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THE ROLE OF BANK CREDIT IN BUSINESS FINANCING IN POLAND

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The role of bank credit in business financing in Poland

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Abstract

The purpose of the paper is to verify the applicability of the pecking order theory to Polish non-finance companies' inclination to use credit-based financing, as well as to indicate the long-term and short-term bank credit use determinants, including the monetary policy impact and the year effect. The analysis covers a sample of 800,000 observations across the period 1995-2011, using the GMM system method. The impact of foreign and government ownership, the share of exports, profitability, liquidity, fixed assets collateral and monetary policy are the determinants of the long-term and short-term bank loan in business financing investigated in the study.

For small and medium-sized enterprises, a negative correlation is found between profitability and both long- and short-term loan financing, as well as between liquidity and short-term loan financing, according to what the pecking order theory assumes. A negative impact of restrictive monetary policy effected via interest rate and rate of exchange channels on Polish firms' decisions as regards financing their business with short-term bank loan is found. The effect of the current and previous period payment gridlocks on short-term bank loan financing experienced by small and medium-sized enterprises should help banks adjust their loan offer to SMEs' needs. The correlation between the bankruptcy risk level and companies' short-term borrowing decisions – positive in the group of large firms and adverse among SMEs – should guide banks' loan committees when modifying their creditworthiness analysis and loan application verification procedures. The use of (S)VAR panel method for investigating the response of the bank loan financing level to the interest rate, exchange rate and credit risk disturbance (shock) are the original aspects of the study. The empirical evidence that a higher share of liquid securities in assets reduces the use of short-term loan and that in small firms its level in a previous period is positively correlated with the use of short-term bank loan financing is the added value of the paper.

Keywords:

bank loan, long-term bank loan, short-term bank loan, pecking order theory, system GMM, (S)VAR

JEL:

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1. Introduction

The low use of bank loans in business financing may be a result of aversion to take on debt and of self-financing preferences – as the pecking order theory assumes – but also of low credit ratings assigned based on restrictive criteria and terms of lending, as well as of the access to alternative sources of financing. Furthermore, the literature of the subject indicates also the influence of the low competitiveness in the banking sector, the high concentration as measured with the Lerner index and the macroeconomic situation, including the financial development of the country, the access to information and the state treasury share in the ownership structure of banks. The impact of these determinants varies – in particular, **Love and Peria (2012)** observe that the impact of bank competition and concentration depends on the economic environment. In some countries, the negative effect of low bank competition may be mitigated by such positive factors as the accessibility of loan information or the general country-level of financial development, while in some other countries this impact may be moderated by the high share of government ownership in the banking sector. The intention of present paper is to look for the causes of the Polish non-finance firms' low inclination to use bank loan as a source of business financing in the pecking order theory, taking into consideration the monetary policy aspect and the general economic situation measured by means of the year effect. Profitability measured by the capability of self-financing (generating financial surplus, i.e. operating cash flow determined by the indirect method) and liquidity are included among explanatory variables in order to verify the pecking order theory applicability to Polish companies choices as regards financing their business with bank loans. The purpose of including domestic interest rate WIBOR3 and the effective exchange rate with their lags and interactions with company size is to analyse the effect of monetary policy restrictions on companies' inclination to use bank loan and financing their business **by bank loans**. We are presuming that as profitability and liquidity grow, companies are less willing to contract bank loans, whether long-term for financing capital expenditures, or short-term to support current operations and the share of new loans in external financing drops. The paper has been structured in a manner intended to support our process. The initial section introducing the theoretical background and research hypotheses is followed by presentation of empirical findings and a

discussion with reference to the literature of the subject. The article ends with a summary and conclusions.

2. Theoretical background and hypotheses

When listing the key factors determining the accessibility of loans to firms, **Guo and Stepanyan (2011)** bring up the banking sector health, as well as economic growth and low inflation. According to **Jiménez et al. (2010)**, bank capital plays a vital role in accessibility of bank loans. Capital infusion into a company and a bank, as well as liquidity injections lead to an increased supply of bank loans as a rule, but the method used to strengthen banks' balance sheets (e.g. through a central bank credit) may impact credit expansion.

When listing determinants of the loan channel sensitivity to monetary policy impulses in Poland, **Kokoszcyński et al. (2002)** indicate the size, liquidity and capital of banks. They find that in a period of restrictive monetary policy, large and strong banks may reduce their supply of loans less than small banks with a low capital level. **Carbo-Valverde et al. (2011)** express an opinion that relational banking, as well as the length and the number of lending relationships considerably improve credit supply and reduce the degree of credit rationing. A bank involved in securitization (issuing securities as loan collateral) relaxes credit constraints in normal periods, however it increases credit rationing during crisis periods. According to **Brown et al. (2010)**, low credibility of the domestic monetary policy may make banks reluctant to lend in the local currency, especially at longer maturities. Lenders offer foreign currency loans if they have increased access to foreign currency liabilities in the form of wholesale funds (Federal Reserve funds, government funds) or customer deposits. Firms, on the other hand, request foreign currency loans if the interest rate differential between local currency and foreign currency credit is high, the volatility of the exchange rate is low and they have a foreign currency income and lower distress costs. Loan maturity is positively correlated with the probability of using a foreign currency loan, although longer maturity is accompanied by a higher interest rate risk as a rule. Lower exchange rate volatility does not have any positive effect on the foreign currency loan, which may result from stabilization of expectations in respect of the European Union's monetary policy. The findings presented by **Brown et al. (2011)** support expectations that development of the foreign

currency borrowing is driven by stable exchange rates and uncertain domestic monetary policies. The economic importance of unstable domestic policy is moderate when compared with the role of companies' revenues or foreign ownership. **Guo and Stepanyan (2011)** state that countries with a higher share of foreign borrowing in domestic credit financing, some European emerging market economies in particular, experienced the largest swings of credit growth before and after the financial crisis of subprime crediting. Given the volatility of capital flows, a banking system which is dependent on foreign funding may prove more vulnerable to external shocks and to boom-bust cycles. Countries that saw little deceleration of credit growth during the crisis were characterized by a relatively stable domestic deposit growth. While the authors here are aware that the low share of bank credit in business financing is a result of the banking sector standing and of the macroeconomic conditions, the focus of the present study is on micro-economic determinants related to the internal financial situation of corporate borrowers, as well as on structural aspects (e.g. legal status, ownership, direction of selling). The problem will be analysed at the company level, not at the bank level.

2.1 Profitability

According to the **trade-off theory** (Kraus and Litzenberger, 1973), profitable companies paying higher corporate income taxes should use more loans, thereby increasing the leverage. The **pecking order theory** (Myers, Majluf, 1984; Myers, 1984), on the other hand, stressing the problem of information asymmetry between the company board and company owners and external investors, indicates that companies choose sources of capital with the lowest level of information gap, since publication of information is costly. Therefore firms prefer internal sources of financing and are most willing to finance their business development with retained earnings. When the internally generated cash surplus turns out insufficient to cover capital expenditures, companies seek external funding with minimum risk involved, namely: bank loans, the issue of bonds and the issue of shares successively. **Alonso et al. (2005)** identify a negative correlation between return on assets and loan-based financing, thereby supporting the pecking order theory. Furthermore, the authors prove that less profitable companies seek loans in order to reduce the risk of inefficient liquidation. Using a probit model, **Cole (2008)** proves that companies declaring no need to borrow are smaller, more profitable, have a lower

leverage, higher liquidity, are longer present on the market, have no problems with late payment of their trade credit, while companies whose loan applications have been accepted are larger. When analyzing how the company size (measured by the logarithm of sales) influences the level of bank loan financing, **Cole (2010)** finds that smaller, more profitable companies with a higher liquidity and owing less fixed assets do not use bank loans. On the other hand, large firms financing their business with bank loan are larger, younger, less profitable and have a lower liquidity. An adverse correlation between profitability and corporate borrowing is proved by **Boguszewski and Kocięcki (2000)**, **Bougheas et al. (2004)**, **Ghosh and Sensarma (2004)**, **Alonso et al. (2005)**, **Dewaelheyns et al. (2007)**, **Cole (2008)**, **Jiménez et al. (2010)** and **Cole (2010)**. Based on the findings referred to above and seeking to verify whether Polish businesses' choices in respect of using bank loan conform with the pecking order theory, we have formulated **Hypothesis 1**: More profitable companies tend to use less bank loan, whether long-term or short-term, to finance their business.

2.2 Liquidity

According to **Acharya et al. (2010)**, aggregate risk is a fundamental determinant of companies' liquidity management choices (cash versus credit lines). Firms with high aggregate risk find it costly to open credit lines, companies exposed to systematic risk opt for cash, while for firms that only need to manage their liquidity risk, bank credit lines dominate cash holdings. **Dewaelheyns and Van Hulle (2007)** prove that the bank debt to assets ratio is positively correlated to liquidity, whereas **Boguszewski, Kocięcki (2000)**, **Cole (2010)** and **Jiménez et al. (2013)** provide evidence that firms with greater cash reserves take out less new loans, relaying rather on internal financing. An analysis of the above studies allows formulation of **Hypothesis 2**: Firms with a higher liquidity show less inclination to use short-term credit financing and use short-term bank loan less.

2.3 Company size and bank credit availability

Cole and Dietrich (2012) prove, that smaller and older firms need credit less often. Among firms needing credit but fearing rejection of their loan applications, younger and slowly growing businesses prevail, less likely to be organized as a corporation and more likely to be located in a small city and in

a country with a higher inflation and a lower GDP per capita. Firms applying for credit, are older, larger, and growing faster, are more likely to have an external auditor, more likely to be run by more experienced management team and to be owned by a foreigner and a male. These firms are more likely to be located in a large city and in a country with a lower inflation but a higher GDP growth. 40% of companies that need credit do not apply for credit because they expect to be turned down (33% of companies from developed countries and 44% from developing countries). Furthermore, these firms are discouraged by unfavourable interest rates and lending terms. In the research sample, almost a half of the firms that applied for a credit were turned down and the turndown rate was higher in developed countries (54%) than in developing countries (48%). **Alonso et al. (2005)** reveal a positive correlation between the company size and the bank credit use. Large firms have more bargaining power they may use in building and maintaining relations with banks. As a result, large firms that might choose to issue debt rather than seek funding in the banking market, finance their business with bank credit. It seems that this is typical for the non-Anglo-Saxon financial system, where the banking sector plays the main role in the financial sector. In the Anglo-Saxon model investment banks play a vital role, while commercial banks deal with firm's business operations on a current basis. **Jiménez et al. (2013)** indicate that the company size and age are positively correlated with the number of bank loans granted. Firms with a better financial standing use more external funding. Larger and older firms, as well as firms from the industrial sector are more likely to access bank funding (**Love and Peria, 2012**). Being more diversified, better known to external players and experiencing less information asymmetry, large firms are assigned lower risk ratings - **Ghosh and Sensarma (2004)**. **Brown et al. (2012)** prove, that small East-European firms are less likely to apply for credit than Western firms, even though they are more likely to need it. Businesses, although in need of a loan, do not submit their loan applications, discouraged by collateral conditions, high – from their point of view – interest rates and cumbersome lending procedures. Among Eastern-European firms, the probability of being denied credit is higher for small, private, young businesses. **Detragiache et al. (2008)** indicate that foreign banks lend to large firms with credible financial reporting rather than to numerous micro- and small, informationally opaque enterprises. The higher rate of firms discouraged to apply for credit in Eastern Europe is driven more by the presence of foreign banks than by the macroeconomic environment or

the lack of creditor protection. Based on analysis outcomes, **Sufi (2009)** finds that the company size and cash flow is positively correlated with the probability of having a credit line. He indicates that the probability of having a credit line is lower for companies with a high market value. **Gelos (2003)** obtains a high positive correlation between company size and foreign currency borrowing, while indicating the ownership structure and debt ratio irrelevance. This means that avoiding excessive indebtedness does not determine the foreign currency credit financing. According to **Brown, Kirschenmann and Ongena (2010)**, large firms are more likely to declare demand for foreign currency loans. Larger and older firms are more likely to have export income, less likely to default and are more likely to be financially transparent. **Brown et al. (2011)** report a high positive correlation between the control variable of applying international accounting standards (*IAS* or *USGAAP*) and foreign currency borrowing. Most probably, this result may be explained by the fact that firms adhering to international accounting standards are more likely to have foreign currency income. Financial transparency reduces – as expected – foreign currency borrowing, therefore companies with a longer public track record are less likely to borrow in foreign currencies. It has been proved that loans with a shorter maturity are more likely to be contracted in domestic currency than long-term loans. The outcomes referred to above lead us to **Hypothesis 3**: Medium-sized and large firms are more inclined to use long-term loan financing than small firms.

