



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

# Macroeconomic determinants of agricultural preferential investment credit in Poland

Alina Danilowska

Warsaw University of Life Science, Department of Economics and Economic Policy, Warsaw, Poland

**Abstract-** In the paper the impact of macroeconomic determinants on the number and value of agricultural investment preferential credits in Poland is examined. This kinds of determinants are of an exogenous character and they cannot be controlled by individual farm. They are related to economic growth, price level changes, monetary policy, inflation, changes in foreign trade conditions. The econometric analysis showed that macroeconomic environment influenced farmers' credit decisions at number and value of taken credits. The statistically significant variables in the case of these measures were the index of price relations of sold agricultural products to goods and services purchased by private farms ("price gap"), interest rate of central bank and real interest rate paid by farmers. Somewhat surprisingly, neither rate of GDP growth nor real effective exchange rate affected the scope of credits. In the case of GDP rate, the result can suggest that farmers expectations does not depend on current phase of business cycle. The reason of lack the influence of terms of foreign exchange can be explained partly by relatively low share of agricultural products in foreign trade turnover.

**Key words-** preferential credit, farmers, macroeconomic determinants,

## I. INTRODUCTION

The farmer's decision about the applying for investment credit is a result of many factors which are classified usually into two groups: micro and macro determinants.

The first group involves factors related generally to farmer's characteristic (demographic) and farm economics (assets, diversification of production, productivity, financial performance etc.). Most of these factors are results of making by farmer business decisions so they can be treated as being within the farmer's control. The second group of factors represents macroeconomic environment of farmers'/farms' activity. The factors in that group are of an exogenous character and they cannot be controlled by individual farm. They are related to economic growth, price level changes, monetary policy, inflation, changes in foreign trade conditions.

Generally, the analyses of agricultural credit are carried out at micro level or concern agricultural credit policy.

The investigation of the connections between micro determinants and different aspects of agricultural credits in Poland were carried by Beckmann and Boger [1], Danilowska [2], Dries and Swinnen [3], Latruffe and Petrick [4], Petrick [5]. The analyses of the influence of macroeconomic conditions on agricultural credit are carried rather seldom and are of descriptive character. This perspective was used for example by Kulawik [6] and Danilowska [7].

The aim of the paper is to examine the influence of macroeconomic determinants on the scope of taking of bank credits by farmers. The analysis in the paper should answer the question which of main macroeconomic variables influence the farmers' credit decisions, how strong and in which direction.

The paper starts with the presentation of the methods of analysis and sources of data. Next, the short description of agricultural credit market in Poland is given with the special focus on the system of preferential credits and the significance of these credits in agricultural bank credits. It is followed by characteristic of econometric model and its results. Finally, the conclusions are drawn up.

## II. MATERIALS AND METHODS

The examined period covers 13 years, from 1994 to 2006. The data considered in this study is obtained from some institutions. The data about numbers and values of preferential investment credits is taken from the annual Reports of The Agency for Restructuring and Modernization of Agriculture (ARMA), which is responsible for carrying the system of agricultural preferential credits. The macroeconomic indicators are published in Statistical Yearbooks of Central Statistical Office in Poland, the interest rate of central bank and exchange rates are available online through the National Bank of Poland and Eurostat website respectively.

To analyse how macroeconomic determinants influence the agricultural credit, the multiply linear

regression model with autocorrelation random disturbance was applied [8]. Additionally, the descriptive method is utilized to characterize the credit market and role of preferential credit on it.

### III. THE AGRICULTURAL CREDIT MARKET IN POLAND

The agricultural credits in Poland are granted by banks under two different patterns. Farmers can apply for commercial credits, that are allowed on market terms or for preferential credits, which terms are more favourable comparing with commercial ones in respect to interest rate ( in the case of about 90% of value of granted credits farmers paid 1/4 of central bank discount rate), maturity and the grace period.

Until the joining EU, the preferential credits were main tool of the government intervention in agriculture [9]. To maintain this tool the special system of preferential credits was establish at the end of 1993. It involves a special state agency – Agency for Restructuring and Modernisation of Agriculture (ARMA), commercial and cooperative banks that cooperate with this agency and Advisory Centres for Agriculture. Banks allow preferential credits from their own resources on their own risk in the framework of so called “lines of credits”, which differ by credit purposes, eligible borrowers and the level of subsidies. Number of these investment credits lines was changed nearly every year.

