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The role of housing loans in stimulating economic growth: the case of Poland

Abstract

Research background and purpose: Studies and the impact of bank lending on GDP growth indicate a significant and positive relationship. Against the background of various forms of lending, housing loans stand out as a particularly important channel of influence of the banking sector on the real economy. The aim of the article is to empirically determine the impact of housing loans on Poland's economic growth in 2010-2023. The article poses a hypothesis stating that housing loans granted by the banking sector in Poland have a positive and statistically significant impact on economic growth, with the impact of loans granted by commercial banks being stronger than that of cooperative banks .

Design / Methodology / Approach: The study uses macroeconomic data for Poland on an annual basis, obtained from the CSO and FSA databases. The paper uses three linear regression models, estimated using the classical least squares method. Annual changes in real GDP were used as an explanatory variable, while the value of housing loans granted by commercial banks, cooperative banks, and the total banking sector were used as explanatory variables. For model transparency and to reduce the problem of collinearity, a VIF analysis was also carried out, thus eliminating overly correlated variables.

Findings: The results obtained confirmed the positive and statistically significant impact of housing loans on economic growth. In the study conducted, the regression coefficients were, respectively: 0.066 for the entire banking sector, 0.059 for commercial banks, and 0.054 for cooperative banks. In all models, high values of the adjusted coefficient of determination were achieved (R^2 ranging from 0.917 to 0.950), indicating the high strength of the variables adopted. These results confirm the research hypothesis set out in the paper.

Value added and limitations: The study makes an important contribution to the literature by providing evidence on the importance of housing loans as a driver of Poland's economic growth. The conclusions of the study can also provide valuable material for policymakers shaping credit and macroprudential policies. However, the analytical method is limited by its assumption of linear and symmetric effects and a lower R^2 for cooperative banks, possibly due to the local influences or variables not included in the model.

Keywords: *commercial banks, cooperative banks, housing loans, economic growth*

JEL Classification: E51, G21, O47

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1. Introduction

Modern market economies finance economic activity and consumption to a large extent through the banking system, and one of the key instruments that allows the allocation of capital in the economy is credit, whether to businesses, households, or farmers. In the context of lending to agricultural activities and the SME sector, cooperative banks play a particularly important role, which, due to the local nature of their activities and their relationship-based model, often better meet the needs of the aforementioned groups (Kura & Płonka, 2023; Bezzon et al., 2024; Hasan et al., 2014; Crovini et al., 2018). It should also be emphasised that, despite the wide range of new alternative forms of financing, in the SME sector, bank loans, along with equity, are one of the main sources of financing for investment activities (Kozioł & Pitera, 2018).

An equally important role in the economies of countries, including Poland, is played by housing loans, the value of which in banks' loan portfolios is growing year-over-year, which indicates the development of this segment of the banking sector (Feruś, 2024). The value and number of housing loans granted by a bank depends on a number of factors, including changes in interest rates and regulations (Lechowicz, 2023), and the growing demand for housing loans, as well as their increasing share in banks' loan portfolios, can significantly affect economic development (Folwarski, 2016). Housing loans play an important role in economic development by, among other things, stimulating the housing sector, through which they can significantly influence macroeconomic indicators (Bazilinska & Panchenko, 2020), or investment decisions (Bochkarova, 2023).

Therefore, the objective of the article is to empirically determine the impact of housing loans on Poland's economic growth in 2010-2023. The article poses the hypothesis that housing loans granted by the banking sector in Poland have a positive and statistically significant impact on economic growth, with the impact of loans granted by commercial banks being stronger than that of cooperative banks due to differences in the scale and nature of their operations.

Despite the growing interest in studying the impact of bank lending on economic growth, in principle few studies focus on the specific role of housing loans, particularly in an economy such as Poland. In addition, few works distinguish between the impact of loans granted by different types of banks (commercial and cooperative), as well as there is a lack of in-depth analysis of the long-term role of the housing sector as a possible channel for the transmission of credit impulses to the real economy, in a volatile macroeconomic and regulatory environment.

2. Literature review

The following theories of economic growth can be distinguished in the literature: classical, neoclassical, endogenous, Keynesian and Schumpeterian.

The classical theory of economic growth is mainly represented by Adam Smith, David Ricardo and Thomas Malthus Smith (1776) notes that the increase in national output is due to an increase in specialisation of labour, which consequently leads to an increase in productivity by dividing the manufacturing process into simpler and repetitive activities. Malthus (1798) supplements these considerations with the warning that the rate of population growth could outstrip the rate of growth of food stocks, which could contribute to limiting the growth of per capita income and, in the long run, inhibit overall economic growth. Ricardo (1817), on the other hand, points out that international trade also allows countries to focus on the production of goods in which they have a relative cost advantage, thus increasing the total volume of world output.