2.4 Assets structure and its effect on bank credit collateral

By using tangible assets as collateral, firms reduce the cost of bank credit through limiting the problem of assets disclosure and substitution (*inter alia*, **Myers and Majluf, 1984; Detragiache, 1994; Boot, Thakor and Udell, 1991; Leeth and Scott, 1989**). **Petersen and Rajan (1994)** as well as **Dewaelheyns and Van Hulle (2007)** report that large firms with a high level of tangible assets use more bank credit. **Cole (2008)** shows that firms in certain industries, such as construction, manufacturing and transportation, are thought to be more creditworthy because they typically have more tangible assets that can be pledged as collateral. **Bougheas et al. (2004)** observe that the access to external finance can be more difficult to firms with a high debt level and thought to face high bankruptcy risk, while there will be no rationing for firms with a good financial standing. Firms with a

high share of bank credit in their capital assets and with a high risk level are reported to have problems with accessing long-term credit, but they may use short-term financing instead, while stable companies with a high share of bank credit in their capital structure may have a better access to credit. Having estimated the fixed effects model, the authors confirm that the short-term debt share in total liabilities is higher for companies with a lower level of collateral. A higher collateral level provides greater access to long-term funding, thereby reducing the long-term debt share in total debt. **Dewaelheyns and Van Hulle (2007)** confirm that large companies with a high share of fixed assets in total assets use bank credit to a greater extent, while firms belonging to capital groups prefer internal financing, due to its lower cost. **Huyghebaert et al. (2007)** point out a potential problem of endogeneity caused by the use of company-level data starting from the first year of operation (e.g. **Scholtens, 1999**). For example, firms showing a high growth rate from the very beginning may have had access to cheap credit. Similarly, firms' liquidation value may grow together with their bank debt used for purchasing tangible assets pledged as these loans collateral. In order to eliminate the problem of endogeneity, lagged value of variables describing firm characteristics are used, which is not possible however when examining business start-ups. Hence, industry-level variables are used as variables approximation. A tobit model analysis proves that entrepreneurs who are in need of capital for starting their business consider not only prices of various credits, but differences in liquidation policy as well. Business start-ups with a higher risk are particularly careful when analysing their capability of meeting obligations and are less inclined to choose bank credit. The effect is even stronger in sectors with high levels of tangible assets. When estimating probit models used for studying determinants of the bank credit use and Heckman model for analysing the bank credit share in assets, **Cole (2010)** finds that firms having less tangible assets do not use bank credit. According to findings presented by **Liberti and Sturgess (2012)**, collateral – and non-specific collateral in particular – is a channel through which borrowers can mitigate bank-specific lending channel effects without turning to alternate lenders in the credit market. Firms with a low collateral level and a high probability of bankruptcy experience worst consequences of the shock. Companies pledging specific collateral (such as inventories, machinery and equipment, accounts receivable, guarantees and promissory notes) experience a smaller decline in lending when exposed to credit supply shock.

Borrowers with a low creditworthiness, less collateral and generating lowest returns experience greatest declines in lending in response to the credit supply shock. Borrowers pledging non-specific collateral (real estate, cash and liquid securities) experience lower cuts in lending under a bank-wide credit supply shock. **Jiménez et al. (2013)** prove that firms with more tangible assets or cash tend to contract less new loans, relying on internal financing rather. An analysis of the above studies allows formulation of the following hypotheses:

Hypothesis 4: Higher non-specific collateral is positively correlated with firms' inclination to finance their business with a long-term loan and with the extent of the long-term credit financing and

Hypothesis 4a: Higher collateral has a negative effect on firms' inclination to use short-term loan financing and on the extent of short-term loan financing.

2.5 Bankruptcy risk

Alonso et al. (2005) give attention to the issue of inefficient liquidation. The probability of bankruptcy and the related loss of assets value during the process of liquidation may result in a situation where bank credit is preferred to the less expensive public debt. The reason is that banks are more flexible about renegotiating the contract terms (**Berlin and Loeys, 1988**). Hence, choosing bank credit may delay company liquidation in a situation where the project Return on Investment does not cover the debt servicing liabilities. A positive correlation between the probability of bankruptcy and the bank credit share in total assets financing is proved. It has been noted that high-leveraged firms facing the risk of bankruptcy are characterized by a significant level of bank borrowing, hoping for potential benefits in the event of insolvency and seeking to mitigate the consequences of inefficient liquidation. **Jiménez et al. (2012)** prove that leverage – particularly, its high value – is the key variable reflecting the firm's standing in crisis. This finding supports the excessive indebtedness theories. Firms with a higher share of equity in total assets and exhibiting a better credit track record are more likely to be granted a loan. Hence, the findings referred to above are a basis for **Hypothesis 5:** Firms with a higher bankruptcy risk use more long-term and short-term loan financing.

The role of credit in financing foreign firms', government owned enterprises' and exporters' business

Love and Peria (2012) prove that exporters have an easier access to bank credit. Foreign firms use less credit – most probably because they can obtain financing from their parent company and thus do not need to borrow from local banks. **Brown et al. (2011)** show that exporters and foreign firms are more likely to finance their business with foreign currency loans. Based on the probit model examining the probability of firms to declare demand for bank credit **Brown et al. (2012)** prove that older firms and exporters are more likely to seek bank loans. Firms with access to any alternative sources of financing, i.e. government owned enterprises, foreign companies and profitable firms with high internal funds are less likely to declare demand for bank credit. Exporters' loan applications are less likely to be rejected. Government owned and foreign owned firms in Western Europe are less likely to be rejected than their counterparts in Eastern Europe (**Brown et al., 2012**). **Gelos (2003)** reports that firms that export more tend to incur more foreign currency debt, which proves that exporters find it easier to pledge collateral against foreign currency credit and are willing to forego part of the insurance against domestic crises provided by foreign currency revenues in exchange for the lower interest rates charged on foreign currency credit. Furthermore, he shows a positive correlation between foreign currency debt and imports value, which suggests that incurring foreign-denominated debt is to a significant extent motivated by the need to purchase inputs on international markets. Considering the findings referred to above, we presuppose that:

Hypothesis 6: Firms with foreign capital and government owned enterprises are less inclined to incur long-term and short-term bank credit.

Hypothesis 6a: Firms with foreign capital use short-term bank credit less.

Hypothesis 6b: Exporters are more inclined to incur long-term and short-term bank credit and use short-term bank credit more.

2.6 The impact of monetary policy on bank credit financing

Bougheas et al. (2004) prove that decisions to grant loans to firms exhibiting certain characteristics differ depending on the interest rate. Both company size and collateral are less significant under credit

market tightening, while such aspects as risk rating and company age gain importance. **Ghosh and Sensarma (2004)** show that manufacturing firms are more sensitive to monetary shocks than service companies and in response to monetary policy tightening they reduce short-term bank borrowing. **Ghosh (2010)** finds that changes in the monetary policy orientation affect the structure of non-finance firms' liabilities. The monetary policy tightening is accompanied by the total debt growth, which seems to contradict the expected interest rate channel effect. Yet, an analysis of debt components reveals that the short-term bank debt grows, while the total short-time debt level drops. Growing interest rates have a negative impact on the accessibility of all debt-based sources of financing, although firms capable of showing their credit track record may count on short-term rescue loans. The monetary policy tightening increases the total debt level in most cases, although the net result varies depending on the firm characteristics. Less indebted firms reduce their total debt level, while profitable firms increase their debt level. The study confirms the relational banking concept. While long-term debt tends to decline in periods of monetary tightening, banks consider it advisable to provide temporary support in the form of short-term bank credit, thereby causing the total debt level to grow. But for small firms, monetary tightening results in a short-term debt reduction. **Demiroglu et al. (2012)** report that when credit market conditions are tight, private firms are less likely to gain access to credit lines. Young private firms are more sensitive to bank market changes than older firms. **Jiménez et al. (2010)** find that banks with lower capital or liquidity reduce loan granting in periods with a lower GDP growth or higher short-term interest rates. Weaker firms in need of credit and dealing with banks with low capital or liquidity are less likely to be granted a loan under tighter monetary conditions. The effects of economic slowdown or tightening monetary policy on loan granting may be stronger for banks and firms with a lower capital. The findings referred to above are a basis for **Hypothesis 7: WIBOR3M and effective exchange rate have a negative effect on firms' inclination to finance their business with a short-term bank credit.**

3. Empirical study

3.1 Research sample

The empirical analysis is based on company-specific balance sheet and profit and loss account data reported by Polish firms in annual statistical reports and quarterly reports of the years 1995 – 2011. The structure of the 1995-2011 sample shows that small enterprises prevail in number (about 66%), while the share of major companies is smallest (5-7%). Over the years, the share of small companies dropped to the advantage of medium-sized businesses. The intense growth of SMEs began following transformation and reforms initiated in 1989. A distinct period of growth is observable in the years 2005-2008, corresponding to the time of significant prosperity in the Polish economy. In the category of major companies, after a 10% decline in 2001, another fall – by some 5% – was observed in 2009.

3.1.1 Research sample – long-term bank credit

The long-term bank credit level is constant over the years 1995-2011, with a slight right-sided asymmetry and a median around 0.07. The growth opportunities median is higher for firms with a long-term loan. In 2002, an increase in interest tax shield was observed in all groups of companies. The interest tax shield median is higher for companies with a long-term loan. Firms with a new long-term loan show a slightly lower bankruptcy prediction ratio. The distribution of the dynamic variable reflecting self-financing is characterized by a higher median in the group of firms without any long-term loan. The non-debt tax shield median is higher for firms with a long-term loan. The cumulated return on equity distribution is relatively constant over time, with a lower median in the group of firms with a new long-term loan. The assets structure factor does not change much over time either and the median is higher for firms with a new long-term loan. An average firm without a long-term loan has higher cash liquidity and quick liquidity ratios than an average firm with a long-term loan.

3.1.2 Research sample – short-term bank loan

The short-term bank loan distribution is symmetric. The share of bank loan in sources of financing ranges between 0.10 and 0.13 in a typical firm (described by the median). The growth opportunities median is higher in the group of firms using short-term loan as a source of financing. Among firms

using a short-term loan, an average large firm has greater growth opportunities than an medium-sized and a small enterprise. The interest tax shield distribution has a higher median for firms using short-term loan. The dynamic variable measuring self-financing has a lower median for firms using short-term loan. The non-debt tax shield distribution is similar for all groups. An average firm with a short-term loan has a lower cumulated ROE than a firm without a short-term loan. The lowest median of cumulated ROE is recorded in the category of small firms. The measure of payment gridlocks (a reciprocal of the receivables turnover ratio) shows a growing tendency over the analysed period and its median is insignificantly higher than for companies not financing their business with short-term loan. Firms not using short-term loan have a higher company size median. The lowest inventory-to-sales ratio is characteristic of an average small firm without any short-term loan. The cash liquidity distribution exhibits a right-sided asymmetry with a lower median for firms financing their business with short-term loan. The collateral distribution is constant over time, with the lowest median for small firms without any short-term loan.

3.2 Definition of variables

3.2.1 Long-term bank credit contracted

Long-term credit determinants have been analysed using variables, such as financial and macroeconomic ratios, as well as structural factors (industry sector, direction of sales, ownership status and legal status). Table 1 presents a complete description of variables designed for the empirical analysis. Following literature overview, a list of potential bank credit determinants has been defined.

