What drives bank lending policy?
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Abstract

Based on aggregate data from the lending survey for Poland and using a series of structural vector autoregressive models, we show that credit market sentiments, bank capital position and quality of banks' balance sheets are the most important drivers of bank lending standards, terms and conditions for the corporate sector. Also, we demonstrate that albeit with some delay, monetary policy shocks affect bank lending policy and additionally have some bearing on credit market sentiments, quality of bank balance sheets and competition. Innovations to the business sector activity and to demand for credit play a minor role for bank lending policy.

Key words: bank credit, lending standards, terms and conditions, structural vector autoregressive model

JEL code : E44, E51, G21

1. Introduction

Lending standards, i.e. the criteria which banks use to select borrowers, together with loan terms and conditions, such as spreads or collateral, are a significant factor for developments in the credit market, as they decide on the allocation of loans to households and corporates and determine their possibility of growth. Their persistent laxity or tightness can lead to credit cycles.

As stipulated by theoretical models, persistent laxity (tightness) is triggered by the cyclical properties of the credit screening process. In economic booms, when the pool of credit applicants with a positive net present value (NPV) increases, lenders may find it optimal to abandon screening and extend credit to all applicants. In bad times, the number of such borrowers falls, whereas banks tend to screen them more carefully, require more collateral or higher spreads. While screening is a generic source of laxity (or tightness), it is largely unobserved. However, bank lending surveys provide information which gives some insight into screening. This is information on lending standards and conditions. Thus, examination of their reactions to a set of real and financial shocks can bring more knowledge on this aspect of bank behaviour, important for both macroprudential and monetary policy.

This is what this paper does. Namely, it demonstrates how lending standards, terms and conditions on loans extended to large (LEs) and small and medium sized corporates (SMEs) react to monetary policy and credit demand shocks, to innovations to the business activity in the corporate sector, to sentiments prevailing in the credit market, to shocks to the quality of the bank loan portfolio or the required capital position and competition. Also, it investigates which factors drove lending standards before the global financial crisis, i.e. during the period when they tended to systematically move towards laxity, and in the period when they were moving towards tightness, which occurred during the crisis. The analysis is based on data from Senior Loan Officer Opinion Surveys (SLOOS) for Poland and spans from 2003Q4 to 2020Q1.

We find that banks conduct not only different policy with respect to large and small and medium-sized enterprises, but also, they do so with respect to long-term and short-term loans. This concerns standards on short-term and long-term loans for LEs. Whereas standards on long-term loans are mostly driven by credit market sentiments, especially risks related to the largest borrowers, standards on short-term loans are driven by bank capital position. In the case of standards for SMEs there is no such difference, both types of standards are driven by the same factors: these related to the credit market sentiments and the quality of the bank credit portfolio (the share of non-performing loans).

Over the sample, shocks to business activity seem not to induce statistically significant responses of lending standards, either for LEs or for SMEs. They do affect some lending terms and conditions: the required collateral and maximum loan size, but these innovations usually explain a minor part of the respective variances. Competition from other banks or from the capital market has a negligible influence on lending standards but is a significant driver of average spreads. In turn, monetary policy shocks affect both lending standards and lending terms and conditions, which means the operation of the credit channel of monetary policy. Positive innovations to demand for long-term credit are found to lead to a tighter bank credit policy, more evident in the case of standards for SMEs than for LEs. However, the effect is delayed and plays a minor role in explaining the variance of lending standards.

Historical decompositions show that before the global financial crisis (GFC), in the economic upturn, banks conducted lax policy, driven mostly by shocks to standards, terms and conditions and by innovations to the monetary policy. During the GFC, banks' lending policy was dominated by concerns about capital position and risks related to the largest borrowers.

The reminder of this paper is organized in the following way. Section 2 presents a brief review of the related literature, section 3 – the estimation method and data. Section 4 provides the results and robustness checks; section 5 summarizes and concludes.

2. Related literature

A first wave of analyses of lending standards appeared in the wake of the savings and loan crisis of the 1980s and 1990s experienced by the US banking industry, e.g. Schreft and Owens (1991), Weinberg (1995). Twenty years later, after the global financial crisis, lending standards became an important element of economic analyses and macroeconomic models, e.g. Gete (2018), Kirti (2018), Swarbrick (2019).

Both, theoretical and empirical literature focus on the cyclical behaviour of bank lending policy. Empirical studies show that lending standards display countercyclical behaviour: in booms they are systematically too lax, whereas in downturns too stringent, e.g. Asea and Blomberg (1998), Lown and Morgan (2006), Berlin (2009), Chen et al. (2020). Figure 1 plots changes in lending standards on long-term loans for large enterprises in Poland. Their countercyclical behaviour is especially visible during the global financial crisis, COVID-19 crisis and in 2004, when banks seemed to be uncertain about economic developments after Poland's EU entry.