Table 1 Preferential agricultural credits due to lines granted by banks in 1994 -2006

Notes: <sup>1</sup> excluding credits for investments in food industry.

Source: Own calculations based on: data from Annual Reports on Activity of the ARMA (1994-2006).

Year	Basic investment credits <sup>1</sup>	Credits for land purchase	Credits to young farmers	Branch and regional credits <sup>1</sup>
	Number	Number	Number	Number
1994	15 850	-	-	81
1995	18 343	8 636	2 934	3 434
1996	15 494	14 246	23 376	4 139
1997	10 953	12 717	26 551	4 789
1998	3 317	4 902	7 595	1 324
1999	3 974	6 596	7 826	1 660
2000	2 755	5 642	5 707	1 837
2001	2 514	5 603	7 647	1 023
2002	4 728	6 718	10 226	1 424
2003	5 005	6 152	11500	1 134
2004	4 670	6 077	7 659	787
2005	4 535	6 267	8 365	609
2006	5 102	6 377	9 933	417
total	97 240	89 933	129 319	22 658

The most important and popular lines have worked since 1994 or 1995 continuously up today. Because of many commercial banks and nearly all cooperative banks grant preferential credits and the fact that the level of subsidies is high, the farmers have quite good access to these credits.

The data in Table 1 shows the results of the credit intervention relating to number of granted preferential credits.

During examined period about 340 thousands of investment preferential credits were granted to the Polish individual farmers. It can be estimated<sup>1</sup> that nearly 12% of all of individual farmers took this kind credits and about 25% of farms that produce mainly for sale<sup>2</sup>.

Data in Table 2 shows the role of preferential credits in the agricultural bank credits.

Table 2 The structure of farmers' debt in the banking sector, (December 31)

Source: Own calculations based on data from Bilansowe wyniki finansowe bankow w 1999-2006, GUS, Warsaw 2000-2007.

Year	Farmers' debt due to preferential credits in total farmers' bank debt (%)							
	1999	2000	2001	2002	2003	2004	2005	2006
Total	79.9	81.3	84.5	79.7	85.4	85.1	77.6	79.7

In the course the 1999-2006<sup>3</sup> the share of farmers' debt due to preferential credits in total farmers' bank debt was very high in many years more than 80%. Preferential credits nearly replaced commercial credits. It was mainly a result of quite easy access to preferential credits and vast range of preferential credits targets.

### IV. THE DETERMINANTS OF TAKING INVESTMENT AGRICULTURAL PREFERENTIAL CREDITS

#### A. *The choice of variables to model*

The analysis considers two measures representing the scope of preferential investment credits: number

<sup>1</sup> considering that one farm, which was taking the preferential credits took on average about 1.4 preferential credit [8]

<sup>2</sup> According to The Agricultural Census 2002, only 940,000 farms from about 2,000,000 of Polish farms produced mainly for market

<sup>3</sup> for the period 1994-1998 data is not available

and value of credits taken by farmers in every year of examined period.

As determinants of each dependent variable the same set of independent variables was pointed out. As aforementioned they are related to economic growth, monetary policy, price structure and condition of foreign exchange. They affect the scope of credits through the shaping farmers' business environment and creation their expectation as investors. On the other hand, some of them influence banks' credit policy and in result credit availability conditions.

Table 3 Description of variables used in model

<sup>1</sup> weighted average (using the period of validity)

<sup>2</sup> as a difference between  $\frac{1}{4}$  of the central bank rediscount rate and rate of change in prices of goods and services purchased by farms

<sup>3</sup> increase in value reflects worsening of terms of foreign trade

Source: Own calculations based on data from Statistical Yearbooks, NBP and Eurostat

Variable	Me- an	Std. Dev	Mini- mum	Maxi- mum	Valid obser
Rate of GDP growth (%)	4.6	1.84	1.1	7	13
Central bank rediscount interest rate <sup>1</sup> (%)	16.2	8.80	4.3	28.3	13
Real interest rate on preferential credit paid by farmers <sup>2</sup> (%)	-6.4	6.86	-18.82	0.55	13
Price relations ("price gap") of sold agricultural products to goods and services purchased by private farms (1990=100)	75.4	11.3	63.1	93.4	13
Real effective exchange rate (1999=100) <sup>3</sup>	105.0	14.96	79.02	128.0	13

In the model, the economic growth is represented by rate of GDP growth. This rate is the basic indicator of business cycle. It is expected that the higher its level is, the more favourable conditions of economic activity are and the expectations of investors are more optimistic what should influence positively the scope of investment credits. Additionally, during economic prosperity, banks are more inclined to grant credits and can relax their terms.