Table 1. Description of variables used in the long-term credit model

Variable	Definition
Long-term credit use	Positive change in long-term bank loan liabilities between year t and $(t-1)$, according to the balance sheet presentation rules (the part of long-term bank loan liabilities payable within a period up to one year is recorded as short-term liabilities (in year t)) / $(total\ debt + (equity - revaluation\ reserve))$
Company size	Logarithm of assets
Financial loss	$[(Taxable\ financial\ income / Revenue\ from\ sales) - (Operating\ income / Revenue\ from\ sales)] / (Long-term\ liabilities + Short-term\ liabilities\ (issue\ of\ debt\ securities,\ credits,\ loans)\ and\ trade\ liabilities\ (trade\ credit)\ (without\ current\ expenses))$
Self-financing – dynamic approach	Cash flows from operating activities computed by indirect method (Net profit (loss) + Total adjustments) / $(total\ debt + (equity - revaluation\ reserve))$
Quick ratio measure	$(Current\ assets - Inventories) / Short-term\ liabilities$
Non-debt tax shield	$Depreciation / (total\ debt + (equity - revaluation\ reserve))$
Interest tax shield	Interest / Total assets

Growth opportunities	$(\text{Revenue from sales (t)} - \text{Revenue from sales (t-1)}) / \text{Revenue from sales (t-1)}$
Cumulated Return on Equity	$(\text{Retained profit} + \text{Capital reserves}) / \text{Equity}$
Inverse bankruptcy prediction	Nehrebecka, Dzik (2012)
Tangibility	Tangible assets / Total assets
WIBOR3M	3-month WIBOR interest rate
Effective rate of exchange	Effective rate of exchange

Source: author's analysis.

3.2.2 Short-term bank credit

Following literature overview, a list of potential short-term bank credit determinants has been defined. Short-term credit determinants have been analysed using variables, such as financial and macroeconomic ratios, as well as structural factors. Table 2 presents a complete description of variables designed for the empirical analysis.

Table 2. Description of variables used in the short-term credit model

Variable	Definition
Short term credit use	Short-term bank credit liabilities without the part of long-term bank credit liabilities payable within a period of up to one year / $(\text{total debt} + (\text{equity} - \text{revaluation reserve}))$
Liquidate inventory ratio	Inventory / Sales
Liquid securities in assets	$(\text{Short-term financial assets} + \text{cash and cash equivalents}) / \text{total debt} + (\text{equity} - \text{revaluation reserve})$
Tangibility	Fixed assets / Total assets
Cumulated Return on Equity	$(\text{Retained profit} + \text{Capital reserves}) / \text{Equity}$
Self-financing – dynamic approach	Cash flows from operating activities computed by indirect method $(\text{Net profit (loss)} + \text{Total adjustments}) / (\text{total debt} + (\text{equity} - \text{revaluation reserve}))$
Cash liquidity measure	Cash / Short-term liabilities
Non-debt tax shield	$\text{Depreciation} / (\text{total debt} + (\text{equity} - \text{revaluation reserve}))$
Interest tax shield	Interest / Total assets
Growth opportunities	$(\text{Revenue from sales (t)} - \text{Revenue from sales (t-1)}) / \text{Revenue from sales (t-1)}$
Payment gridlocks measure	Trade receivables / Revenue from sales
Quick liquidity measure	$(\text{Current assets} - \text{Inventories}) / \text{Short-term liabilities}$
Inverse bankruptcy prediction	Nehrebecka, Dzik (2012)
WIBOR3M	3-month WIBOR interest rate
Effective rate of exchange	Effective exchange rate

Source: author's analysis.

3.3 Research method

Based on the literature of the subject referred to above, a dynamic econometric model has been designed, describing how the long-term and short-term credit contracted by non-financial companies in Poland is affected by three categories of factors: macroeconomic, microeconomic – associated with the internal financial situation and structural (e.g. legal status, direction of sales). The model presented in the paper includes estimations of individual effects, sector-specific effects and time-related effects. This approach can be interpreted as a way to address the cost of capital in the long- and short-term credit equation, this element being extremely hard to observe at company level. The analysis has been based on anonymized panel data from non-financial firms' financial reports of the years 1995 – 2011. Parameters have been computed using the GMM estimator (Generalised Methods of Moments, Arellano and Bover 1995, Blundell and Bond 1998). Authors of most articles referred to in the literature overview, including **Alonso et al. (2005)** or **Cole and Dietrich (2012)**, use panel data in their models. Yet, panel data models often suffer from the problem of autocorrelation, which makes the least squares estimator inefficient. The fixed effects estimator, on the other hand, requires explanatory variables to be exogenous.

Table 3. Correlation of explanatory variables in the model of inclination to contract long-term bank credit

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	Inclination to contract long-term bank credit	1,000											
2	Financial loss	-0,082	1,000										
3	Long-term credit use one period lagged	0,210	-0,254	1,000									
4	Company size	0,156	0,218	0,050	1,000								
5	Self-financing – dynamic approach	-0,018	-0,067	-0,029	-0,065	1,000							
6	Quick ratio measure	-0,108	0,280	-0,450	-0,12	0,130	1,000						
7	Non-debt tax shield	0,020	-0,116	-0,058	-0,044	0,276	0,025	1,000					
8	Interest tax shield	0,145	-0,317	0,351	0,263	0,027	-0,327	0,128	1,000				
9	Growth opportunities	0,060	0,045	0,031	0,062	0,117	0,043	0,004	-0,040	1,000			
10	Cumulated Return on Equity	-0,043	0,019	0,056	-0,101	0,041	0,040	-0,043	-0,036	-0,031	1,000		
11	Inverse bankruptcy prediction	0,023	-0,127	0,162	-0,069	-0,306	-0,267	-0,041	0,090	-0,180	-0,039	1,000	
12	Tangibility	0,152	-0,069	-0,187	0,231	-0,011	-0,024	0,332	0,074	-0,033	-0,169	0,167	1,000

Source: Author's analysis based on data published by the Central Statistical Office of Poland.

Table 4. Correlation of explanatory variables in the model of long-term bank credit use

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	Long-term credit use	1,000											
2	Financial loss	-0,192	1,000										
3	Long-term credit use one period lagged	0,086	-0,124	1,000									
4	Company size	-0,199	0,572	-0,070	1,000								
5	Self-financing – dynamic approach	0,031	-0,141	-0,064	-0,188	1,000							
6	Cash liquidity ratio	0,015	0,104	-0,332	-0,055	0,096	1,000						
7	Non-debt tax shield	0,052	-0,186	-0,10	-0,137	0,346	0,026	1,000					
8	Interest tax shield	0,067	-0,202	0,279	0,064	0,022	-0,213	0,142	1,000				
9	Growth opportunities	0,000	0,076	0,023	0,045	0,083	0,060	0,001	-0,089	1,000			
10	Cumulated Return on Equity	0,037	0,008	0,110	-0,056	0,092	0,005	-0,015	0,026	0,013	1,000		
11	Inverse bankruptcy prediction	-0,012	-0,037	0,230	0,155	-0,277	-0,258	-0,087	0,104	-0,150	-0,097	1,000	
12	Tangibility	0,094	0,024	-0,316	0,171	0,068	0,121	0,23	-0,081	-0,050	-0,205	0,127	1,000

Source: Author's analysis based on data published by the Central Statistical Office of Poland.

Table 5 Models of inclination to contract and utilize new long-term credit

Explanatory variable	Models with effect of the year		Models with control variables for the monetary policy impact	
	MODEL I Inclination to contract long-term credit	MODEL II Long-term credit use	MODEL III Inclination to contract long- term credit	MODEL IV Long-term credit use
Long-term credit use one period lagged	0,4895*** (0,0696)	-0,0049 (0,1578)	0,1998*** (0,0368)	-0,2026 (0,3424)
Financial loss	208,7816 (689,4657)		-294,9681 (674,3764)	
Financial loss one period lagged	63,8670 (757,5585)	910,5556* (540,1879)	475,2289 (784,0990)	-1019,4921 (1073,7402)
Medium-sized firms	0,1499*** (0,0560)	0,0107 (0,0624)	1,7035* (0,9476)	1,3906 (1,2842)
Large firms	-0,0295 (0,1038)	-0,0813 (0,0819)	0,5871 (2,2952)	0,2097 (1,8295)
1997	-0,0114 (0,0259)			
1998	0,0009 (0,0222)	0,0095 (0,0099)		
1999	-0,0065 (0,0180)	-0,0102 (0,0110)	0,0430** (0,0169)	0,0343 (0,0347)
2000	0,0122 (0,0157)	-0,0152 (0,0122)	-0,0368** (0,0155)	0,0018 (0,0232)
2001	0,0196 (0,0160)	0,0094 (0,0146)	0,0212* (0,0109)	-0,0262 (0,0199)
2002	-0,0656*** (0,0114)	-0,0644** (0,0262)		
2003		-0,0326*** (0,0122)		
2004	-0,0139* (0,0083)	-0,0364*** (0,0118)	-0,0339*** (0,0084)	-0,0275# (0,0183)
2005	0,0112 (0,0119)	-0,0229* (0,0119)		
2006	0,0145# (0,0094)	-0,0245** (0,0115)	0,0085# (0,0055)	0,0045 (0,0083)
2007	0,0210** (0,0098)	-0,0143 (0,0126)		
2008	-0,0060 (0,0114)	-0,0314*** (0,0098)		
2009	-0,0325** (0,0146)	-0,0158 (0,0143)	-0,0117 (0,0147)	-0,0161 (0,0154)
2010	-0,0269*** (0,0090)	-0,0151## (0,0112)	-0,0129** (0,0060)	-0,0032 (0,0106)
Exporter unspecialised	0,1290* (0,0730)	-0,0352 (0,0629)	0,0911 (0,0831)	-0,0291 (0,0684)
Exporter specialized	0,1699** (0,0730)	0,0507 (0,0889)	0,1780** (0,0801)	-0,0673 (0,1243)
The share of foreign ownership	-0,2402*** (0,0767)	0,1056 (0,1114)	-0,2430*** (0,0859)	0,1118 (0,1502)
Construction	0,1855** (0,0427)	0,1710* (0,0909)	0,2195*** (0,0874)	-0,0488 (0,1304)
Trade	0,2264*** (0,0595)	0,0896 (0,0803)	0,2713*** (0,0598)	-0,1192 (0,1536)
Transport	-0,0863 (0,1174)	-0,0764 (0,1251)	-0,1504 (0,1242)	0,2002 (0,1381)
Other services	0,0274 (0,0657)	0,0076 (0,0536)	0,0771 (0,0705)	-0,0735 (0,0710)
Limited partnerships	-0,2501 (0,4278)	-0,0668 (0,3539)	-0,4583 (0,4189)	0,0087 (0,5293)
Limited liability companies	-0,0144 (0,0852)	0,0002 (0,0566)	-0,0397 (0,0887)	-0,1787** (0,0734)
Joint-stock companies	-0,0488 (0,1173)	0,1055 (0,0824)	-0,0871 (0,1263)	-0,2146** (0,0944)
Foreign companies	-1,2696# (0,8219)		-1,2766# (0,7933)	
State-owned enterprises	-0,3233* (0,1869)	-0,2203 (0,3382)	-0,3628* (0,1931)	-0,3596 (0,3890)