Theoretical models aimed at explaining what leads banks to systematically set too lax or too stringent standards, departing from the observation that when making a loan, lenders are involved in costly and time-consuming evaluations of the borrowers. Screening and monitoring reduce creditor risk as firms tend to invest sub-optimally. In economic booms, however, when the pool of credit applicants with a positive net present value increases, lenders may find it optimal to abandon screening and extend credit to all applicants. In bad times, the number of such borrowers falls, whereas banks tend to screen them more carefully. Thus, theoretical models usually point out that the underlying reason of too lax or too stringent policy is the very process of screening loan applicants. Together with the assumption of asymmetric information, costly screening can explain the cyclical behaviour of standards. For example, in Ruckes (2004), the improving economic outlook and declining average default probabilities of borrowers reduce the profitability of screening. This causes bank screening intensity to display an inverse U shape as a function of economic prospects. Low screening activity in expansions creates intense price competition among lenders. As a result, loans are extended to lower-quality borrowers. When the economic outlook worsens, price competition diminishes, and standards tighten significantly.

Dell'Ariccia and Marquez (2010) consider a model belonging to the same strand. Banks have private information about the creditworthiness of some borrowers (dubbed as "known" borrowers) but not others ("unknown" borrowers). For the latter group, banks can either use collateral requirements to sort "good" from "bad" borrowers, or they can lend with no such

requirement. The informational asymmetries between banks and borrowers generate adverse selection problems that constitute the main incentives for banks to screen loan applicants. In a downturn, when demand for loans is subdued and the proportion of unknown borrowers is sufficiently low, banks will choose to screen out bad borrowers by demanding a sufficiently high collateral requirement. In a boom, when the proportion of unknown borrowers is high, banks will offer contracts with no collateral requirement. To the extent that banks cannot distinguish between these two groups, as the proportion of new projects in the market increases, the distribution of borrowers applying to each bank improves as well. Banks find it profitable to reduce collateral requirements to undercut their competitors and increase their market share.

There is a growing body of literature on dynamic lending standards. In these models, standards both influence and respond to economic circumstances. Importantly, lenders' choice to acquire information on borrowers differs in booms and in recessions, Hu (2018), Farboodi and Kondor (2020), Fishman et al. (2020). In Farboodi and Kondor (2020), the model captures credit market sentiments as lenders' rational choice of lending standards under imperfect information. Credit-market sentiments are high when most lenders optimally choose lax lending standards. This leads to low interest rates and high output growth, but also to the deterioration of future credit application quality. When the quality is sufficiently low, lenders endogenously switch to tight standards, i.e. sentiments become low. This implies high credit spreads and low output, but a gradual improvement in the quality of applications, which eventually triggers a shift back to lax lending standards and the cycle continues. In a dynamic model of Fishman et al. (2020), stringent standards reduce the availability of lending not only to potentially "bad" borrowers, but also to the otherwise creditworthy ones. Thus, a period of tight credit policy may lead to a worsening of the credit portfolio and a hysteresis in the credit market.

This paper, as Lown and Morgan (2006), is based on data from a bank lending survey, where banks explicitly report on changes in lending policy and indicate the underlying reasons, such as changes in the macroeconomic conditions, the financial standing of borrowers or in the quality of bank balance sheets. Furthermore, the survey contains information on changes in average spreads, spreads on riskier loans and the required collateral, which are of key importance in the theoretical models of lending standards. Employed in the paper, vector autoregressive models show the reactions of bank lending policy to shocks from the real and financial sectors and to shocks to monetary policy.

3. Estimation method and data

3.1. Estimation method

3.1.1. Assumptions and models

Following Berlin (2009), we define a change in lending standards as a change which does not match the alteration in the net present value of a loan. Thus, a change in standards occurs if banks change their appetite for risk. In principle, banks give loans if the net present value, i.e. the discounted sum of future repayments on the loan minus the loan amount, is positive. If, for example, due to adverse shocks to the real sector, the number of projects with a positive NPV decreases, banks are supposed to adjust lending standards. If they do it in line with a drop in the NPV, it means that they do not change their risk appetite, but simply act in a usual way for profit-maximizing units. However, if in a contraction banks systematically do not fund projects with a positive NPV, it means that they have altered their attitude to risk and in fact changed lending standards. By the same token, if in an expansion banks systematically fund loans with a negative NPV, it means that they have changed standards towards laxity.