The central bank interest rate reflects the monetary policy, which affect banks' behaviour and influences credit availability conditions. The liberalization of monetary policy is signalled by decrease of central bank interest rates. Moreover, in the case of preferential investment credits in Poland, there is a strict relation between the level of central bank interest rate (rediscount rate) and the interest rate paid by

farmers. The reduction of discount rate is likely to have a positive influence on scope of examined credits.

The credit cost factor is represented in this study by real interest rate paid by farmers. It is a difference between the nominal interest rate paid by farmers (as aforementioned it is connected with rediscount rate) and rate of inflation. For most years in the analyzed period it was less than zero. It can be expected that the lower real interest rate is, the more farmers are interested in financing investments by credits.

The price gap between prices of goods sold and bought by farmers is used as measure of price changes of fundamental for farmers' financial performance importance. It is essential for farmers' expectations. The higher the indicator is, the more favourable for farmers price changes are, so the positive sign of coefficient can be expected.

The real effective exchange rate is a proxy for how the foreign trade influences the demand for agricultural products and influences the price changes. The decrease of the index indicates positive changes in foreign exchange terms. In most years of analyzed period terms of foreign trade were worsening.

## B. Results of the model

Tables 4 and 5 show the results of regression model. The levels of Chi-squared tests indicate that models for both dependent variables are statistically significant. The level of R<sup>2</sup> is high – 0.66 - in the case of number of taken credits and 0.65 in the case of their volume. The analysis showed that from five variables taken to model three are statistically significant. The level of coefficient for monetary policy proxy suggests that central bank rediscount rate is an important determinant for the number and volume of investment credits. Liberalization of monetary policy has an positive impact on farmers' decisions to finance investment by credits as can be supposed in both the direct and indirect way. Directly, it influences the nominal price of the preferential credits paid by farmers. Indirectly, it creates the conditions of banks' operating what can result in their willingness to granting agricultural credits.

The analysis confirms the expectation that real interest rate is important for farmers too. It is worth to underline that during the three first years of the investment preferential credit system operating the real interest rate was even two-digit for the favour of farmers.

Table 4 The results of multiply linear regression model for number of credits

<sup>1</sup> for 11 years in the 13 year period the real interest rate was negative quantities

Variable	Full model			Model only with significant variables		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Constant	-297436.8	96758.22	0.018	-241491.8	629266.97	0.004
Rate of GDP growth (%)	152.47	2186.22	0.9464			
Central bank rediscount interest rate (%)	-4344.36	1264.83	0.0109	-3395.46	921.09	0.005
Real interest rate on preferential credit paid by farmers (%) <sup>1</sup>	1569.03	1188.97	0.2285	2507.6	991.25	0.0323
Price relations ("price gap") of sold agricultural products to goods and services purchased by private farms (1990=100)	4929.78	1378.6	0.009	4492.57	1063.8	0.0022
Real effective exchange rate (1999=100)	276.79	398.11	0.5093			
Model significance LR test (Chi-squared) (p-value)						
R <sup>2</sup> _LR	14.56 (0.012)			14.05 (0.0028)		
	0.67			0.66		

Table 5. The results of multiply linear regression model for credit volume<sup>1</sup><sup>1</sup> in thousand PLN

Variable	Full model			Model only with significant variables		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Constant	-16349479	4790532	0.0112	-12700077	3414051	0.0048
Rate of GDP growth (%)	57644	134888	0.682			
Central banks rediscount interest rate (%)	-193001	60721	0.0155	-193339	48939	0.0034
Real interest rate on preferential credit paid by farmers (%)	148422	68051	0.0655	190126	55953	0.0079
Price relations of sold agricultural products to goods and services purchased by private farms (1990=100)	249420	70335	0.0094	247516	58034	0.0021
Real effective exchange rate (1999=100)	28295	23783	0.2730			
Model significance LR test (Chi-squared) (p-value)	16.11 (0.0065)			13.71 (0.0033)		
R <sup>2</sup> _LR	0.71			0.65		

The investigation illustrates the importance of "price gap" for the farmers activity as borrowers. This gap influences directly the financial results of farming as well as the farmers expectations. The level of coefficient point out the strong relationship.