Cooperatives	-0,1626* (0,0936)		-0,1692* (0,1011)	
Others	-0,1293 (0,1186)	0,1691** (0,0768)	-0,1549 (0,1270)	-0,0549 (0,0896)
Self-financing – dynamic approach	-0,2936** (0,1279)	-0,7604*** (0,1284)	-0,2055* (0,1142)	-0,6867*** (0,1346)
Self-financing – dynamic approach one period lagged	0,4421*** (0,1112)	0,0930 (0,1635)	0,3198*** (0,1005)	-0,1232 (0,2063)
Quick ratio measure	0,0117* (0,0069)	-0,0129 (0,0112)	0,0056 (0,0077)	0,0189 (0,0135)
Non-debt tax shield	1329,1726# (822,8181)	-564,1082 (622,0263)	784,1315 (829,6037)	-2070,9775** (936,6371)
Non-debt tax shield one period lagged	-1526,7247* (793,1381)	1055,6131* (614,1637)	202,9648 (688,5436)	1588,4828* (811,1607)
Interest tax shield	1,5338** (0,5956)	2,1298*** (0,8080)	1,0643* (0,5885)	1,8957* (0,9982)
Growth opportunities	0,1886* (0,1130)	0,1189# (0,0754)	0,2019** (0,0894)	-0,0950 (0,1362)
Growth opportunities one period lagged	0,0507 (0,0702)	-0,0523## (0,0374)	-0,0933# (0,0582)	0,0891 (0,1017)
Cumulated Return on Equity one period lagged	-0,0178 (0,0262)	0,0985*** (0,0290)	-0,0590** (0,0263)	0,0860# (0,0545)
Inverse bankruptcy prediction	10,0286 (16,2113)	18,3860## (16,1236)	5,2512 (16,4880)	-8,2385 (22,4953)
Tangibility	0,6593# (0,4082)	1,6712*** (0,2294)	0,8868** (0,3890)	1,4422*** (0,4492)
Tangibility one period lagged	-0,0671 (0,3942)	-1,2075*** (0,1074)	-0,5037## (0,3644)	-1,4155*** (0,3036)
WIBOR3M			-0,41 (0,0033)	-0,44 (0,0057)
Effective currency rate			0,39** (0,0016)	0,18 (0,0034)
WIBOR3M X medium-sized firms			3,16** (0,0136)	-2,11 (0,0136)
WIBOR3M X large firms			-3,45 (0,0293)	8,70*** (0,0239)
WIBOR3M one period lagged, small firms			0,14 (0,0024)	0,52 (0,0063)
WIBOR3M two periods lagged, small firms			0,22 (0,0035)	0,06 (0,0058)
WIBOR3M one period lagged X medium-sized firms			-0,46 (0,0124)	1,85 (0,0160)
WIBOR3M one period lagged X large firms			3,95## (0,0291)	-10,33*** (0,0312)
WIBOR3M two periods lagged X medium-sized firms			-2,10* (0,0108)	0,18 (0,0157)
WIBOR3M two periods lagged X large firms			-0,24 (0,0164)	-0,47 (0,0138)
Effective currency rate X medium-sized firms			-0,94# (0,0063)	-0,23 (0,0079)
Effective currency rate X large firms			-0,86 (0,0143)	0,44 (0,0113)
Effective currency rate one period lagged			-0,33* (0,0018)	-0,18 (0,0031)
Effective currency rate two periods lagged			0,45*** (0,0016)	0,57# (0,0038)
Effective currency rate one period lagged X medium-sized firms			1,14# (0,0070)	-0,34 (0,0079)
Effective currency rate one period lagged X large firms			-1,65 (0,0156)	0,63 (0,0120)
Effective currency rate two periods lagged X medium-sized firms			-1,76*** (0,0061)	-0,84 (0,0111)
Effective currency rate two periods lagged X large firms			2,02## (0,0154)	-0,89 (0,0153)
Constant	-0,2591** (0,1041)	-0,4177 (0,5573)	-0,6979*** (0,2559)	-0,0315 (1,0870)
Test		Test statistic [p-value]		
Arellano-Bond Test for the first-order autocorrelation	-21,735 [0,0000]	-13,101 [0,0000]	-21,489 [0,0000]	-6,204 [0,0000]
Arellano-Bond Test for the second-order autocorrelation	2,137 [0,0326]	1,447 [0,1479]	-1,104 [0,2695]	-1,224 [0,224]
Sargan Test	110,236 [0,0470]	216,205 [0,0163]	105,930 [0,0512]	90,247 [0,1435]

Source: Author's analysis based on data published by the Central Statistical Office of Poland.

Table 6. Correlation of explanatory variables in the model of inclination to contract short-term bank credit

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Inclination to contract long-term bank credit	1,000													
2	Liquidate inventory ratio	0,273	1,000												
3	Cash liquidity measure	-0,301	0,143	1,000											
4	Size	0,181	0,252	0,202	0,000										
5	Liquid securities in assets	-0,018	-0,006	0,097	0,174	1,000									
6	Quick liquidity measure	-0,450	-0,279	0,285	-0,125	-0,005	1,000								
7	Non-debt tax shield	0,006	-0,078	-0,119	-0,044	-0,016	0,025	1,000							
8	Interest tax shield	0,364	0,185	-0,324	0,263	0,025	-0,327	0,128	1,000						
9	Growth opportunities	-0,011	-0,092	0,04	0,062	-0,008	0,043	0,004	-0,041	1,000					
10	Payment gridlocks measure	0,061	0,028	0,014	0,292	0,048	-0,123	-0,083	0,119	-0,004	1,000				
11	Inverse bankruptcy prediction	0,143	0,119	-0,123	-0,069	-0,014	-0,292	-0,040	0,090	-0,180	-0,088	1,000			
12	Tangibility	0,017	-0,038	-0,078	0,213	-0,001	-0,013	0,36	0,075	-0,036	-0,209	0,16	1,000		
13	Cumulated Return on Equity	-0,025	-0,002	0,01	-0,101	0,013	0,040	-0,043	-0,036	-0,031	0,002	-0,039	-0,161	1,000	
14	Self-financing – dynamic approach	-0,053	-0,122	-0,065	-0,065	-0,006	0,130	0,276	0,027	0,117	-0,126	-0,306	0,018	0,041	1,000

Source: Author's analysis based on data published by the Central Statistical Office of Poland.

Table 7. Correlation of explanatory variables in the model of short-term bank credit use

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Short-term bank credit use	1,000													
2	Liquidate inventory ratio	0,136	1,000												
3	Cash liquidity measure	-0,203	0,000	1,000											
4	Size	-0,104	0,203	0,577	1,000										
5	Liquid securities in assets	-0,038	-0,001	0,132	0,172	1,000									
6	Quick liquidity measure	-0,203	-0,157	0,037	-0,063	-0,006	1,000								
7	Non-debt tax shield	-0,054	-0,191	-0,109	-0,045	-0,017	0,084	1,000							
8	Interest tax shield	0,214	0,056	-0,095	0,133	0,032	0,134	0,102	1,000						
9	Growth opportunities	-0,071	-0,107	0,121	0,095	-0,005	0,058	-0,009	-0,078	1,000					
10	Payment gridlocks measure	-0,024	0,028	0,121	0,293	0,060	-0,109	-0,079	0,059	-0,008	1,000				
11	Inverse bankruptcy prediction	0,220	0,188	-0,099	0,071	0,011	-0,250	-0,018	0,140	-0,203	-0,066	1,000			
12	Tangibility	-0,156	-0,143	-0,094	0,113	-0,016	0,042	0,457	0,044	-0,049	-0,247	0,150	1,000		
13	Cumulated Return on Equity	0,032	-0,014	0,021	-0,039	0,006	0,035	-0,065	-0,013	-0,015	0,02	-0,046	-0,137	1,000	
14	Self-financing – dynamic approach	-0,097	-0,168	-0,096	-0,097	-0,011	0,137	0,300	0,035	0,063	-0,159	-0,243	0,109	0,026	1,000

Source: Author's analysis based on data published by the Central Statistical Office of Poland.

Table 8. Short-term bank credit determinants with the year effect taken into account

Explanatory variable	Large firms		Medium-sized firms		Small firms	
	MODEL I	MODEL II	MODEL III	MODEL IV	MODEL V	MODEL VI
	Inclination to contract short-term credit b (se)	Short-term credit use b (se)	Inclination to contract short-term credit b (se)	Short-term credit use b (se)	Inclination to contract short-term credit b (se)	Short-term credit use b (se)
Short-term bank credit use one period lagged	0,9995*** (0,0888)	0,2731*** (0,0371)	2,1764*** (0,1930)	0,1678** (0,0749)	2,0447*** (0,1678)	0,4555*** (0,1195)
Liquidate inventory ratio	2,3205*** (0,7989)	0,2402 (0,2065)	0,7371* (0,4234)			
Liquidate inventory ratio one period lagged	-2,6521*** (0,8308)	-0,0456 (0,2178)		0,4141*** (0,1519)	1,5610*** (0,4731)	-0,2735# (0,1733)
1997	-0,0587## (0,0409)				0,0034 (0,0800)	
1998	-0,0286 (0,0319)	0,0021 (0,0060)	-0,0248 (0,0312)	0,0077# (0,0050)	0,0428 (0,0385)	0,0816 (0,0714)
1999	-0,0441# (0,0286)	0,0076 (0,0067)	0,0186 (0,0194)	0,0073 (0,0063)	0,0205 (0,0330)	-0,0719*** (0,0154)
2000	-0,0275 (0,0240)	0,0096## (0,0075)	0,0698*** (0,0205)	0,0096## (0,0073)	0,0906*** (0,0274)	-0,0518*** (0,0132)
2001	-0,0087 (0,0226)	0,0184** (0,0084)	0,0415** (0,0196)	0,0043 (0,0081)	0,0335 (0,0335)	-0,0775*** (0,0144)
2002	-0,1549*** (0,0223)	0,0052 (0,0080)	-0,1428*** (0,0240)	-0,0090 (0,0125)		-0,0509*** (0,0157)
2003		0,0288*** (0,0057)	0,0521*** (0,0167)	0,0274*** (0,0085)	0,0104 (0,0294)	-0,0070 (0,0110)
2004	-0,0756*** (0,0160)		-0,0595*** (0,0174)	0,0103 (0,0084)	-0,0707*** (0,0246)	-0,0248** (0,0101)
2005	-0,0271# (0,0175)	-0,0082 (0,0069)	-0,0084 (0,0152)	0,0058 (0,0073)	-0,0212 (0,0256)	-0,0437*** (0,0108)
2006	-0,0103 (0,0164)	-0,0012 (0,0068)	-0,0089 (0,0138)	0,0088 (0,0076)	-0,0630*** (0,0243)	-0,0334*** (0,0093)
2007	-0,0255# (0,0172)	0,0010 (0,0070)	-0,0247* (0,0130)	0,0112* (0,0065)	-0,0252## (0,0184)	-0,0086 (0,0079)
2008	-0,0064 (0,0184)	-0,0032 (0,0079)	-0,0009 (0,0141)	-0,0018 (0,0073)	0,0072 (0,0182)	-0,0065 (0,0088)
2009	-0,0341## (0,0250)	-0,0231** (0,0095)	-0,0205## (0,0151)	0,0033 (0,0074)	-0,0668*** (0,0239)	-0,0300*** (0,0106)
2010	-0,0544*** (0,0157)	-0,0177* (0,0093)	-0,0441*** (0,0108)	-0,0047 (0,0060)	-0,0776*** (0,0185)	-0,0207*** (0,0074)
2011		-0,0053 (0,0110)				
Exporter unspecialised	0,0202 (0,0912)	-0,0152 (0,0256)	-0,0877 (0,0909)	-0,0446# (0,0293)	0,1108 (0,1226)	-0,0062 (0,0404)
Exporter specialised	0,0259 (0,1104)	-0,0356 (0,0324)	-0,0034 (0,1041)	0,0580# (0,0359)	0,4554** (0,1911)	0,2210*** (0,0802)
The share of foreign ownership	-0,1075 (0,0924)	0,0332 (0,0264)	-0,1800* (0,1007)	-0,1173*** (0,0390)	-0,6358*** (0,1566)	0,0032 (0,0866)
Construction	-0,1331 (0,1362)	-0,0606# (0,0390)	-0,0740 (0,0923)	0,0567# (0,0384)	0,2120* (0,1115)	0,0399 (0,0535)
Trade	0,1605 (0,1519)	-0,0506## (0,0395)	0,1831** (0,0823)	0,0283 (0,0309)	0,1634* (0,0901)	-0,0412 (0,0360)
Transport	-0,0947 (0,1635)	-0,0170 (0,0484)	0,1383 (0,1515)	-0,0676 (0,0605)	0,0440 (0,2386)	-0,0315 (0,0871)
Other services	-0,2208** (0,1055)	-0,0468 (0,0408)	-0,1405* (0,0842)	-0,0081 (0,0493)	0,0688 (0,0989)	-0,0832* (0,0493)
Limited partnerships	1,2859** (0,5937)	0,4002** (0,1689)	0,3414 (0,4354)	0,4323* (0,2401)	0,1842 (0,9180)	0,0682 (0,3857)
Limited liability companies	0,1484 (0,1377)	-0,0099 (0,0424)	0,0418 (0,0823)	-0,0182 (0,0290)	0,0213 (0,1219)	-0,0618* (0,0371)
Joint-stock companies	0,3439*** (0,1281)	-0,0135 (0,0385)	-0,3189** (0,1240)	0,0113 (0,0377)	-0,3510# (0,2309)	-0,1191# (0,0792)
Foreign companies	-1,2370 (0,8405)	0,6539 (0,5898)				
State-owned enterprises	0,1130 (0,2021)	-0,0800 (0,0674)	-0,2265## (0,1649)	-0,0179 (0,1015)	-1,1806** (0,4683)	-0,2305 (0,2873)