To disentangle empirically *true* changes in lending standards from the set of adjustments which are in line with the changing NPV, we compare actual changes in lending standards and their model-based forecasts. The models contain variables from the lending survey, which refer to the risks related to the enterprise sector. If changes in the actual and forecasted standards differ systematically over a prolonged period, we conclude that bank lending policy moves towards laxity/stringency.[1]

The estimation method used in the paper departs from the observation that although potential drivers of the lending standards form two groups, one related to the real sector and another related to the financial sector, there exist feedback loops both within them and between them. Negative developments in the real sector worsen the financial situation of the borrowers and increase their risk of default. The ratio of non-performing loans rises, whereas bank profits decline. As a result, banks need to spend more funds on screening and monitoring. Bank balance sheets become weaker as a growing share of non-performing loans raises risk weights of the asset portfolio. To meet capital requirements banks may have to deleverage or increase capital. The latter can be costly as investors may require a higher risk premium. Finally, credit impediments will result in lower growth rates of activity in the real

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[1] Because data from SLOOS does not show levels, but changes, in standards/T&C, we cannot say that standards are too lax or too stringent, but rather that bank policy moves towards laxity/stringency.

sector and in a gradual deterioration of the financial standing of firms. Thus, to capture dynamic relationships between variables, we build structural vector autoregressive models.

If the underlying structural model is as in (1):

(1) $AY_t = C(L)Y_{t-1} + Bv_t$,

where Y_t is a vector of endogenous variables, A is a vector of contemporaneous relations among the variables, $C(L)$ is a matrix of a finite order lag polynomial, and v_t is a vector of structural disturbances, we can estimate a VAR model as the reduced form of the underlying model:

(2) $Y_t = A^{-1}C(L)Y_{t-1} + u_t$,

where u_t is a vector of VAR residuals, normally independently distributed with full variance-covariance matrix Σ. The relation between the residuals and structural innovations is:

(3) $Au_t = Bv_t$ and

(4) $B^{-1}Au_t = v_t$

To identify structural shocks, it is necessary to impose restrictions on matrices A and B in (4).

In the baseline setting, we have five endogenous variables: investment of the corporate sector on a year-on-year basis, credit volume[2] on a year-on-year basis, one variable from the list of potential drivers of bank lending policy from SLOOS, the interest rate and credit standards (or alternatively one of T&C). Such a set of variables makes it possible to control for business cycle developments and monetary policy. Thus, in the case of lending standards, the vector Y_t is:

(5) $Y_t = \left[\!\!\left[\Delta_4 inv_t, \Delta_4 l_t^i, driver_t^k, i_t, supply_t^{i,j} \right]\!\!\right]'$,

and for lending terms and conditions:

(6) $Y_t = \left[\!\!\left[\Delta_4 inv_t, \Delta_4 l_t^i, driver_t^k, i_t, supply_t^z \right]\!\!\right]'$

where Δ_4 stands for a fourth difference of a variable, i takes values from 1 to 2, $i=1$ means "long-term loans" and $i=2$ means "short-term loans"; j takes values from 1 to 2, $j=1$ stands

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[2] We consider solely loans in domestic currency.

for LE, $j=2$ for SME; k takes values from 1 to 6; $k=1$ is for the overall macroeconomic conditions, $k=2$ for industry-specific risks, $k=3$ for risks related to the financial standing of the largest borrowers, $k=4$ for risks related to the lender's capital position, $k=5$ for risks related to the quality of lender's portfolio of loans (the share of non-performing loans in the loan portfolio) and $k=6$ for risks related to competition from other banks or other financial institutions. Finally, z takes values from 1 to 6; $z=1$ is for average spread, $z=2$ for spread for riskier borrowers, $z=3$ for the required collateral, $z=4$ for the maximum maturity, $z=5$ for the maximum size of a loan and $z=6$ for the non-interest rate cost of a loan. Thus, in total, we have 96 models with various combinations of loans, lending standards or terms and conditions.

Potential drivers of bank lending policy form two groups: the first one is related to the developments in the real sector, the second one in the banking sector. The first group contains elements $k= [1, 2, 3]$. The factors of the first group approximate banks' sentiment with respect to borrowers. The theory stipulates that if there is a radical shift in sentiments, e.g. towards expected higher profits or better overall economic outcomes, going beyond fundamentals, banks will ease lending standards, terms and conditions. The required collateral is expected to go down, since facing a larger number of potential borrowers, banks would reduce screening. This should result in a credit boom, rising output and – with some delay – in the deteriorating quality of banks' loan portfolio.

The second group, $k= [4, 5, 6]$, approximates banks' perception of the quality of their own balance sheets, competition and – to some extent – of the macroprudential policy of the supervisory institution. If banks perceive their own financial standing as good, they will be more favourable to extend more loans, providing that borrowers have investment projects with a positive net present value. Banks' reaction to the perceived shifts in competition, e. g. resulting from new entrances, would also end up with looser lending standards to undercut competitors. Also, an increasing number of borrowers can result in fiercer competition if banks want to extend their market share. Information contained in a bank's perception of its capital position is more complicated, since it may depict not only the state of capital position which is related to its business activity and asset structure, but also decisions of the institution conducting supervisory or macroprudential policy. In the paper, we cannot differentiate between them.