Two independent works - Solow (1956) and Swan (1956) - in turn form the basis of neoclassical growth theory. Solow (1956) points out that although investment increases the stock of capital, due to declining capital income, the growth rate of per capita income without a steady inflow of new technology will tend towards zero. Swan (1956), on the other hand, presents very analogous conclusions in his model, with a greater consideration of the impact of technological change, while emphasising that only through continuous innovation can the economy avoid the trap of low per capita income growth.

In terms of endogenous economic growth theory, Romer (1986) developed a model in which innovation and knowledge are treated as public goods with constant or increasing returns, allowing for sustained economic growth per unit without the need for exogenous technological shocks to enter. Lucas (1988), on the other hand, points to the important role of human capital in economic growth. Indeed, he believes that the growth of knowledge and skills among workers leads to an increase in production efficiency and generates a self-reinforcing mechanism of economic growth, as higher levels of human capital promote the discovery of new innovations.

Harrod (1936), in his work, defines the guaranteed growth rate as the ratio of the propensity to save to the ICOR (which represents how many units of capital are required to produce one unit of additional output), while stressing that any deviation from this rate leads to increasing and worsening volatility. Domar (1946), on the other hand, formulates the term required rate of growth by juxtaposing the growth of capital accumulation with the growth of output, pointing out that too low a level of investment in relation to the level of savings leads to a shortage of demand and its excess to excessive inflationary pressures.

On the contrary, Schumpeter (2021) developed the concept of creative destruction. According to it, entrepreneurs introducing new innovations that replace existing

innovations may lead to disruptions in the short term, but in the long term they drive economic growth by increasing productivity.

The studies available in the literature on the impact of bank lending on economic growth reveal a somewhat complex relationship. Studies show that bank lending has a moderately positive impact on GDP index growth in Europe and that the global financial crisis has contributed to weakening this relationship. Research by Antoshin et al. (2017) shows that a 10% increase in credit to the private sector increases real GDP by 0.6-1% and real private investment by 2-2.5%.

Particularly significant correlations are observed for housing loans. Studies in the Turkish market show that credit shocks, including housing loans, have a statistically significant impact on economic activity, especially in the short term (Küçük *et al*., 2020; Hanişoğlu & Azer, 2017). Research conducted by Timsina & Pradhan (2017) on banks operating in Nepal between 1996 and 2015 also finds that bank lending has a positive impact on economic growth. Similar conclusions are also drawn from a study by Morin & Özen (2020), where it was indicated that commercial banks, through the credit process, had a positive impact on the growth of the real sector, but some studies indicate that this impact is rather short-term in nature (Tahir et al., 2015).

Available research also suggests that changes in domestic credit to the private sector (calculated as a percentage of GDP) have a greater impact on GDP per capita growth than changes in the share of entrepreneurship in GDP (Sultanova, 2021).

In addition, it is indicated that in the short term, shocks to mortgages, house prices, and GDP have a positive impact on GDP, and a shock to mortgages has a positive impact on mortgage supply, while a shock to GDP has a negative impact on house prices (Filotto *et al*., 2018), indicating a complex interaction between housing credit, property markets, and economic growth. The rapid growth of lending in the context of housing loans, as observed in Central and Eastern European countries, has raised concerns about macroeconomic stability, particularly in the context of rising private sector indebtedness and the risk of housing price bubbles (Walko, 2008). However, a number of empirical studies indicate that relationship-based banking, i.e. cooperative banking, is more stable and countercyclical, as relationship-based banks are able to take more risks during economic downturns and, in addition, firms using relationship-based lending tend to benefit from better credit availability (Kil et al., 2025; Chiaramonte et al., 2013).

However, some studies also indicate a negative impact of credit on economic growth (Leitão, 2012). The related literature highlights that while public debt has a significant negative impact on GDP, private sector debt is associated with a positive impact, albeit a relatively weaker one (Snieška & Burkšaitienė, 2018). Another important factor that can affect economic growth is property prices. Studies show that their impact in this context is positive and immediate, and its magnitude is similar to the delayed negative impact of public debt on GDP (Snieška & Burkšaitienė, 2018). At the same time, it

should be pointed out that the relationship between household debt and economic growth may take on a non-linear character, and positive effects may turn into negative ones once the 58% PKV threshold is exceeded and after the global financial crisis (Asteriou & Spanos, 2022). Moreover, the non-negative effects of over-indebtedness become particularly apparent when the value of credit to the private sector exceeds 70% of GDP, which may indicate the need for a cautious assessment of the long-term effects of housing credit market development on economic growth (Asteriou & Spanos, 2022).