Cooperatives					-0,2546* (0,1344)	
Others	0,8744*** (0,3025)	0,0620 (0,0658)	0,1075 (0,1304)	0,0070 (0,0468)	0,0214 (0,1530)	-0,1107** (0,0493)
Liquid securities in assets	-0,3624 (0,3515)	-0,2154* (0,1219)	-0,1508 (0,2032)	0,0685 (0,2277)	0,4744 (0,4987)	-0,4446### (0,3157)
Liquid securities in assets one period lagged	0,0338 (0,1419)	0,0351 (0,0430)	-0,1521*** (0,0491)	0,0424 (0,1917)	-0,0869 (0,3644)	0,6417*** (0,2437)
Tangibility	-0,0453 (0,3937)	-0,3953*** (0,0954)	-0,6211* (0,3619)	-0,3655** (0,1445)	-0,0144 (0,4740)	-0,1436 (0,1622)
Tangibility one period lagged	0,2292 (0,3536)	0,1615** (0,0823)	0,2179 (0,3171)	0,2757* (0,1407)	0,7246# (0,4578)	0,1832 (0,1783)
Cumulated Return on Equity			0,3284** (0,1629)	0,0666 (0,0698)	0,3589 (0,3047)	0,0169 (0,0711)
Cumulated Return on Equity one period lagged	0,0385 (0,0365)	0,0207* (0,0110)	-0,2361** (0,1030)	-0,0198 (0,0646)	-0,1922 (0,2774)	-0,0085 (0,0660)
Self-financing – dynamic approach	0,3908** (0,1564)	0,0087 (0,0522)	-0,4334*** (0,1311)	-0,1028* (0,0584)	0,1835 (0,1454)	-0,0997### (0,0767)
Self-financing – dynamic approach one period lagged	-0,0159 (0,0239)	0,0099 (0,0092)				
Cash liquidity measure	-0,0968### (0,0701)	0,0390 (0,0408)	-0,1560*** (0,0136)		-0,0947*** (0,0161)	-0,0538* (0,0299)
Cash liquidity measure one period lagged	-0,0338 (0,0343)	-0,0397** (0,0188)				
Non-debt tax shield	-1625,4075** (791,6976)	228,4548 (201,6702)	716,6444 (753,6127)	-568,5946 (444,6455)	-303,5277 (1,2554)	-354,3889 (600,1168)
Non-debt tax shield one period lagged	452,1561### (328,8621)	-84,3264 (97,5487)	1316,9549*** (372,5381)	490,0585### (362,6484)	34,0258 (1313,7893)	-422,5052 (571,7756)
Interest tax shield	1,5295# (0,9123)	0,3946 (0,3117)	-0,2778 (0,6592)	1,1771*** (0,4150)	-12,1375*** (2,4916)	-0,4557 (1,0899)
Interest tax shield one period lagged					11,8070*** (2,0624)	1,4135* (0,8395)
Growth opportunities	0,2139* (0,1143)	-0,0396### (0,0300)			0,1797 (0,1402)	-0,1187* (0,0614)
Growth opportunities one period lagged	-0,0236 (0,0201)	0,0003 (0,062)	0,0393*** (0,0100)	0,0305 (0,0294)	-0,0178 (0,1148)	-0,0116 (0,0495)
Payment gridlocks measure	0,4613 (0,6553)	-0,2380### (0,1772)		0,2486 (0,2136)	1,3448* (0,7361)	0,5211* (0,2924)
Payment gridlocks measure one period lagged	-0,2539 (0,3115)	0,1077 (0,0915)	0,1851** (0,0739)	-0,0676 (0,1909)	-0,7868 (0,6527)	-0,5312** (0,2633)
Quick liquidity measure				-0,0373*** (0,0138)		
Inverse bankruptcy prediction	92,2403*** (32,9412)	30,9553*** (10,0292)	-59,0179** (23,5616)	86,7736*** (19,7763)	-36,3737* (21,4018)	57,2989*** (13,8931)
Inverse bankruptcy prediction one period lagged				-44,3907** (18,4065)		
Constant	0,0895 (0,2112)	0,1221** (0,0564)	0,5108*** (0,1354)	0,0040 (0,0751)	-0,1856 (0,1733)	0,1289* (0,0660)
Test						
				Test statistic [p-value]		
Arellano-Bond Test for the first-order autocorrelation	-22,213 [0,0000]	-11,929 [0,0000]	-19,398 [0,0000]	-6,0285 [0,0000]	-15,542 [0,0000]	-6,6933 [0,0000]
Arellano-Bond Test for the second-order autocorrelation	-1,167 [0,2430]	0,585 [0,5579]	-0,915 [0,3601]	1,528 [0,1265]	0,816 [0,4143]	0,994 [0,3199]
Sargan Test	111,381 [0,5519]	108,091 [0,2965]	139,426 [0,0517]	100,335 [0,1554]	107,721 [0,1945]	89,486 [0,1214]

Source: Author's analysis based on data published by the Central Statistical Office of Poland.

Table 9. Short-term bank credit determinants with the monetary policy impact taken into account

Explanatory variable	Large firms		Medium-sized firms		Small firms	
	MODEL I	MODEL II	MODEL III	MODEL IV	MODEL V	MODEL VI
	Inclination to contract short-term credit b (se)	Short-term credit use b (se)	Inclination to contract short-term credit b (se)	Short-term credit use b (se)	Inclination to contract short-term credit b (se)	Short-term credit use b (se)
Short-term bank credit use one period lagged	1,2881*** (0,1009)	0,3559*** (0,0407)	1,7663*** (0,3030)	0,0314 (0,1556)	1,2802*** (0,2921)	0,4339*** (0,1575)
Short-term bank credit use two periods lagged					0,5983** (0,2775)	
Liquidate inventory ratio	1,8080** (0,8083)	-0,2657 (0,2141)	0,0711 (0,5891)			
Liquidate inventory ratio one period lagged	-2,0609** (0,8430)	0,5038** (0,2236)		-0,2772 (0,2864)	0,4887 (0,4924)	0,0117 (0,2039)
WIBOR3M	-0,43* (0,0024)	-0,08 (0,0011)	-1,24** (0,0053)	0,09 (0,0010)	-0,47*** (0,0015)	-0,09 (0,0010)
WIBOR3M one period lagged	1,15*** (0,0019)	0,18*** (0,0007)	1,55*** (0,0024)	0,66*** (0,0013)	-0,14 (0,0016)	0,07 (0,0012)
WIBOR3M two periods lagged	-1,15*** (0,0030)	-0,02 (0,0010)	-0,61** (0,0029)	-0,49*** (0,0014)	0,11 (0,0020)	-0,09 (0,0014)
Effective currency rate	-0,40*** (0,0008)	-0,01 (0,0003)	-0,37*** (0,0006)	0,02 (0,0004)	-0,17*** (0,0006)	-0,001 (0,0004)
Effective currency rate one period lagged	0,42*** (0,0012)	0,05* (0,0003)	0,44*** (0,0010)	0,09* (0,0005)	-0,09 (0,0009)	0,10** (0,0005)
Effective currency rate two periods lagged	0,19* (0,0010)	0,07** (0,0003)	0,07 (0,0011)	0,13*** (0,0004)	0,17** (0,0007)	0,14*** (0,0005)
1999	0,1548*** (0,0243)	0,0319*** (0,0093)	0,1864*** (0,0393)	0,0775*** (0,0159)	0,0427** (0,0215)	0,0234 (0,0164)
2000	0,0577** (0,0253)	0,0216** (0,0092)	0,1311*** (0,0451)	-0,0021 (0,0128)	0,1200*** (0,0242)	0,0145 (0,0117)
2001	0,1245*** (0,0217)	0,0173** (0,0067)	0,0387### (0,0299)	-0,0024 (0,0102)	0,1010*** (0,0195)	-0,0025 (0,0118)
2004					-0,0409*** (0,0151)	
2005	0,0166 (0,0219)		-0,0127 (0,0273)			
2006	0,0070 (0,0107)	-0,0010 (0,0036)	-0,0094 (0,0097)	-0,0014 (0,0052)	-0,0060 (0,0066)	-0,0011 (0,0052)
2008	-0,0288### (0,0216)	-0,0097### (0,0075)	-0,0338** (0,0172)	-0,0298*** (0,0095)		-0,0261*** (0,0085)
2009		-0,0242*** (0,0080)		-0,0280*** (0,0095)	-0,0260 (0,0207)	-0,0367** (0,0147)
2010	-0,0103 (0,0115)	-0,0043 (0,0056)	0,0038 (0,0107)	-0,0128# (0,0086)	-0,0045 (0,0121)	-0,0071 (0,0078)
Exporter unspecialised	0,0260 (0,0908)	0,0309 (0,0289)	0,0905 (0,1209)	0,0089 (0,0404)	0,1587 (0,1333)	-0,0623 (0,0507)
Exporter specialized	0,0242 (0,1074)	0,0153 (0,0354)	0,2552* (0,1476)	0,1255** (0,0576)	0,2674### (0,1993)	0,0013 (0,0928)
The share of foreign ownership	-0,0706 (0,0969)	-0,0073 (0,0260)	-0,5895*** (0,1695)	-0,1887*** (0,0702)	-0,4574*** (0,1582)	0,1279# (0,0813)
Construction	-0,0177 (0,1348)	0,0591# (0,0376)	-0,1880# (0,1257)	-0,0764 (0,0502)	0,0440 (0,0108)	-0,0316 (0,0610)
Trade	0,0055 (0,1511)	-0,0736* (0,0401)	0,2491* (0,1313)	-0,0030 (0,0443)	0,1181### (0,0922)	-0,0036 (0,0482)
Transport	-0,2576# (0,1589)	0,0426 (0,0486)	-0,0772 (0,2036)	-0,2197** (0,0965)	0,0126 (0,2406)	-0,1149 (0,1036)
Other services	-0,3393*** (0,1013)	-0,0188 (0,0369)	-0,2549** (0,1286)	0,0076 (0,0604)	-0,1181 (0,0997)	0,0059 (0,0530)
Limited partnerships	0,6465 (0,5776)	0,0093 (0,1374)	-1,0044** (0,4411)	-0,1287 (0,3063)	0,7055 (0,8684)	0,2385 (0,3698)
Limited liability companies	-0,1904### (0,1330)	0,0074 (0,0408)	0,0896 (0,1033)	0,1177*** (0,0431)	-0,1284 (0,1073)	-0,0239 (0,0351)
Joint-stock companies	0,0843 (0,1225)	-0,0173 (0,0379)	0,1160 (0,1465)	-0,0222 (0,0618)	-0,4152* (0,2173)	-0,0953 (0,0869)
Foreign companies	-3,3029 (3,4477)	0,7908 (0,6955)				
State-owned enterprises	-0,0137 (0,1952)	-0,0882 (0,0789)	-0,2528 (0,2956)	0,1697 (0,1534)	-0,1826 (0,3613)	-0,2580 (0,3130)