Naturally, there exist relationships between variables from these two groups. Changes in the perceived macroeconomic risk and – to a lesser degree – in the industry-specific risk

Granger cause changes in banks' balance sheets (or non-performing loans, *npl*) and in competition. This suggests that in fact, the perceived quality of banks' balance sheets and competition depend on past developments of credit market sentiments. There are, however, two cases when the variables also display reverse causality. Namely, *npl* and bank capital position Granger cause risks related to the largest borrowers. Thus, it seems that deterioration of their own balance sheets induces banks to tighten lending policy, which finally results in a worsening of the financial standing of borrowers.

To identify structural shocks, we use the following set of assumptions. Investment reacts to developments in monetary policy and credit standards (or alternatively: terms and conditions) with a lag. Demand for loans depends on investment (scale variable) and the interest rate. Potential drivers of lending policy, supposed to cause changes in credit standards, terms and conditions depend contemporaneously on the current state of the economy, approximated by investment activity of the corporate sector. Moreover, they depend contemporaneously on loans. The behaviour of loans contains important information for forming banks' sentiments on the real sector. It is also important for drivers of standards, terms and conditions related to developments in the banking sector – non-performing loans or competition, as banks form their evaluations observing not only their own balance sheets, but also developments in the credit market on the aggregate level. In the case of capital position, this assumption holds as well, since each credit requires additional capital.

Because Narodowy Bank Polski conducts an inflation targeting policy, the policy rule should respond to developments in prices and in the real sector. However, we do not explicitly include prices, and in the model, the monetary policy rate responds contemporaneously to developments in investment. Since this can be considered as a misspecification, in the robustness checks we augment the model to introduce inflation.

Finally, banks' lending policy depends on investment, banks' sentiments with respect to the enterprise sector, or their perception of the current developments in the financial sector and monetary policy.

The set of restrictions in matrices A and B is as in (7). To simplify the notation below, we refer to all types of loans analysed in the paper as l_t and to all lending standards, terms and conditions, which approximate loan supply as $supply_t$. We identify five exogenous shocks: (i) to the real (business) activity of the enterprise sector, approximated by shocks to investment; (ii) a shock to demand for credit; (iii) a shock to one of factors reckoned by credit officers to be a driver of lending policy; (iv) to the monetary policy; (v) a shock to bank lending policy

(either to standards or terms and conditions). Being a deviation from the usual credit policy, corresponding to the NPV of loans, it fulfils Berlin (2009) conditions of a "true" change".

$$(7) \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ \alpha_{21} & 1 & 0 & \alpha_{24} & 0 \\ \alpha_{31} & \alpha_{32} & 1 & 0 & 0 \\ \alpha_{41} & 0 & 0 & 1 & \alpha_{45} \\ \alpha_{51} & 0 & \alpha_{53} & \alpha_{54} & 1 \end{bmatrix} \begin{bmatrix} u_t^{inv} \\ u_t^l \\ u_t^{driver} \\ u_t^i \\ u_t^{supply} \end{bmatrix} = \begin{bmatrix} v_t^{inv} \\ v_t^l \\ v_t^{driver} \\ v_t^i \\ v_t^{supply} \end{bmatrix}.$$

To check the robustness of results, models are respecified: loans to the corporate sector are removed while a second driver of bank lending policy is introduced. Thus, in the model, there are two driving factors, one from each group, i.e. one from $k = [1, 2, 3]$ and one from $k = [4, 5, 6]$.

Another feature of this setting is that the identified shocks to lending standards are simultaneously exogenous with respect to the driving factors of both groups and therefore we avoid a possible problem of historical decompositions of models containing solely one driver from the group related to the banking sector. Now, once we have two drivers, the forecast of lending standards represents these which correspond to the NPV and to risks attributable to the banking sector. In the historical decompositions, shocks to the risk factors related to the banking sector show a change in bank appetite for risk which is orthogonal to the shock of factors affecting the NPV.

The set of restrictions in matrices A and B is as in (8):

$$(8) \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ \alpha_{21} & 1 & 0 & 0 & 0 \\ \alpha_{31} & \alpha_{32} & 1 & 0 & 0 \\ \alpha_{41} & 0 & 0 & 1 & \alpha_{45} \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & 1 \end{bmatrix} \begin{bmatrix} u_t^{inv} \\ u_t^{driver[1,2,3]} \\ u_t^{driver[4,5,6]} \\ u_t^i \\ u_t^{supply} \end{bmatrix} = \begin{bmatrix} v_t^{inv} \\ v_t^{driver[1,2,3]} \\ v_t^{driver[4,5,6]} \\ v_t^i \\ v_t^{supply} \end{bmatrix}$$

We use non-recursive factorizations. Models are overidentified by one restriction. The restrictions are formally tested (Chi-square test) and not rejected.

3.1.2. Identification of periods of bank credit policy moving to laxity (stringency)

Providing evidence that banks may systematically choose too lax or too stringent standards and finding their actual drivers is a non-trivial task. The first problem lies in disentangling – in the historical data – movements of standards which correspond to changes of the unobservable NPV from those which are in excess or are too small. As shown in Figure

2, before the 3rd quarter of 2008, lending standards, terms and conditions for the enterprise sector were in the negative zone, which means that they were getting looser on a quarter-to-quarter basis, but it is not clear whether in fact they were too loose.