Somewhat surprisingly, neither rate of GDP growth nor real effective exchange rate affects the scope of credits. In the case of GDP rate it can suggest that farmers expectations do not depend on current phase of business cycle. The reason of lack the influence of terms of foreign exchange can be explained partly by relatively low share of agricultural product in foreign trade turnover.

## V. CONCLUSIONS

Results on the level of influence that macroeconomic determinants have on taking investment preferential credits by farmers show, that macroeconomic environment is important. It is in line

with conclusions that have been drawn up by authors of World Bank Report on the functioning of financial market in Poland [10]. The statistically significant factors are related to different categories of price: "price gap", price of money in the economy and price of borrowing by farmers. In the light of findings of Danilowska [7] about the low influence of microeconomic determinants on farmers' credit decisions it can be said that macroeconomic determinants are much more important than factors connected with economics of farms and farmers' demographic features. It is a little surprising, and indicates that more attentions in investigations of farmers investment activity and investment financing should be paid on macroeconomic factors.

## REFERENCES

1. Beckmann V., Boger S. (2003) Courts and Contract Enforcement in Transition Agriculture: Theories and Evidence

- from Poland, *Agricultural Economics*, Blackwell, Vol. 31 (2-3), pp. 251-263
2. Danilowska A. (2007) Informal Loans – Alternatives or Supplements to Bank Credits for Polish Farms, *Studies on the Agricultural and Food Sector in Central and Eastern Europe*, edited by Martin Petric and Gertrud Buchenrieder Leibnitz Institute of Agricultural Development in Central and Eastern Europe IAMO, Halle (Saale) Vol. 39, pp. 93-112
  3. Dries I., Swinnen J. (2005) The Impact of Vertical Coordination on Supplier Access to Finance and Investments: Evidence from the Polish Dairy Sector, <http://agecon.lib.umn.edu>
  4. Latruffe L., Petrick M. (2005) The Determinants of Polish Farmers' Credit Interest Rates, <http://agecon.lib.umn.edu>
  5. Petrick M. (2004) A Microeconomic Analysis of Credit Rationing in the Polish Farm Sector, *European Review of Agricultural Economics* Vol. 31 (1), pp. 77-101
  6. Kulawik J. (2000) Makro i mikroekonomiczne przesłanki oraz skutki interwencjonizmu państwowego w sferze kredytowania rolnictwa. Synteza, IERiGZ, Warszawa
  7. Danilowska A. (2007) Poziom zroźnicowanie i uwarunkowania kosztów transakcyjnych kredytów i pożyczek rolniczych, Wydawnictwo SGGW, Warsaw
  8. Green W.H. (2000) *Econometric Analysis* (fourth edition), Prentice Hall International, London
  9. Danilowska A. (2005) The Credit Support System in the Polish Agriculture. The Evaluation of 10 Years Performance, <http://agecon.lib.umn.edu>
  10. Report no. 22598-pol. 2001: Poland. The Functioning of the Labor, Land and Financial Markets: Opportunities and Constrains for Farming Sector Restructuring. December 2001. Environmentally and Socially Sustainable Development Unit Europe and Central Asia Region. Document of the World Bank.
  11. Annual Reports on Activity of the ARMA (1994-2006), ARMA Warsaw
  12. Bilansowe wyniki finansowe bankow (1999-2006), Central Statistical Office (GUS), Warsaw 2000-2007
  13. Statistical Yearbooks of the Republic of Poland (1995-2007), Central Statistical Office, Warsaw  
<http://epp.eurostat.ec.europa.eu>
  14. <http://www.nbp.gov.pl>

Author: Alina Danilowska

- Institute: Warsaw University of Life Science, Department of Economics and Economic Policy
- Street: Nowoursynowska 166
- City: Warsaw 02-787
- Country: Poland
- Email: [alina\\_danilowska@sggw.pl](mailto:alina_danilowska@sggw.pl)