Cooperatives					-0,2967** (0,1297)	
Others	0,2712 (0,2909)	0,2057*** (0,0696)	-0,0794 (0,1914)	-0,0340 (0,0759)	-0,3659** (0,1669)	0,0320 (0,0545)
Liquid securities in assets	-0,2640 (0,3629)	0,0952 (0,2302)	-0,0579 (0,7000)	0,0703 (0,5273)	0,3405 (0,5839)	0,6932 (0,4115)
Liquid securities in assets one period lagged	0,0315 (0,1442)	0,0013 (0,1209)	-0,3826 (0,7237)	-0,2378 (0,4454)	-0,0569 (0,4958)	-0,3565 (0,4070)
Tangibility	-0,0424 (0,4051)	-0,1648# (0,1037)	0,8158 (0,5509)	-0,1881 (0,1829)	-0,2205 (0,4214)	-0,0308 (0,1865)
Tangibility one period lagged	0,3895 (0,3499)	0,0392 (0,1079)	-0,6533 (0,5526)	0,0602 (0,1852)	0,4644 (0,4341)	-0,1229 (0,1856)
Cumulated Return on Equity one period lagged	0,0405 (0,0363)	0,0662*** (0,0173)	0,4025 (0,3114)	-0,2887** (0,1185)	-0,4349** (0,1988)	-0,0281 (0,1134)
Cumulated Return on Equity			-0,4514 (0,3298)	0,2485** (0,1150)	0,4366** (0,2112)	0,0181 (0,1206)
Self-financing – dynamic approach	0,4295*** (0,1570)	-0,1603*** (0,0482)	-0,5818** (0,2054)	-0,0108 (0,0897)	-0,0299 (0,1682)	-0,2105** (0,0835)
Self-financing – dynamic approach one period lagged	-0,0120 (0,0248)	0,0945*** (0,0366)				
Cash liquidity measure	-0,2324*** (0,0676)	-0,0893** (0,0381)	-0,1539*** (0,0330)		-0,1382*** (0,0215)	-0,0238 (0,0570)
Cash liquidity measure one period lagged	0,0401 (0,0328)	0,0273 (0,0238)				
Non-debt tax shield	-133,2199 (772,5174)	507,8992# (344,0444)	-7327,3303*** (1830,8526)	-1117,8592# (714,9313)	-1774,1613## (1273,5663)	-1011,0791 (836,5361)
Non-debt tax shield one period lagged	388,3091 (326,1477)	206,1014 (283,3589)	9148,8272*** (1691,9192)	1398,8546** (546,7805)	1582,3459# (1054,8323)	1408,9310* (818,9098)
Interest tax shield	1,1517## (0,8777)	0,9866*** (0,3645)	2,9029# (1,7708)	3,6951*** (1,1028)	-2,6856## (1,9667)	0,9467 (1,2138)
Interest tax shield one period lagged					3,3940** (1,5913)	0,0859 (0,6397)
Growth opportunities	0,5852*** (0,0907)	-0,0536* (0,0322)	0,2568** (0,1251)		0,0844 (0,1126)	-0,1203* (0,0687)
Growth opportunities one period lagged	-0,0620*** (0,0194)	-0,0005 (0,0216)	0,1725 (0,1351)	-0,0925* (0,0551)	0,2739*** (0,0942)	0,0577 (0,0565)
Payment gridlocks measure	1,2629** (0,6303)	-0,4231** (0,1694)		0,6821** (0,3286)	0,2428 (0,6354)	-0,5037 (0,3616)
Payment gridlocks measure one period lagged	-0,9349*** (0,3058)	0,2720* (0,1536)	0,8932** (0,3698)	-0,0193 (0,2827)	-0,2781 (0,5124)	0,5759 (0,3742)
Inverse bankruptcy prediction	45,6676## (33,8621)	-12,4123 (13,0037)	-131,4245** (56,8771)	89,8833*** (28,8268)	-60,8136** (29,0144)	99,8246*** (15,3522)
Quick liquidity measure				-0,0660** (0,0262)		
Constant	0,0377 (0,2123)	-0,0727 (0,0768)	0,2967 (0,2679)	-0,3459*** (0,1264)	0,5975*** (0,1871)	-0,2740*** (0,1014)
Test		Test statistic [p-value]				
Arellano-Bond Test for the first-order autocorrelation	-22,317 [0,0000]	-9,388 [0,0000]	-11,238 [0,0000]	-4,745 [0,0000]	-11,194 [0,0000]	-5,290 [0,0000]
Arellano-Bond Test for the second-order autocorrelation	-1,693 [0,0904]	1,161 [0,2455]	2,235 [0,0254]	-0,354 [0,7232]	-2,193 [0,0583]	1,582 [0,1136]
Sargan Test	150,614 [0,0323]	141,193 [0,3193]	109,497 [0,0445]	92,586 [0,0512]	91,270 [0,0844]	68,726 [0,3851]

Source: Author's analysis based on data published by the Central Statistical Office of Poland.

To solve the problem of endogeneity of the explanatory variables correlated with the random error, Alonso *et al.* (2005) used Generalized Method of Moments. The models have been diagnosed in terms of the correct instruments selection by means of Sargan test checking whether the condition of instruments and random component combined orthogonality has been satisfied. Furthermore, this condition is verified by means of a test for autocorrelation in differences of model residuals, The

model design assumptions require that no residual component correlation of order 2 or higher can be present. An analysis of descriptive statistics and histograms of continuous variables shows a significant percent of atypical observations in all samples. Taking the distribution of probability into account, 5% of the outermost values have been replaced with the 0.95 quantile or 0.05 quantile value at the same time, depending on the property distribution. This allows analysis of relations between the variability of dependent variable and the variability of explanatory variables without any loss of essential information. Before the econometric analysis, the correlation between explanatory variables has been estimated. Detailed outcomes of Spearman's ranks correlation for explanatory variables of the contracted long-term credit models are presented in Tables 3 and 4; for explanatory variables of the contracted short-term credit models – in Tables 6 and 7. Factors determining the long-term bank credit contracted by companies have been analysed for the inclination to contract long-term credit (model I and III) and for the extent to which long-term credit is used (model II and IV). Effect of the year has been taken into account in model I and II, while in models III and IV have been expanded to include control variables for the macroeconomic environment conditions, WIBOR and the effective currency rate (Table 5). Determinants of the short-term bank credit contracted by companies have been analysed in a breakdown by company size. Two models have been estimated for each of the three categories: small, medium and large firms, namely: the inclination to contract short-term credit and the extent to which short-term credit is used. Models presented in table 8 take effect of the year into account, while models presented in table 9 have been expanded to include control variables for the macroeconomic environment conditions, WIBOR and the effective currency rate.

4. Findings

The findings show that estimators of annual parameters reflect the general macroeconomic situation well. The inclination to contract long-term credit is observed to grow in a period of prosperity, while in the year 2000 and 2001, the restrictive monetary policy weakened firms' inclination to contract long-term loans. In response to the economic slowdown of the year 2002, firms were less inclined to contract long-term loans and the share of long-term credit in external funding declined. Poland's accession to EU reduced the demand for long-term credit, opening access to Union's internal market

and to EU funds. This resulted in a reduced share of long-term credit contracted from external financing sources over the years 2004-2006. The economic prosperity and good macroeconomic situation of the year 2007 boosted the inclination to contract long-term bank loans. As a result of a downturn, growing interest rates and unstable macroeconomic situation, the share of long-term loans in external funding declined in 2008, in spite of the credit boom. The financial crisis experienced by the EU states in 2009 reduced the inclination to contract long-term bank credit. According to data presented in the National Bank of Poland's quarterly reports based on questionnaire surveys conducted among credit committees chairmen from 27 largest banks operating on the Polish market, the year 2010 brought tighter lending terms, especially margin and collateral requirements. Stricter credit criteria, initially applicable to small and medium-sized enterprises, were extended in the second quarter of 2010, to include large firms too. This resulted in a reduced inclination to contract long-term credit and a lower share of long-term credit in external funding. Large firms used more short-term credit in the years 2000 and 2001, before the economic crisis and slowdown, while the financial crisis in the EU states (2009-2010) triggered a short-term external financing decline in this category of companies. Medium-sized enterprises used more short-term loans immediately before the financial crisis, i.e. in 1998, 2000 and 2007, while in the category of small enterprises, this form of external financing was more common in the periods 1999-2002 and 2004-2006 than in 1996.

Construction firms and trading companies are more inclined to finance their business with long-term bank credit than industrial firms, while small and medium-sized enterprises add short-term credit too, since they are capable of pledging a higher value mortgage-backed security or collateralize their trade receivables, inventories or VAT receivable. Small firms, considered to be less creditworthy and subject to higher business risks, experience very strict limitations in respect of external financing, including bank credit availability. Hence, they may be more susceptible to the so-called financial accelerator effect and more dependent upon their current financial standing when planning any capital expenditures. Therefore, models estimated on the population of small and medium-sized enterprises have also been included in the study, as these may provide additional information about processes that determine the analysed phenomena. Small construction companies, as well as small and medium-sized trading enterprises are more inclined to use short-term bank credit than industrial firms. Construction

companies use more long-term bank credit – small construction companies also more short-term bank credit – than industrial companies, due to the high capital intensity of their infrastructural projects, long project payback periods (adequate to credit maturity) and the need to incur expenditures prior to receiving any advance payments or reimbursement grant. Large and medium-sized service firms are less inclined to finance their business with short-term bank credit than industrial companies, while small service firms use less short-term bank credit than industrial firms do, owing to insufficient assets that might be pledged as loan collateral. Firms' inclination to take on long-term bank credit decreases and the long-term credit share in external funding declines, as their profitability and capability of generating cash surplus grows. This conforms to the pecking order theory and indicates that there are no grounds for rejecting **hypothesis 1** in respect of long-term credit. Monetary policy affects – via the interest rate channel – the inclination to contract long-term bank credit, increasing the cost of external funding. Additionally, higher business profitability, enabling firms to accumulate higher capital reserves and retained earnings, results in a lower inclination to use long-term bank credit, which conforms to the pecking order theory. Medium-sized firms are less inclined to take on short-term bank credit as their profitability and capability of generating cash surplus grows; hence, the share of short-term credit in their external funding decreases – as postulated by the pecking order theory. The situation looks similarly in the category of small enterprises: as their capability to generate higher cash surplus grows, the share of short-term bank credit in external funding decreases, although at the 20% significance level. Large firms capable of generating cash surplus are more inclined to take on short-term bank credit, which is a result of the larger scale of operations, as well as of having stable sources of income (e.g. long-term contracts with invoices being issued on a monthly basis). To sum it up, the findings summarized above indicate that there are no grounds for rejecting **hypothesis 1** for small and medium-sized firms in respect of short-term credit. Hypothesis 1 has been rejected only for large companies' financing with short-term bank credit. The applicability of the pecking order theory to Polish companies' choices regarding credit-based financing is confirmed by Boguszewski and Kocięcki (2000), Bougheas et al. (2004), Ghosh and Sensarma (2004), Alonso et al. (2005), Dewaelheyns and Van Hulle (2007), Cole (2008), Jiménez et al. (2010) as well as Cole (2010). The higher the quick ratio, the more firms are inclined to take on long-term bank loans, since their

capability to service debt in due time grows. On the other hand, firms with a higher cash liquidity (*regardless their size*) are less inclined to contract short-term bank credit, since they are more capable of financing their current accounts on their own. Even small firms with a higher cash liquidity declare less demand for short-term bank funding. Higher previous period cash liquidity in large firms and higher current period quick liquidity in medium-sized firms results in a reduced share of short-term bank credit in external funding, owing to a higher capability of financing accounts payable with the firm's own funds. The findings summarized above indicate that there are no grounds for rejecting **hypothesis 2**, just as the pecking order theory suggests and according to the findings presented by Boguszewski, Kocięcki (2000), Cole (2010) as well as Jimenéz et al. (2013).