To solve the problem, we argue that a hypothetical level of standards consistent with the unobservable NPV can be obtained as a forecast from models which relate standards to: (i) developments in the real sector, such as investment, the cyclical component of which coincides with the cyclical component of GDP, (ii) the interest rate policy of the central bank, which, in turn, impacts interest rates in the money market, lending rates in the banking sector and which also affects yields on treasuries. Such forecasts encompass the main factors which affect the NPV, e.g. Berlin (2009).

In this study, we have two types of models: those containing risk factors related to the borrowers *(k= [1, 2, 3])* and those with risk factors related to the banking sector *(k= [3, 4, 5])*. Models of the first group bring forecasts of standards which correspond to the explicit risk of the borrowers and therefore are well suited to indicate periods when banks systematically set too lax or too stringent standards. The effects of shocks identified in the historical decompositions can be interpreted as banks' overreaction to the actual risks. Historical decompositions obtained from models of the group k= *[1, 2, 3]* are, however, limited to the drivers of standards related to the real sector, whereas standards can be also driven by factors related to the banking sector. To overcome this problem, historical decompositions obtained from models containing variables of the second group are used to determine the role of such factors as capital position, the quality of bank loan portfolio and competition.

3.2. Survey data

The survey was launched in late 2003. It is conducted on a quarterly basis. Loan officers answer questions related to loan supply and demand to the non-financial corporations and households. They declare whether credit standards, terms and conditions have been (i) tightened considerably, (ii) tightened somewhat, (iii) remained basically the same, (iv) eased somewhat, (v) eased considerably. Standards are minimum requirements of creditworthiness, set by banks, that the borrower is required to meet to obtain a loan. The survey contains standards applied to large enterprises and small and medium-sized enterprises, on short- and long-term loans. Lending terms and conditions comprise three price dimensions: average spread, spread on riskier loans, and non-interest rate cost, and three non-price elements: the required collateral, maximum size and maximum maturity of a loan.

Loan officers are requested to rate factors which drove lending standards. They comprise (i) risks related to the borrowers – macroeconomic, industry-specific and related to the default of the largest borrowers of a bank, (ii) risk related to the lenders – capital position and the share of non-performing loans in total loans, and (iii) structural factors (competition from other banks and non-bank financial institutions.

The answers rank from (i) have contributed to tightening considerably, (ii) have contributed to tightening somewhat, (iii) have basically not contributed to any changes, (iv) have contributed somewhat to softening to (v) have considerably contributed to softening. The twenty four banks which currently (2020-2021) respond to the survey possess about 87-89% of total loans to the non-financial sector.

The aggregation of data consists in the calculation of weighted percentages of responses and the net percentage, i.e. the difference between the structures presenting opposite trends. The importance of banks in a market segment is represented by the share of loans outstanding of this bank in the loan portfolio of all banks that respond to the survey, broken down by types of loans. Thus, a weight, corresponding to a bank's share in a given market segment is assigned to particular responses. Figure 2 depicts lending standards, terms and conditions together with risk factors indicated in the survey.

3.3. Non-survey data

The list of the non-survey data comprises investment (Gross Fixed Capital Formation), two types of loans in the domestic currency: (i) long-term loans, i.e. loans for investment and real property acquisition, and (ii) short-term loans, i.e. in current account and for working capital. Loans are in real terms, calculated using an investment price deflator. The weighted average of rates on overnight money market transactions, POLONIA, approximates monetary policy.

Because we use historical decompositions, variables need to be stationary. We employ therefore annual rates of growth of investment and credits. The series included in the analysis are reproduced in Figure 2. Details on the sources and construction of the variables are presented in the statistical appendix. The sample spans the period 2003Q4-2020Q2 and practically does not include the period of non-standard monetary and fiscal policies adopted due to the COVID-19 pandemic.

In the estimations we use a dummy for the first quarter of 2016 to eliminate a drop in public investment largely induced by the switch to the new EU programming period.