It is also worth pointing out that part of the study focuses on indicating that macroeconomic factors such as the rate of GDP growth and the scale of deposit funding play a significant role in credit growth and that GDP growth stimulates economic activity (or destimulates it during economic downturns) (Iwanicz-Drozdowska & Witkowski, 2016).

Based on their review of the literature, the authors formulated the following hypothesis: housing loans granted by the banking sector in Poland have a positive and statistically significant impact on economic growth, with the impact of loans granted by commercial banks being stronger than that of cooperative banks due to differences in the scale and nature of their operations.

3. Characteristics of the Polish housing loan market in comparison with EU countries

The ratio of loans granted by banks to the gross domestic product is a composite measure to illustrate the degree of integration of the banking sector with the real sphere of the economy. This indicator also makes it possible to assess the level of involvement of financial institutions in financing production and investment activities of enterprises, as well as in meeting the housing and consumption needs of households. On the other hand, the aforementioned credit-to-GDP ratio can also be interpreted as an indicator of the level of development and maturity of a country's financial system. Analysis of data on the ratio of household loans to GDP (Figure 1) allows us to see significant differences in the intensity of credit support to the real economy by the banking sector in individual member states of the European Union. When analysing data on the European credit market, the division of countries proposed by the United Nations (UN) was adopted. According to the aforementioned division, EU countries fall into one of four categories of European countries. The first group is the Western European countries, which include: Austria, Belgium, France, Germany, Luxembourg, the Netherlands, and Ireland. The second group, southern European countries, includes Croatia, Greece, Italy, Malta, Portugal, Spain, Slovenia, and Cyprus. Among the Central and Eastern European countries, Bulgaria, the Czech Republic, Poland, Hungary, Romania, and Slovakia are distinguished. The Baltic countries are Lithuania,

Latvia, and Estonia. The last group is made up of the Scandinavian countries, which include Denmark, Finland, and Sweden.

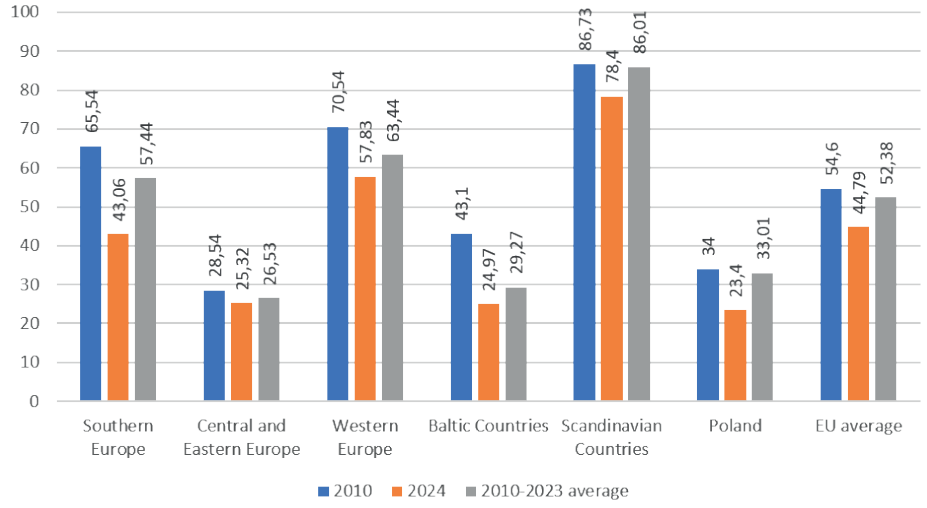

Figure 1. **Ratio of bank loans to households to GDP in EU country groups, 2010 and 2023, 2010 and 2023 (in %)**

Source: own study based on Kil et al. (2025)

Analysis of the data summarized in Figure 1 allows us to observe that during the analyzed period the highest values for the ratio of household loans to GDP were observed in the Scandinavian countries, where the average ratio was 86.01%. This was followed by the countries of Western Europe (63.44%) and southern Europe (57.44%), thus exceeding the average value for the countries of the European Union of 52.38%. The high share of household credit in GDP in the regions mentioned above may be due primarily to the dominant role of mortgages and the high level of social acceptance of external financing for both housing and consumption needs. Moreover, this level of the ratio can be interpreted as a factor promoting economic growth by stimulating domestic demand, boosting construction investment, and supporting the dynamics of private consumption.