An analysis of financial losses shows that higher absolute financial losses of a previous period accompany a higher share of long-term credit in external funding, which is a result of the constant inclination to finance business with long-term credit. Financing with new (contracted) long-term loans plays a major role in small and medium-sized enterprises, since it provides a significant capital supply with a relatively long maturity. The greater the difference between gross margin and the share of operating profit in net sales revenue, the more debt companies tend to take on, using bank loans. Medium-sized firms are more inclined to take on long-term bank credit than small firms, also in the model with the monetary policy impact taken into account. Based on the findings summarized above, **hypothesis 3** has not been rejected for medium-sized firms only. Gelos (2003), Alonso et al. (2005), Sufi (2009), Love and Peria (2012), Jimenéz et al. (2013) report a positive correlation between the company size and the bank credit use. A higher share of tangible assets in total assets in the current period, with capital expenditures on tangible assets under construction and advances for tangible assets under construction of period t included, strengthens the inclination to take on long-term bank credit and results in a higher share of long-term bank credit in external funding, which indicates that there are no grounds for rejecting **hypothesis 4**. Ghosh and Sensarma (2004) report similar findings. A higher share of fixed assets in total assets in the current period results in a reduced inclination to take on short-term bank credit in the category of medium-sized firms and reduces the large and medium sized firms' demand for short-term bank credit financing, since in a situation like this they have a better access to alternative sources of financing, including long-term bank loans. Therefore, medium-

sized firms with more substantial assets pledged as collateral are less inclined to use short-term bank credit. This is a consequence of risk aversion, i.e. for fear of losing the ability to service debts in due time, firms choose sources of funding with a longer maturity.

A higher share of fixed assets in total assets in period ($t-1$), which plays the role of collateral at the stage of the loan application analysis, increases small firms' inclination to contract short-term bank loans. Firms with a relatively low proportion of tangible assets to total assets may be thought of as non-transparent and experiencing more information asymmetry problems (Ghosh and Sensarma, 2004, *inter alia*). The findings summarized above give grounds for rejecting hypothesis 4a for small firms. No grounds have been found for rejecting **hypothesis 4a** for medium-sized firms only.

Firms that are financially sound, i.e. firms with a low bankruptcy risk, tend to keep their debt level low and therefore choose lower long-term loans. At the 20% significance level, firms with a higher bankruptcy risk are characterized by a relatively higher long-term borrowing and a higher share of long-term bank credit in external funding. It should be noted that firms facing bankruptcy risk owing to negative equity have been rejected from the research sample, while 6% of them contracted long-term bank loans.

Large firms with a higher bankruptcy risk are more inclined to contract short-term bank loans, while small and medium-sized firms with a higher bankruptcy risk are less inclined to contract short-term bank loans. This is caused by the short maturity of these loans and by the fact that loan applications of small and medium-sized firms are analysed longer than those submitted by large firms. Facing a higher credit risk involved in financing small and medium-sized enterprises, banks are more thorough and rigorous when analysing SMEs' creditworthiness and reject loan applications of firms with a lower liquidity, incapable to pay short-term loans in a timely manner. The higher bankruptcy risk causes that small and medium-sized firms are less inclined to take on short-term bank credit. In the category of medium-sized firms, a higher bankruptcy risk of a previous period ($t-1$) at the stage of the loan application analysis, results in a lower share of short-term credit in external financing. Firms with a bankruptcy risk (*regardless their size*) have a higher share of short-term credit in financing. It should be noted that firms facing bankruptcy risk owing to negative equity have been rejected from the research sample. The findings summarized above do not give grounds for rejecting **hypothesis 5**.

In the category of government owned enterprises, only small entities show a significantly higher inclination to use short-term bank credit than that observed in the group of partnerships and civil law companies. The findings show that firms with foreign ownership are less inclined to use long-term bank credit and SMEs with foreign ownership are also less inclined to use short-term bank credit than domestic firms, since they have a better access to alternative sources of financing, including loans from their parent companies or its subsidiaries. Government owned firms are less inclined to use long-term bank credit than partnerships and civil law companies and this tendency is additionally strengthened by monetary policy, which affects the cost of external financing via the interest rate channel. The findings summarized above do not give a basis for rejecting **hypothesis 6** in respect of the long-term bank credit, while in case of the short-term credit no grounds for rejecting hypothesis 6 have been found for SMEs with foreign ownership and for small government owned firms only. This confirms the findings reported by Brown et al. (2012). Owing to the better access to alternative sources of financing, medium-sized firms with foreign ownership have a lower share of short-term bank credit in external funding than domestic firms. The category of medium-sized firms is the only one for which **hypothesis 6a** has not been rejected. Non-specialized and specialized exporters are more inclined to take on long-term bank credit than non-exporters. Monetary policy, via the interest rate channel, increases specialized exporters' willingness to contract long-term bank credit, owing to the better access to credit, including foreign lending. Among small and medium-sized firms, exporters tend to be more willing to contract short-term bank loans and have a higher share of short-term bank credit in external funding than non-exporters, this being a result of an easier access to foreign markets, which involves a higher demand for inventory financing. Furthermore, specialized exporters have a better access to less expensive short-term foreign lending and their currency risk is lower. In the category of SMEs, non-specialized exporters show a lower share of short-term bank credit in external funding than non-exporters at a 15% significance level. The findings summarized above are supported by the literature of the subject (Gelos, 2003; Brown, Ongena and Yesin, 2011; Love and Peria, 2012; Brown et al., 2012) and mostly support **hypothesis 6b**. The category of large exporters is the only one for which hypothesis 6b has not been confirmed in respect of the short-term bank loan financing.

Based on the estimation of models for the inclination to contract long-term and short-term credit, as well as for the long-term and short-term credit use we conclude that firms financing their business with long-term credit in a previous period are more inclined to use long-term credit. Similarly, firms financing their business with short-term credit in a previous period are more inclined to continue using short-term credit. This indicates that firms choosing to contract a bank loan are characterized by stable financial strategy. Small enterprises are most inclined to finance their business with short-term credit. A higher inventories to sales ratio in year t results in a greater inclination among medium-sized and large firms to finance their business with short-term bank loans, since with higher liquidity they are more capable of debt servicing, which conforms to the maturity matching theory. Small enterprises, due to the scale of their operations, are much less capable of self-financing than large firms, which is confirmed by their cautious approach to using short-term credit (a negative correlation between the inventories to sales ratio in year $t-1$ on the use of short-term credit at a 15% significance level). In case of medium-sized firms, the higher inventories to sales ratio in year $t-1$ increases the short term credit share in external financing.

The effect of tax shield follows the financial leverage model. A higher interest tax shield results in a greater inclination to contract short-term bank loans, owing to economies resulting from deduction of interest payments from taxable income. A higher non-debt tax shield of the given year reduces the inclination to contract short-term bank credit, since other, alternative and less expensive sources of financing can be used. As a result, it is not necessary to borrow from a bank in order to save on taxes. Large firms reduce their tax liabilities significantly through high cost of depreciation. In the group of small enterprises, a higher interest tax shield (in period t) reduces the inclination to contract short-term credit owing to risk aversion, i.e. fear of losing the ability to service debts in due time. Firms with a high development rate have greater financial needs and, therefore, are more inclined to contract long-term bank credit. Sales growth is inadequate to their financial needs, especially to capital expenditures, since developments are capital-intensive.

A higher share of liquid securities in assets translates into a reduced share of short-term credit in external funding. Medium-sized firms with a higher share of liquid securities in assets of a previous period are less inclined to finance their business with short-term bank credit. Only small enterprises

with a higher share of liquid securities in assets of a previous period use more short-term bank credit, since collateral in the form of liquid securities mitigates their credit risk aversion. Payment gridlocks increase small firms' demand for short-term bank credit and its share in sources of financing. In the category of medium-sized firms, previous year's payment gridlocks translate into a higher demand for short-term credit, since current financial needs are greater than the revenue from sales.

4.1 The impact of monetary policy on bank credit financing

The monetary policy tightening translates into higher short-term interest rates on the inter-bank market, thereby resulting in a growth of commercial banks' loan and deposit interest rates. Under such circumstances, price-stickiness makes real interest rates grow. Higher interest rates on loans result in a reduced demand for credit (**Demchuk et al., 2012**). This is reflected in the findings summarized in Table 9, where, according to **hypothesis 7**, monetary policy – via the WIBOR3M and exchange rate channels – has a negative effect on the non-finance firms' inclination to contract short-term bank credit. The effect of monetary policy exerted via the WIBOR3 channel with a one-period lag – a reduced use of new long-term bank credit – is stronger for large firms than for small enterprises (Table 5), since they have a better access to alternative sources of financing and in the conditions of restrictive monetary policy they are capable of seeking less expensive funding. On the other hand, its impact on firms' inclination to finance their business with short-term bank credit and on the use of such credit, is positive in the category of medium-sized and large companies. In case of the effective exchange rate lagged one or two periods, monetary policy has a positive effect on firms' inclination to finance business with short-term bank credit and on the use of such credit regardless the firm size. At a 20% significance level, the effect of WIBOR interest rate lagged one period – an increased inclination to contract long-term bank credit – is stronger for large firms than for small enterprises, while in the category of medium-sized firms a similar effect is achieved with a two period WIBOR lag. This may be a consequence of the long decision-making process of the capital expenditure planning and implementation, as well as the lengthy loan application analysis. The exchange rate channel concept addresses the effect of monetary policy on the domestic currency value, where the monetary policy tightening leads to domestic currency appreciation. The domestic currency value growth translates into

a decline in imported goods prices quoted in domestic currency and a change in the assets value (the so-called balance-sheet effect) (Demchuk et al., 2012). Effective exchange rate translates into a general increase of firms' inclination to contract long-term bank credit, especially in foreign currency. But the effective exchange rate in period t and even more in period $(t-1)$ has a negative impact (although at a 15% significance level) on medium-sized firms' inclination to contract long-term bank loans, which may be caused by their uncertainty as regards revenue stability and their currency risk perception, especially with a low share of exports in total sales. Effective exchange rate lagged one period has a negative effect on small enterprises' inclination to contract long-term bank loans, but effective exchange rate lagged two periods has a positive effect on small enterprises' inclination to contract long-term bank loans, as well as on the size of loans, most probably **due to the lower cost of foreign currency credit**. The decision-making process of planning capital expenditures and selecting sources of financing is most lengthy in case of small enterprises, similarly as the loan application analysis. Small firms exhibit greatest credit aversion, including long-term credit, due to their uncertainty of income and financial performance. Banks, when analysing small enterprises' credit worthiness, take a higher risk of losing the loan repayment capability into account, thereby posing stricter requirements as regards revenues generated by small firms. Effective exchange rate lagged two periods is negatively correlated with medium-sized firms' inclination to contract long-term bank credit, due to the currency risk perception, especially with a low share of exports in total sales and a relatively high level of regular commitments in domestic currency. In the category of large firms, on the other hand, effective exchange rate lagged two periods is positively correlated with the inclination to contract long-term bank credit, owing to the low currency risk perception. Large firms use financial instruments to protect themselves against the exchange risk, thereby definitely mitigating their aversion to foreign currency debts.