4. Results

Due to the considerable number of the estimated models, below we only outline properties of the obtained impulse response functions. Two models of lending standards serve us as examples: one which employs drivers related to the real sector developments (risks of default of the largest borrowers), and another, with drivers related to the developments in the financial sector (*npl*). In our notation, the models are the following:

$$(9) \qquad Y_t = [\![\Delta_4 inv_t, \Delta_4 l_t^1, driver_t^3, i_t, supply_t^{1,1}]\!]'$$

$$(10) \qquad Y_t = [\![\Delta_4 inv_t, \Delta_4 l_t^1, driver_t^5, i_t, supply_t^{1,2}]\!]'.$$

In the former model, we use lending standards for LEs (in equation (5) *j=1*), while in the latter – for SMEs (in equation (5) *j=2*). Graphical examples are confined to models with the long-term credit; responses obtained from those with short-term loans display similar shapes. In turn, decomposition of variances of forecast errors of lending standards for LEs and SMEs is presented for all models of lending standards. Historical decompositions of lending standards in the pre-GFC period and during the GFC are shown solely for the selected models (with the three most important drivers of standards from Scheme 1). The section presenting results for lending terms and conditions has the same structure. For the sake of space limits, we do not show the graphical illustration.[3]

Hence, for T&C we consider following models:

$$(11) \qquad Y_t = [\![\Delta_4 inv_t, \Delta_4 l_t^i, driver_t^5, i_t, supply_t^1]\!]',$$

$$(10) \qquad Y_t = [\![\Delta_4 inv_t, \Delta_4 l_t^i, driver_t^1, i_t, supply_t^2]\!]',$$

$$(11) \qquad Y_t = [\![\Delta_4 inv_t, \Delta_4 l_t^i, driver_t^3, i_t, supply_t^3]\!]'.$$

The results of robustness checks (decomposition of variances and historical decompositions) are done solely for lending standards on long-term loans for LEs and SMEs.

Throughout the paper, a positive value of shocks to the drivers of banks' lending policy means an adverse innovation, i.e. deterioration of the drivers.[4,5]

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[3] Available upon request.

[4] Original survey data have been multiplied by (-100) to make their influence on macroeconomic variables compatible with the interest rate.

[5] If competition moves up in a graph, it does not mean that competition increases, but instead, that it added to a tightening of credit policy.

4.1. Lending standards

4.1.1. Impulse response functions

Figure 3 and Figure 4 depict reactions of lending standards. A positive *shock to the business activity* (investment shock) increases demand for loans, both long-term and short-term, and ameliorates sentiments in the credit market. The interest rate goes up; in some models this effect is statistically significant, in others it is not. Banks' perception of their own situation with respect to the capital position, quality of credit portfolio (non-performing loans) or competition slightly ameliorates on impact. This effect is usually not significant and tends to revert and even to turn into worsening with time, e.g. with a delay of 7-10 quarters, a statistically significant deterioration of the capital position appears. Also, at the same time, competition in the banking sector gets weaker. Lending standards on both long-term and short-term loans, display a small move to more laxity on impact, but the effect is usually insignificant. Then, banks tend to slightly tighten standards, in parallel with the worsening drivers, i.e. both credit market sentiments, and risk factors related to the banking sector.

A positive *shock to demand for long-term credit* usually leads to a worsening of sentiments in the credit market, a slight increase in the interest rate and lower investment growth. With a delay of about 3 quarters banks tighten lending standards for both LEs and SMEs. Responses obtained in models with banks' perception of the capital position, non-performing loans and competition display the same pattern. Thus, lenders behave in a different way when increased demand for long-term credit is due to innovations in the real sector and when it is due to exogenous shocks to demand for long-term lending. This may mean that banks are more cautious in the latter situation, suspecting possible credit bubbles.

A positive *shock to demand for short-term credit* does not induce a rise in the short-term interest rate; neither potential drivers of lending standards, nor lending standards react in a statistically significant way. This suggests that banks may treat shocks to demand for long-term and short-term credit in a different way.

A shock *to credit market sentiments (worsening)* causes a statistically significant drop in long-term lending. Many models also display a significant fall in investment. However, they do not show what we could call a dominating type of reaction of the interest rate; the reactions go in various directions and most of them are simply statistically insignificant. Lending standards react in a statistically significant way: in all models they are tightened. Shocks to the variables which approximate developments in the banking sector and bank financial conditions (capital position, *npl* and competition) induce similar reactions of lending

standards, investment, long-term credit and monetary policy rate to those observed after innovations to credit market sentiments; solely shocks to competition seem not to affect standards for SMEs.

An adverse *interest rate shock* (monetary policy tightening) induces a fall in investment and – with some delay – in the long-term credit. Short-term credit increases initially to display a significant fall with a delay of some 2 quarters. This effect can be due to a transitory substitution of long-term credit with credit lines drawdowns. There is also a deterioration of credit market sentiments. Banks perceive a weakening of their capital position and balance sheet quality. As a result, they gradually tighten lending standards. The maximum effect of tightening of standards coincides with the maximum drop in investment. Thus, an adverse shock to monetary policy leads to a more stringent bank lending policy, but by the same token, more lax central bank policy rate may induce more laxity in banking sector behaviour and risk-taking.

4.1.2. The relative role of drivers of lending standards

The relative role of various shocks on lending standards on long-term loans are depicted in Figure 5 and Figure 6; Scheme 1 shows the main drivers. Comparisons are difficult because we have six models for each standard and because some shocks affect standards with a delay. This means that variables which explain the variance of lending standards change over time.