A slightly different situation was observed in Poland (33.01%), Central and Eastern Europe (26.53%) and the Baltic states (29.27%), where the ratio of household loans to GDP remained significantly below the average EU. The countries in the aforementioned

groups also saw a decrease in the value of this indicator compared to 2010. The observed situation may be indicative of growing credit barriers, such as high interest rates, which have a significant impact on the pricing of debt instruments, including mortgages (Glova & Sabol, 2011). An additional factor may be the deteriorating creditworthiness of households, or banks tightening their credit policies in response to higher credit risk. Additionally, regulatory constraints, including limits on loan-to-value (LTV) ratios and debt service-to-income (DSTI) ratios, have played a key role in shaping access to mortgage financing in these regions. These prudential measures, while aimed at ensuring financial stability, may also restrict the availability of credit, thus impacting the dynamics of housing loans and their contribution to economic growth. The observed changes may also indicate greater financial caution on the part of consumers, greater interest in saving, or the growing popularity of renting as an alternative to owning property.

Figure 2 presents changes in the value of housing loans granted by banks operating in Poland between 2010 and 2024.

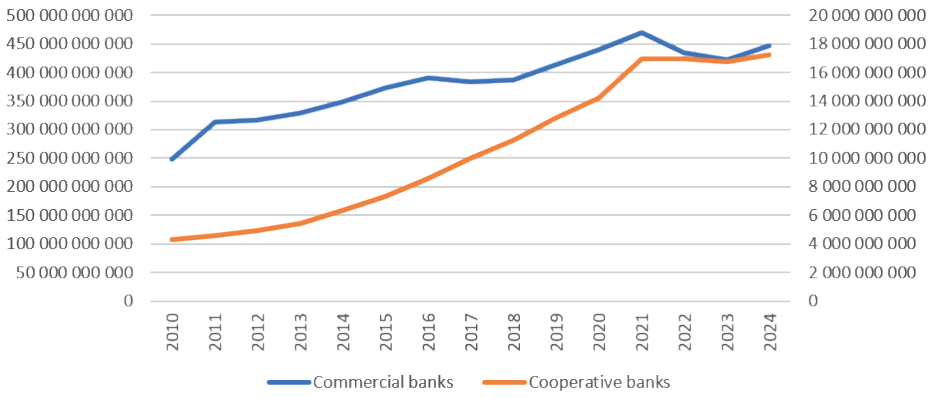

Figure 2. **Value of housing loans granted in Poland in 2010-2024 by commercial banks (left axis) and cooperative banks (right axis)**

Source: own elaboration based on KNF data

On the basis of the data presented in the graph, it can be concluded that commercial banks remained the dominant source of financing for housing needs. From 2010 to 2020, significant and stable growth was observed in the value of the mortgage portfolio. This period was characterised by a favourable macroeconomic environment and relatively low interest rates, as well as high demand for residential property. In 2021, however,

an apparent weakening of credit dynamics began to be observed. The reduction in residential lending in 2022-2023 can be interpreted as an effect of the central bank's monetary tightening, with a consequent increase in interest rates and a deterioration in credit availability. However, in 2024, a renewed increase in the value of lending has begun to be observed, which may signal the start of a renewed recovery in the housing loan market. For cooperative banks, the increase in the value of loans granted between 2010 and 2020 was much more dynamic.

Furthermore, it should be noted that in the period 2022-2023, cooperative banks did not experience such a significant impact of monetary policy on the housing loan portfolio as in the case of commercial banks. In the context of the analyses carried out on the value of housing loans granted, it can be seen that the dynamics of the housing loan sector will weaken after 2021, which may have negative implications for economic growth, especially with regard to housing, as an important channel for the transmission of fiscal and monetary impulses. It can also be argued that, on the one hand, the growing role of cooperative banks may compensate to some extent for some of the constraints associated with the commercial banking sector, but due to their relatively smaller scale of operation, it is not a full substitute. In the longer term, constraints related to the supply of mortgage credit may contribute to a slowdown in the dynamics of investment in residential real estate and, consequently, also to a reduction in activity in the construction sector and a weakening of multiplier effects in the economy.

4. Methods

The study focused on assessing the impact of the value of housing loans granted on Poland's economic growth in 2010-2023, using three separate linear regression models estimated using the least squares method. The dependent variable was annual gross domestic product (GDP) growth, while the experimental variables were the values of housing loans granted by the entire banking sector, commercial banks, and cooperative banks, respectively. Each of these three measures (i.e., the values of the housing loans granted) was estimated separately, with a uniform set of control variables. This made it possible to compare the strength and significance of the impact of the experimental variables between different segments of the banking sector. For reasons of availability, annual data made available by GUS (2025) and KNF (2025) were used.