In order to analyse the impact of monetary policy on Polish companies' bank credit financing more thoroughly, we have examined the response of the short- and long-term bank credit use to interest rate, exchange rate and credit risk shocks, using S(VAR) panel method (Holtz et al., 1988). VAR methodology, where all variables in the system are treated as endogenous, has been combined with panel analysis, which enables non-observable individual effects to be included. The model based

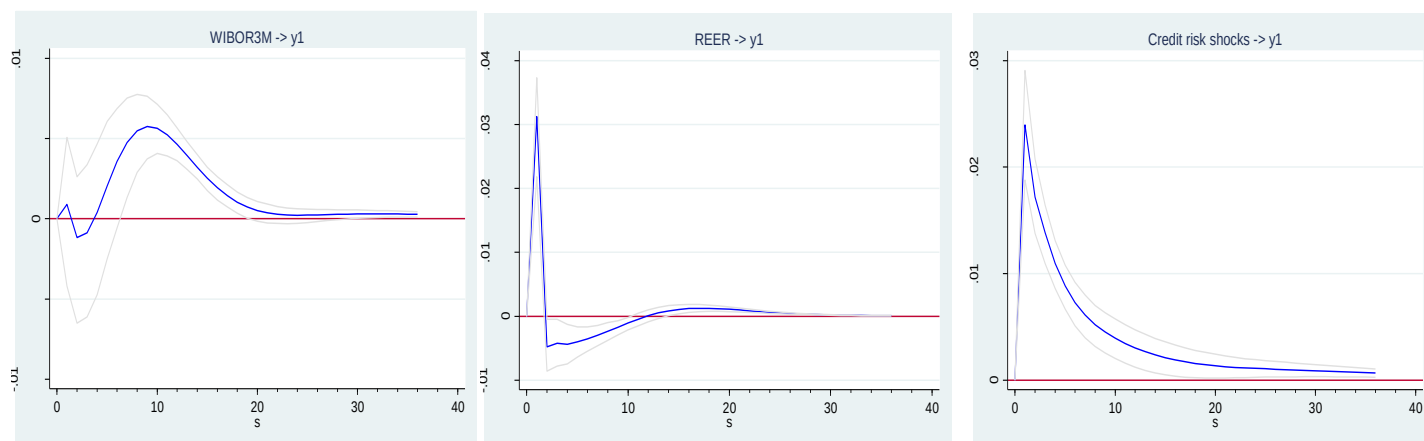
on quarterly data obtained from statistical reports F-01/I-01 of the years 4q1996-4q2012, uses the following variables, besides the utilization of short-term (long-term) bank credit: bank refinancing rate (WIBOR3M), real effective exchange rate (REER) and credit risk measured as accounts receivable lost due to credits and loans to private enterprises and companies and co-operatives divided by short-term and long-term credits and loans to enterprises. The outcomes are presented on Figure 1 and 2. According to Figure 1, the long-term bank loans' response to interest rate shocks is relatively quick, but not very strong. A slight growth of the long-term credit use can already be observed in the first quarter following the shock, since facing higher costs of interest companies confine the use of any other sources of financing, in effort to sustain their debt servicing ability. The use of long-term credit declines in quarter 2-3 as a result of the use of more expensive loans being held down, to begin a gradual recovery from the third quarter on, up to the level before the interest rate shock and even by 0.5 higher in quarter 9. The long-term credit use response to a credit risk shock is stronger. A growth of the long-term credit use by 1.9-2.9 is observed in quarter 1-2 already, as a result of the next tranche payment or the provision of some additional support in the form of repayment extension or payment of an assistance tranche for overcoming some temporary financial problems. From quarter 3 on, the use of long-term credit gradually declines as a result of credit rationing by banks which experience losses on loan exposures resulting from the credit risk growth.

The strongest long-term credit response is observed in case of the real effective exchange rate shock – a growth by 2.1-3.8 in the first quarter already, as a consequence of a higher foreign currency loan valuation, which may be a manifestation of the balance sheet channel effect. From quarter 2-3 on, the use of long-term bank credit decreases below the pre-shock level and this may be a manifestation of the exchange rate channel effect. A gradual deceleration of the long-term credit use response to the real exchange rate shock and a gradual recovery to the pre-shock level is observed from quarter 3-4 on. The greatest strength and the nature of response to the real exchange rate shock may be caused by the significant share of foreign currency loans in firms' long-term credit.

A much stronger response of the short-term credit use to the interest rate shock can be distinguished on Figure 2. The short-term credit use grows by 19 even in the first quarter after the shock, since facing higher costs of interest companies confine the use of any other sources of financing, including

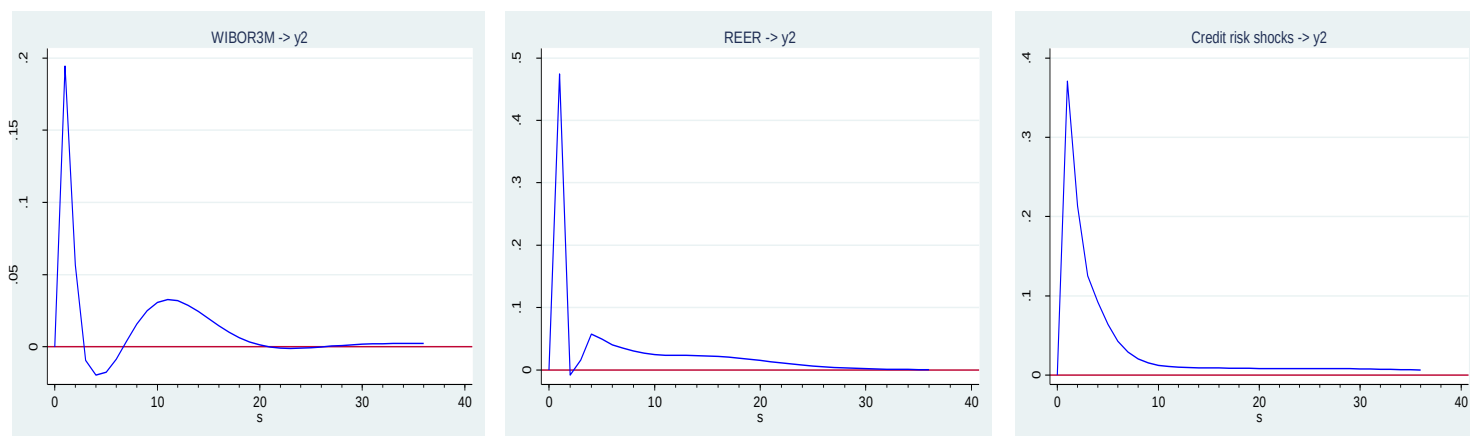
trade credit (shown in the denominator of the short-term credit use), in effort to sustain their debt servicing ability. The use of short-term credit declines below the pre-shock level in quarter 2 as a result of the use of more expensive loans being held down, to begin a gradual recovery from quarter 3-4 on, up to the level before the interest rate shock in quarter 6 and even by 3.5 higher in quarter 10-11.

Figure 1. Functions of the firms' long-term credit use (y1) response to interest rate (WIBOR3M), exchange rate (REER) and credit risk shocks



Source: Author's analyses based on quarterly data from F-01/I-01 of the years 4q1996-4q2012.

Figure 2. Functions of the firms' short-term credit utilization (y2) response to interest rate (WIBOR3M), exchange rate (REER) and credit risk shocks



Source: Author's analyses based on quarterly data from F-01/I-01 of the years 4q1996-4q2012.

The growth of the cost of servicing loans contracted in PLN occurring after WIBOR3M growth is partly compensated by the access to foreign currency credit, which restricts the effectiveness of the transmission mechanism. Similarly as in case of the long-term credit responses, the short-term credit use responds most strongly to the real effective exchange rate shock, showing a growth close to 0.48

in the first quarter already, as a result of the foreign currency credit liabilities growth, as well as due to the necessity to reduce financing from other sources (shown in the denominator of the ratio), so as to be able to pay higher loan instalments, which may be a manifestation of the balance sheet channel effect. In the second quarter following the real exchange rate shock, the short-term credit use declines rapidly, even below the pre-shock level, which may be a manifestation of the exchange rate channel effect and of the necessity to use alternative sources of financing to service higher cost of credit. From quarter 3-4 on, the short term credit use is observed to grow by 0.05, since in case of creditworthy firms with a credit track record or having a relationship with the bank, using a short-term loan, especially a foreign currency one, may be more advantageous than any alternative sources of financing. A gradual deceleration of the short-term credit use response to the real exchange rate shock and a gradual recovery to the pre-shock level is observed from quarter 5 on. The greatest strength and the nature of response to the real exchange rate shock may be caused by the significant share of foreign currency loans in firms' short-term credit and the relatively stable inclination to finance business with short-term loans, including foreign currency loans. As regards the credit risk shock, a much stronger response is observed in the short-term credit use than in the long-term credit use. In the second quarter, a 0.38 growth in the short-term credit use takes place as a result of debt rollover, increased current account overdraft or using a credit line for fear of credit rationing that may be expected as a consequence of the credit risk growth in the economy. Thereafter, from quarter 3-4, the short-term credit use declines, to stabilize above the pre-shock level from quarter 10 on. This may be caused by the fact that having established a relationship with the bank, a firm may obtain a short-term loan even in the period when banks adopt credit rationing policies in response to losses on loan exposures resulting from the credit risk growth.

5. Recapitulation and final conclusions

Small and medium-sized enterprises (SMEs) in Poland use much less bank credit than their creditworthiness allows, implementing financial strategies that follow the pecking order theory. Profitable small and medium-sized firms generating cash surplus and thereby capable of self-financing, use less long-term and short-term bank credit, while SMEs with a higher liquidity use less

short-term bank credit. These findings are supported by the literature of the subject (Boguszewski and Kocięcki, 2000; Bougheas et al., 2004; Ghosh and Sensarma, 2004; Alonso et al., 2005; Dewaelheyns and Van Hulle, 2007; Cole, 2008; Cole, 2010; Jiménez et al., 2010). On the other hand, large firms capable of generating financial cash surplus, with their larger scale of operations and stable income, are more inclined to contract short-term bank loans. Outputs from models estimated with the GMM system estimator and the (S)VAR panel method show the mechanism of monetary policy transmission to reality, and to the business sector in particular, via the interest rate, exchange rate and bank credit channels supported by the corporate balance sheet channel. A negative effect exerted by monetary policy via the interest rate and exchange rate channel on Polish firms' inclination to finance their business with short-term credit. The negative impact of monetary policy, lagged one period, on the long-term credit use is stronger for large firms than for small firms. On the other hand, this impact is positive in the category of medium-sized and large firms, which corresponds with the findings reported by **Ghosh (2010)**. Effective exchange rate lagged one or two periods has a positive effect on the firms' inclination to finance their business with short-term bank credit and on the short-term credit use. An analysis of the firms' bank credit use following the interest rate, exchange rate or credit risk shock shows that the response is much stronger – especially to the effective exchange rate shock – for short-term bank credit than for long-term credit. Foreign firms, firms with foreign ownership and government-owned enterprises are less inclined to contract long-term bank loans, while small and medium sized entities in all these categories are also less inclined to use short-term bank credit, owing to the wider access to alternative sources of funding, such as borrowing from mother companies and foreign currency loans. Exporters are more inclined to finance their business with long- and short-term bank credit. SMEs in this category use more short-term credit than non-exporters. These findings are confirmed by empirical studies published by Gelos (2003); Brown et al. (2011); Love and Peria (2012); Brown et al. (2012). Higher losses on financial operations of the previous period accompany a higher share of long-term credit in external funding – this is a result of the constant inclination to finance business operations with new long-term credit. Higher liquidity increases the inclination to contract long-term bank credit, since it improves the debt servicing capability. The interest tax shield effect follows the financial leverage model, but a higher non-debt tax shield weakens the inclination to

contract long-term credit, since firms are then capable of reducing their taxes not only through debt, but also through depreciation or operating lease.

Higher fixed assets collateral increases firms' inclination to contract long-term bank credit and the share of foreign long-term bank credit in external funding, which confirms the findings reported in the literature of the subject (Ghosh and Sensarma, 2004). Firms with high growth opportunities have greater financial needs and therefore are more inclined to contract long-term bank loans. Large firms with a higher bankruptcy risk are more inclined to contract short-term bank credit, while small and medium-sized enterprises are less inclined to do so. Payment gridlocks increase small firms' demand for short-term bank loans and their share in external funding, but payment gridlocks experienced in a previous year reduce the use of short-term bank credit in this category of firms, while in the category of medium-sized companies they result in an increased demand for short-terms bank credit. A higher share of liquid securities in assets reduces the use of short-term bank credit and in the category of medium-sized firms it also reduces the inclination to use short-term bank credit. Only small firms with higher liquid reserves in a previous year increase the short-term bank credit use, since collateral in the form of liquid securities mitigates their credit risk aversion.

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