	-2,482	0,0141 **
Inflation rate	0,602504	0,111235	5,416	2,19e-07 ***
Arithmetic mean of dependent variable	4,153019		Standard deviation of dependent variable	2,748371
Sum of squares of residuals	786,0793		Standard error of residuals	2,216528
Coefficient of determination R-square	0,376841		Corrected R-square	0,349577
F(7, 160)	13,82230		p value for F test	6,17e-14
Akaike information criterion	752,0031		Statistics of Durbin- Watson	1,842429

\*\*\*p<0,001; \*\*p<0,05; p<0,1.

Dependent variable: st.proc.def.CPI.food

White's test for heteroskedasticity of residuals (variability of residual variance) coefficient of determination of R-square = 0,072610, p value = P(Chi-square(35) > 47,838873) = 0,072610.

RESET test for specification - zero hypothesis: specification correct. Statistics of the test: F(2, 158) = 6,82447 with p value = P(F(2, 158) > 6,82447) = 0,143636.

Test for non-linear - zero hypothesis: interdependence is linear. Statistics of the test: LM = 21,3948 with p value = P(Chi-square(7) > 21,3948) = 0,322778.

Source: own elaboration based on data: [www.oecd.org/dataoecd/](http://www.oecd.org/dataoecd/);  
[www.worldbank/database/](http://www.worldbank/database/), downloaded: 8.01.2012

The conducted analysis proved that the presented independent variables explain on average changes within a real interest rate for agriculture (coefficient

of determination at the level of 0,37). It does not allow to explain thoroughly the process of variability for a selected group of countries. The evaluation of the materiality level of exogenous variables distinguished on the basis of literature allowed to accept all variables at the materiality level of  $p < 0,05$ . Considering different relations between variables first differences between variables and their logarithmed values were estimated as well. The evaluation was conducted with use of Akaike information criterion. The estimation of the variable coefficients of the model shows that the changes of exchange rate have relatively small meaning. Among the other ones it is possible to indicate several significant interdependences. High levels of support for agriculture measured in relation to one active farmer were characteristic for the states with a relatively high level of the interest rate. It highlights the meaning of the amount of retransfers for the flow of financial resources with help of the credit market in well-developed countries. They increased the value of real interest rates for agricultural holdings, therefore the costs of obtaining those resources. A dependent variable is also favourably connected with the economic growth as well as general inflation rate, however with lower values of coefficients. Particular importance is attributed to the relation with the inflation rate indicating the influence of nominal variables on creating costs through the credit market. However the higher rate of economic growth, increasing a global demand, is usually treated as a factor raising the value of interest rates. Business entities in the conditions of the economic growth tend to raise higher costs of obtaining resources. A negative interdependence can be observed in relation to terms of trade and the amount of land. The higher level of the amount of land in agriculture, indicating the growth of demand for capital being a complementary factor for the increase of human capital as well as reducing the number of farmers (substitution effect of work-capital) appeared in the conditions of lower real interest rates. Thus such a process requires stability of the economic system for providing the flow of resources between agriculture and other areas of economy.

## 5. Conclusion

The conducted deliberations prove the emergence of the group of macroeconomic factors breaking the balance on the market of credits for agriculture measured with the interest rate deflated with the index of the prices of agricultural products. The imperfections of the credit market for agriculture in highly-developed countries become the effect of both the specificity of agricultural production and the resources connected with it as well as the

changes taking place on the global financial market. Among the significant factors it is necessary to pay also attention to the influence of the agricultural policy with help of retransfers dedicated to the agricultural sector, which was confirmed also in the model. A higher level of financial support caused an increase in real interest rates. This relation has both an indirect dimension with the very retransfers, but also a direct one with the amount of agricultural land. Moreover an important role is also played by nominal changes including the rate of inflation and terms of trade (tab. 1). It proves that as a result of their impact there is a change of the volume of incomes of farms, at least with the influence on the credit market for agriculture. The presented deformations cause that the allocation of the capital factor as well as relations between production factors can not fulfil the terms of optimization. It is however possible to indicate that the credit market for agriculture becomes the source of disturbances coming from both the background of its changes as well as conducted actions within the agricultural policy. For regard of the obtained average levels of model adaptation it is necessary to intensify the conducted deliberations.

## Summary

### **The imperfections of a credit market in agriculture**

In the article the relations of the credit market with the agricultural sector were evaluated. The significance of the imperfections in the allocation of resources with help of the credit market was presented. The attention was paid to both the specificity of the very agriculture and the external conditions, which were created as a result of the process of globalization. The effects of the impact of the selected macroeconomic indicators on the adjustments within the interest rate calculated with use of the changes of the prices of agricultural products were examined. Ten highly-developed countries were analyzed for regard of the similar conditions of functioning. The research period referred to 1990-2010. The conducted deliberations allowed to distinguish a group of factors influencing the terms of creating the costs of obtaining the credit money. The character of the existing correlations was analyzed. The different meaning of particular relations was proved. The presented results raise the significance of retransfers dedicated to agriculture with help of the state.

## Streszczenie

### Niedoskonałości rynku kredytowego w rolnictwie

W artykule poddano ocenie związki rynku kredytowego z sektorem rolnym. Podniesiono znaczeni niedoskonałości w alokacji zasobów za pośrednictwem rynku kredytowego. Zwrócono uwagę zarówno na specyfikę samego rolnictwa jak i warunków zewnętrznych, jakie zostały ukształtowane w wyniku procesu globalizacji. Zbadano skutki oddziaływania wybranych wskaźników makroekonomicznych na dostosowania w zakresie stopy procentowej przeliczonej za pośrednictwem zmian cen produktów rolnych. Analizie poddano dziesięć państw wysokorozwiniętych, ze względu na zbliżone warunki funkcjonowania. Okres badawczy obejmował lata 1990-2010. Przeprowadzone rozważania pozwoliły wyróżnić grupę czynników oddziałujących na warunki kształtowania kosztów pozyskania pieniądza kredytowego. Przeanalizowano charakter występujących zależności. Wykazano odmienne znaczenie poszczególnych relacji. Wskazane wyniki podnoszą znaczenie retransferów kierowanych do rolnictwa za pośrednictwem państwa.

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