Based on a review of the literature, 10 control variables with the potential to significantly affect economic growth were identified. These included the following: number of patents granted, education level of young people, budget expenditure, net export balance, capital expenditures, number of dwellings built, industrial output sold, consumption

in the household sector, number of people working in the national economy, and inflow of foreign direct investment. The characteristics of the variables used are presented in Table 1. Tables 2 and 3 contain descriptive statistics and the correlation matrix of the variables included in the statistical analysis, respectively. Calculations were carried out using Gretl software.

Table 1. **Characteristics of the variables used in the study**

Dependent variables – DEP.VAR.	
GDP	Gross Domestic Product (GDP) y/y
Experimental variables – CREDIT.VAR.	
SECTOR	Housing loans in the banking sector y/y
COMM.B	Housing loans in commercial banks y/y
COOP.B	Housing loans in cooperative banks y/y
Macroeconomic control variables – CONTR.VAR.	
PATENTS	Patents granted y/y
EDUCATION	Education level of young people (overall)
EX_NETTO	Net exports (balance of trade in goods) y/y
BUD_EXPEN	Total state budget expenditure y/y
INVEST	Total investment outlays y/y
DWELLINGS	Dwellings completed (put into use) y/y
INDUST.SALES	Total industrial sales y/y
CONSUM	Household sector consumption y/y
EMPL	Employed in the national economy y/y
FDI	Foreign direct investment y/y

Source: own elaboration

Table 2. **Statistics for the variables used in the study**

Variable	Average	Minimum	Maximum	Standard deviation
GDP	0.035	-0.020	0.069	0.025

SECTOR	0.055	-0.077	0.228	0.080
COMM.B	0.058	-0.076	0.263	0.092
COOP.B	0.115	-0.012	0.194	0.064
PATENTS	0.054	-0.314	0.436	0.243
EDUCATION	0.907	0.897	0.930	0.008
EX_NETTO	-0.653	-12.272	8.224	4.792
BUD_EXPEN	0,061	-0,027	0,275	0,085
INVEST	0.037	-0.112	0.154	0.070
DWELLINGS	0.027	-0.151	0.167	0.085
INDUST.SALES	0.051	-0.019	0.147	0.043
CONSUM	0,028	-0,034	0,062	0,027
EMPL	0.007	-0.083	0.031	0.028
FDI	0.282	-0.707	3.094	0.910

Source: own elaboration

Before the actual analysis, a preliminary study was conducted to assess the collinearity between the control variables. The variance inflation factor (VIF) coefficients were calculated for all independent variables, assuming that a value greater than 10 indicates a significant risk of collinearity and a reduction in the precision of the estimation. As a result of this verification, the two variables with the highest VIF values, i.e., budget expenditure and household sector consumption, were discarded. Despite the reduction in the set of independent variables, the approach adopted made it possible to maintain an adequate multidimensionality of the economic growth phenomenon and to eliminate excessive collinearity, which increases the reliability of the results obtained. Maintaining multidimensionality means that the model still includes key areas of influence (e.g., number of dwellings built, investment outlays, net exports, etc.), which makes it possible to isolate the effect of the impact of the value of housing loans granted from other independent variables. This makes the estimated impact of the value of housing credit on GDP more reliable, both from a statistical (lower VIF) and substantive point of view, as the model still reflects the various dimensions that determine economic growth.

Table 3. **Correlation matrix for the variables used in the study**

	GDP	SECTOR	COMM.B	COOP.B	PATENTS	EDUCA-TION	BUD_ EXPEN
GDP	1.000						
SECTOR	0.104	1.000					
COMM.B	0.096	0.978	1.000				
COOP.B	0.333	0.439	0.323	1.000			
PATENTS	0.260	0.414	0.450	0.368	1.000		
EDUCATION	0.047	-0.217	-0.228	-0.312	-0.086	1.000	
BUD_EXPEN	-0.644	-0.281	-0.248	-0.384	-0.167	0.497	1.000
EX_NETTO	-0.645	0.325	0.334	0.279	0.138	-0.162	0.515
INVEST	0.578	-0.020	0.001	-0.150	-0.036	0.336	-0.195
DWELLINGS	0.104	-0.429	-0.436	0.207	-0.055	-0.332	0.063
INDUST. SALES	0.846	0.268	0.261	0.335	0.291	0.042	-0.590
CONSUM	0.940	0.028	-0.002	0.404	0.161	0.113	-0.636
EMPL	0.710	0.061	0.044	0.285	0.331	0.225	-0.618
FDI	0.322	0.134	0.116	0.304	0.198	-0.041	-0.361
	EX_NETTO	**INVEST**	**DWEL-LINGS**	**IN-DUST. SALES**	**CONSUM**	**EMPL**	**FDI**
EX_NETTO	1.000						
INVEST	-0.472	1.000					
DWELLINGS	0.067	-0.276	1.000				
INDUST. SALES	-0.500	0.375	-0.151	1.000			
CONSUM	-0.620	0.409	0.100	0.836	1.000		
EMPL	-0.520	0.285	-0.119	0.568	0.810	1.000	
FDI	-0.146	0.401	-0.184	0.257	0.249	0.193	1.000

Source: own elaboration

The final functional form of the model was as follows:

where: i - period number; t - object number; DEP.VAR. - dependent variable (GDP); CREDIT.VAR. - experimental variables (SECTOR, COMM.B, COOP.B), CONTR.VAR. - control variables (PATENTS
EDUCATION, EX_NETTO, INVEST, DWELLINGS, INDUST.SALES, EMPL, FDI); εit - random component.