For standards on long-term loans for LEs, the most important drivers are two factors from the group of credit market sentiments, namely risks related to the financial situation of the largest borrowers and the overall macroeconomic conditions. They are followed by the capital position from the group of the financial sector risks. In the case of lending standards on long-term loans for SMEs, the most important drivers from the group of credit market sentiments are the same as for LEs, but macroeconomic conditions seem to matter somewhat more than risks to the largest borrowers. In contrast to standards for LEs, for standards on loans for SMEs the share of non-performing loans plays a larger role than bank capital position.

Monetary policy shocks have a non-negligible impact on lending standards on long-term loans, but they play a greater role in the case of LEs than SMEs. They usually show up with a delay of approximately 4 quarters. Shocks to demand for credit are of less importance, broadly comparable to shocks to the business activity (investment shocks).

Variance decomposition of standards on short-term loans (Figure 7 and Figure 8) shows that those for LEs are driven the most by bank capital position. Nonetheless, credit market sentiments are also important, in particular risks related to the largest borrowers and industry-specific risks. In the case of SMEs, credit market sentiments dominate, especially the overall macroeconomic conditions and risks related to the largest borrowers. Risks related to the banking sector play a lesser role; as in the case of standards on long-term loans, the share of non-performing loans is more important than the capital position. Likewise, shocks to the current business activity explain a relatively small part of the variance of standards. Shocks to credit demand and monetary policy usually play a less important role than for standards on long-term loans.

Our results show that in the case of LEs, standards on long- and short-term loans are set in a different way: while credit market sentiments dominate for the behaviour of lending standards on long-term loans, for standards on short-term loans banks' perception of their capital position outstrips factors from the group of credit market sentiments and non-performing loans.

When setting standards on loans for SMEs, banks seem not to differentiate so noticeably between standards on long-term and short-term loans. Importantly, more banks consider the share of non-performing loans than the capital position. This seems reasonable, since the amounts extended to SMEs are smaller than those to LEs and may require less additional capital. Another important observation is the role of risks related to the financial standing of the largest borrowers and their impact on standards for SMEs. It seems that banks treat the risks of default of the largest borrowers as a signal of a possible deterioration of the overall financial standing of the enterprise sector. Also, banks have better access to information on LEs and they may extend their risk perception on SMEs.

Scheme 1: Main drivers of lending standards

standards, LEs, long	standards, SMEs, long	standards, LEs, short	standards, SMEs, short
• risk related to the largest borrowers • overall macroeconomic conditions • capital position • monetary policy	• overall macroeconomic conditions • risk related to the largest borrowers • npl • monetary policy	• capital position • risk related to the largest borrowers • industry-specific risk • monetary policy/business activity	• overall macroeconomic conditions • risk related to the largest borrowers • npl • monetary policy

4.1.3. Historical decompositions of lending standards

Before the Global Financial Crisis: period 2004.2-2008.2.

Since the beginning of 2005 in the case of LEs, and since the end of 2005, in the case of SMEs, actual changes in lending standards on long-term loans have persistently been larger than forecasted, Figure 9 and Figure 10. To a large extent, standards were driven towards laxity by their own shocks, shocks to monetary policy and to risks related to the largest borrowers. In the case of SMEs, besides own shocks to standards, bank credit policy was heading towards laxity due to a good standing of bank balance sheets – both capital and non-performing loans (although the latter also displayed an episode of pushing credit policy towards more stringency). Shocks to competition and demand for credit also played a role, albeit relatively small.[6]

The period of the Global Financial Crisis and the ensuing sovereign debt crisis.

The crisis led to a tightening of bank lending policy: standards rocketed to unprecedented levels. Importantly, they were much higher than forecasted (Figure 11, Figure 12). In turn, during the sovereign debt crisis, they were broadly in line with the predicted values, thus according to our definition, they were neither tightened nor softened. Starting from 2011, standards for SME displayed a few episodes of tightening, but they were not protracted.

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[6] To save space, we show historical decompositions of variances of lending standards obtained from two models, with risk factors which are identified as main drivers. Other graphs are available upon request.

Up to 2009Q2, lending standards for LEs and SMEs were mostly driven by banks' concerns about their capital position, financial situation of the largest borrowers, the quality of banks' balance sheets (the share of non-performing loans) and own shocks to standards. In the case of SMEs, a fourth factor, namely the overall macroeconomic situation, mattered as well. Thus, it seems that when setting standards for LEs, despite worries related to the real sector, these were risks related to the financial sector which prevailed. In the case of standards for SMEs, concerns about the real sector seem to be as important as those about the banking sector. We suppose that costs of screening SMEs and uncertainty concerning their actual financial standing are the underlying reasons of the larger role of drivers related to the real sector.

In the period of the sovereign debt crisis, lending standards for SMEs, which displayed some tightening, were driven by macroeconomic conditions, banks' own preferences and monetary policy shocks.