5. Results and discussion

Table 4 shows the results of the estimation of the impact of the value of housing loans granted on economic growth. For the banking sector as a whole, the regression coefficient on the value of housing loans granted was 0.066 and was found to be statistically significant, which may indicate a strong and positive impact of these loans on GDP growth. Similarly, in the model that included the value of housing loans granted by commercial banks, the coefficient was 0.059, while in the model for cooperative banks, the coefficient was 0.054. These results indicate that both the value of housing loans granted by commercial banks and cooperative banks can have a significant and positive impact on economic growth, with the strength of this impact being greater for the former. The results obtained are consistent with those of available studies. The positive impact of housing loans on economic growth has been proven and confirmed by several studies (e.g. Küçük et al., 2020; Hanişoğlu & Azer, 2017; Timsin & Pradhan, 2017; Morina & Özen, 2020). There are available studies that show that the development of the banking sector as a whole also has a positive and significant impact on economic growth, and this effect is particularly evident in the EU post-transition countries and the CEE region (Yılmaz Bayar et al., 2020; Zeqiraj et al., 2019; Dinu & Roman, 2024). However, it should be noted that Petkovski and Kjosevski (2014) have shown that a negative relationship between credit to the private sector and economic growth is observed in transition countries, which undoubtedly highlights the complexity of this sector and the need for various measures to promote its stability and development (Yılmaz Bayar et al., 2020).

Research in developing countries also confirms the positive impact of banking development on the economy (Ayunku, 2014; Aurangzeb, 2012; Saqib, 2016), and among the key factors that stimulate this are the liberalisation of the sector, access to credit, interest rates and investments that support long-term growth.

Table 4. **Results of model estimation for economic growth (GDP)**

Model number	1	2	3
SECTOR	0.066*** (0.010)		
COMM.B		0.059*** (0.011)	
COOP.B			0.054*** (0.018)
PATENTS	0.001 (0.003)	-0.001 (0.003)	0.005 (0.006)
EDUCATION	0.010 (0.082)	0.033 (0.087)	-0.129 (0.204)
EX_NETTO	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
INVEST	0.120*** (0.013)	0.115*** (0.012)	0.132*** (0.019)
DWELLINGS	0.121*** (0.013)	0.123*** (0.016)	0.081*** (0.014)
INDUST.SALES	0.272*** (0.029)	0.273*** (0.03)	0.280*** (0.048)
EMPL	0.251*** (0.034)	0.257*** (0.033)	0.209*** (0.036)
FDI	0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)
CONST	-0.002 (0.075)	-0.023 (0.078)	0.122 (0.187)
VIF (max)	2.847	2.954	3.590
R^2	0.950	0.947	0.917

Resistant standard errors are given in parentheses. The p-values for the statistical tests are given. *** significance at the 1% level, ** significance at the 5% level, *significance at the 10% level

Source: own elaboration

In the context of mortgages, while undoubtedly an important driver of construction and economic development, it has been pointed out that over-expansion of this form of

financing can lead to increased macroeconomic volatility, as well as crises (Bezemer et al., 2016; Greenwald, 2016), hence the importance of proper regulation, concerning, for example, limits on the DSTI ratio, which prove to be more effective in mitigating risk than limits on loan values alone (Greenwald, 2016).

However, it should be noted that previous studies have not considered the distinction of loans by the type of bank that provides them, which is an added value of our study.

Since the method of least squares assumes linearity and symmetry of effects, a positive and negative change in the value of housing loans granted of the same size translates into an increase or decrease in GDP, respectively. When commercial banks reduce the value of mortgage loans granted, the decline in economic growth may be more severe than in the case of an analogous reduction in cooperative banks. From this point of view, commercial banks may act as an amplifier of the business cycle - in both growth and slowdown phases, changes in the value of housing loans may lead to relatively stronger fluctuations in GDP than in the case of cooperative banks. The differences between the regression coefficients also reflect the relative effectiveness of the two banking subsectors in influencing the economy, commercial banks, operating on a larger scale and with a more diversified loan portfolio, show a slightly stronger impact than cooperative banks.

In the context of the adopted model specification, the results obtained may confirm that housing loans represent an important transmission channel of the impact of banking sector activity on the real economy. Maintaining a consistent structure of control variables ensures that the estimated coefficients reflect the direct impact of the value of housing loans granted, while eliminating the influence of other independent variables. The results obtained can provide a basis for formulating recommendations for credit policy and macroprudential instruments, supporting the optimisation of the role of commercial and cooperative banks in financing housing and stimulating economic growth.

All three models are also characterised by very high values of the adjusted coefficient of determination, which may indicate the high ability of the adopted set of independent variables to explain the variability of economic growth. For the model including the entire banking sector, the adjusted R^2 is 95%, for commercial banks 94.7% and for cooperative banks 91.7%. This may imply that in each of the three approaches, the experimental variables together with the controls explain GDP changes very well, with the analysis of the whole sector providing the highest precision and the study of cooperative banks providing the lowest, although still very good, precision. This spread in adjusted R^2 values may suggest that additional unrecognised factors are more important for cooperative banks, which may be due to their local specificity of operations. In contrast, the high R^2 values for the sector as a whole and for commercial banks may indicate that the value of housing loans

granted in these areas may be more homogeneous in nature and more strongly predict growth.

6. Robustness check

In order to determine the stability of the results obtained, a robustness analysis of the panel models was also performed (Table 8-10). As part of the modifications made to the model, independent variables that had a high level of correlation with each other were swapped, and two new control variables were added. Table 5 shows a description of the new independent variables that were used to test the stability of the models made. The statistical characteristics and correlation matrix of the new control variables are presented in Tables 6 and 7, respectively.

Table 5. **Characteristics of the variables used in the robustness check study**

Macroeconomic control variables – CONTR.VAR.	
CPI	Inflation, consumer prices
STOCK	Change in 0.05-quantile of the daily returns of the WIG index within each year

Source: own elaboration

Table 6. **Statistics for the variables used in the robustness check study**

Variable	Average	Minimum	Maximum	Standard deviation
CPI	0.036	-0.009	0.144	0.044
STOCK	-0.017	-0.027	-0.011	0.005

Source: own elaboration

Table 7. **Correlation matrix for the variables used in the robustness check study**

	GDP	SEC-TOR	COMM.B	COOP.B	PA-TENTS	EDU-CA-TION	BUD_ EXPEN	EX_ NETTO
CPI	-0.030	-0.472	-0.375	-0.816	-0.342	0.420	0.269	-0.447
STOCK	0.229	-0.186	-0.264	0.448	0.177	0.100	-0.259	0.013
	INVEST	DWEL-LINGS	INDUST. SALES	CONSUM	EMPL	FDI	CPI	STOCK
CPI	0.207	-0.200	0.126	-0.050	-0.153	-0.157	1.000	
STOCK	0.066	0.227	0.069	0.350	0.567	0.056	-0.403	1.000

Source: own elaboration

Table 8. **Robustness check results of model estimation for economic growth (GDP) and banking sector (SECTOR)**

Model number	4	5	6	7
SECTOR	0.052*** (0.013)	0.052*** (0.016)	0.048*** (0.016)	0.058*** (0.012)
CPI	-0.050* (0.031)			
STOCK		-0.552*** (0.158)		
BUD_EXPEN			-0.107*** (0.026)	
CONSUM				0.617*** (0.038)
VIF (max)	4.020	3.031	5.452	2.700
R^2	0.941	0.949	0.907	0.962

Models 4–7 include the following control variables: PATENTS, EDUCATION, EX_NETTO, INVEST, DWELLINGS, INDUST.SALES, EMPL, FDI, and CONST. Model 6 excludes EMPL; Model 7 exclude both EMPL and INDUST.SALES. Resistant standard errors are given in parentheses. The p-values for the statistical tests are given. *** significance at the 1% level, ** significance at the 5% level, *significance at the 10% level.

Source: own elaboration

Table 9. **Robustness check results of model estimation for economic growth (GDP) and commercial banks (COMM.B)**

Model number	8	9	10	11
COMM.B	0.049*** (0.009)	0.045** (0.021)	0.047*** (0.013)	0.056*** (0.013)
CPI	-0.075*** (0.023)			
STOCK		-0.420 (0.281)		
BUD_EXPEN			-0.112*** (0.023)	
CONSUM				0.622*** (0.041)
VIF (max)	3.437	6.087	5.136	
R^2	0.953	0.937	0.912	

Models 8–11 include the following control variables: PATENTS, EDUCATION, EX_NETTO, INVEST, DWELLINGS, INDUST.SALES, EMPL, FDI, and CONST. Model 10 excludes EMPL; Model 11 exclude both EMPL and INDUST.SALES. Resistant standard errors are given in parentheses. The p-values for the statistical tests are given. *** significance at the 1% level, ** significance at the 5% level, *significance at the 10% level.

Source: own elaboration

Table 10. **Robustness check results of model estimation for economic growth (GDP) and cooperative banks (COOP.B)**

Model number	12	13	14	15
SECTOR	-0.098 (0.068)	0.086*** (0.007)	0.054** (0.024)	-0.004 (0.017)
CPI	-0.233** (0.092)			
STOCK		-1.199*** (0.166)		
BUD_EXPEN			-0.094*** (0.027)	
CONSUM				0.703*** (0.085)
VIF (max)	22.698	4.608	7.078	5.360
R^2	0.921	0.972	0.900	0.930

Models 12–15 include the following control variables: PATENTS, EDUCATION, EX_NETTO, INVEST, DWELLINGS, INDUST.SALES, EMPL, FDI, and CONST. Model 14 excludes EMPL; Model 15 exclude both EMPL and INDUST.SALES. Resistant standard errors are given in parentheses. The p-values for the statistical tests are given. *** significance at the 1% level, ** significance at the 5% level, *significance at the 10% level.

Source: own elaboration

In the case of the modifications made to the model, which included the addition of new and the replacement of existing independent variables, it was found that qualitatively the results remained consistent and the previous interpretation of the results did not change.

7. Conclusions

The analysis of the Polish housing loan market in comparison to the European Union shows that the ratio of household loans to GDP in Poland is significantly below the EU average. The observed phenomenon may be indicative of the existence of credit barriers, such as, for example, high interest rates, deteriorating creditworthiness, or changes in consumer behaviour. The observed phenomenon of the deterioration of the ratio of housing loans to GDP may be a manifestation of structural changes in the functioning of financial systems and the model of financing economic growth. From

the perspective of economic growth, the consequence of the aforementioned trend may be a weakening of investment and consumption dynamics, especially in those countries where the banking sector has traditionally played a key role in financing growth. A lower level of banks' involvement in lending may consequently result in a slower transmission of demand impulses into the economy, which in the longer term may have a negative impact on the rate of economic growth. Historically, commercial banks have been the dominant source of housing finance in Poland, but a weakening of the dynamics of housing loans has been observed after 2021, which may be an effect of the tightening of monetary policy. This impact appears to be less pronounced in cooperative banks, which recorded more dynamic growth between 2010 and 2020 and were less affected by policy tightening between 2022 and 2023. The weakening of the dynamics of the housing loan sector after 2021 may have negative implications for economic growth, particularly in residential construction, and constraints on the supply of mortgage credit may contribute to a slowdown in property investment and construction activity in the longer term.

The results obtained in the empirical analysis confirm the positive impact of housing loans on economic growth, with the strength of the impact of commercial banks slightly higher than that of commercial banks. Therefore, these results confirm the research hypothesis that housing loans granted by the banking sector in Poland have a positive and statistically significant impact on economic growth, with the impact of loans granted by commercial banks being stronger than that of cooperative banks due to differences in the scale and nature of their operations. The observed differences in impact between commercial and cooperative banks may reflect the relative efficiency of the two subsectors and the scale of their operations. Commercial banks, due to their larger scale, can act as an amplifier of the business cycle, meaning that changes in the value of their housing loans can lead to stronger fluctuations in GDP than in the case of cooperative banks.

From a practical and regulatory perspective, these findings highlight that the housing loans are strongly influenced by changes in the monetary policy stance and regulatory requirements, including LTV and DSTI limits, which directly affect households' access to mortgage loans and, consequently, investment and consumption dynamics. This indicates that policymakers and financial supervisors should consider the potential long-term impact of credit tightening on economic growth when designing macroprudential policies, particularly in economies where the banking sector plays a critical role in financing residential investment and overall economic activity. Furthermore, the results underscore the importance of coordinating monetary and regulatory policies with housing programs to effectively support sustainable development of the housing market and promote broader economic growth.

Attention should also be paid to the limitations of the analytical method used, which assumes linearity and symmetry of effects, which is not always reflected in

reality. Furthermore, the relatively lower R^2 for cooperative banks may be due to the influence of local factors or variables not included in the model. In future research, the authors could focus on extending the analysis to include nonlinear models and cross-country comparisons, also taking into account structural variation in financial markets.

Authors' contribution

M.F., M.B. and **B.B.:** article conception, theoretical content of the article, research methods applied, conducting the research, data collection, analysis and interpretation of results, draft manuscript preparation.

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