4.2. Lending terms and conditions

4.2.1. Impulse response functions

In principle, the reactions of T&C are similar to those presented for standards. Nonetheless, there is also an important difference. Namely, after *positive shocks to the business activity* (approximated by shocks to investment), banks seem to relax the required collateral, maximum size and maturity (the reactions are obtained from models with long-term and short-term credit). Reactions of other terms and conditions are not conclusive: some models of average spreads, spreads on riskier loans and non-interest rate costs also display this effect, but others do not. Usually, the effect of more lax policy is short-lived – it shows up on impact and does not persist longer than two quarters. We find, therefore, some support for the theoretical predictions that banks conduct more lax policy after positive shocks to the overall economic situation.

The responses of T&C to *shocks to demand for long-term credit* are also like those of standards: all of them are tightened. In turn, *shocks to demand for short-term credit* induce such a behaviour of T&C only in the models for maximum maturity and average spreads. This may mean that banks may perceive shocks to demand for long-term credit as potentially riskier than shocks to demand for short-term loans. Thus, in the case of the former they tend to counteract, while reactions to the latter are weaker.

Negative *shocks to credit market sentiments, capital position and non-performing loans* cause a drop in both short-term and long-term lending; solely shocks to competition do not lead to a statistically significant fall in credit.

Monetary policy shocks affect lending terms and conditions in a statistically significant way, albeit with some delay. Thus, monetary tightening leads to tighter lending terms and conditions. This is an important result, since it means that the central bank has an impact on credit supply through both lending standards and terms and conditions, and that its decision on the interest rate triggers the operation of the credit channel.

4.2.2. The relative role of drivers of lending T&C

Scheme 2 shows the main drivers of terms and conditions. Average spreads are mostly driven by the behaviour of competitors, banks' perception of their own capital position and – to a lesser degree – by risks related to the borrowers. The impact of competition on average spreads is of key interest – firstly because theories of bank lending policy stipulate competition as an influential driver, and secondly, because average spreads are crucial in bank lending policy. In turn, spreads on riskier loans depend the most on the quality of banks' credit portfolio. Other drivers are the same as in the case of average spreads, i.e. these are risks related to the largest borrowers, the overall macroeconomic conditions and capital. The required collateral is mainly driven by factors related to the borrowers. This is well justified by the fact that collateral depends on a type of borrowers and risks related to the borrowers. Both maximum maturity and non-interest rate cost of loans are mostly affected by the quality of the bank credit portfolio and risks related to the largest borrowers. Shocks to monetary policy have also some impact on T&C, but they usually explain a lesser part of variance than credit market sentiments or factors related to the developments in the banking sector.

Another way of interpreting the results is to look at specific risk factors and verify how banks respond with T&C. Thus, if there were shocks to risks of the real sector, banks would react with spreads on riskier loans, the required collateral and average spreads. Likewise, if they observed shocks to the capital position, they would increase average spreads and spreads for riskier borrowers. In reaction to negative shocks to the quality of their balance sheets, banks would tighten spreads for riskier borrowers and the required collateral to improve the pool of borrowers. Also, they would reduce the maximum maturity of loans. Shocks to competition would induce the reaction of spreads. In sum, banks react mainly with spreads, and the required collateral.

Scheme 2: Main drivers of lending terms and conditions

average spreads	spreads on riskier loans	required collateral	maximum maturity
•competition •capital position •risk related to the largest borrowers •overall macroeconomic conditions	•npl •overall macroeconomic conditions •risk related to the largest borrowers •capital position	•overall macroeconomic conditions •risk related to the largest borrowers •npl • monetary policy	•npl •risk related to the largest borrowers •monetary policy •demand for credit

maximum size	non-interest rate cost
•overall macroeconomic conditions • monetary policy •industry-specific risks •business activity	•npl •risk related to the largest borrowers •capital position •demand for credit

4.2.3. Historical decompositions of lending T&C

Before the Global Financial Crisis

Lending terms and conditions tended to soften from the beginning of 2005 to the end of 2007 (spread) or to the second quarter of 2008 (spreads on riskier loans and collateral), Figure 13. They were mostly driven by shocks to monetary policy, own shocks of T&C and innovations to bank perception of risks related to the largest borrowers. Put it another way, expansionary monetary policy and banking sector preferences were the main causes of soft credit policy. To a lesser degree, T&C were also driven by shocks to demand for credit and business activity (investment). Beyond that, bank capital position, perceived as good, tended to soften spreads, and – in some periods – also the required collateral. Some tightening of spreads observed in 2008 suggests that banks used them to respond to the first symptoms of disturbances in the financial market.

During the Global Financial Crisis

T&C moved towards stringency: their actual changes were much larger than changes in the NPV, Figure 14. Spreads and collateral were pushed by bank worries about their capital

position, the financial conditions of the largest borrowers and the quality of credit portfolio. Albeit smaller, the overall macroeconomic conditions also played a role. Later, T&C were pulled by interest rate shocks. In turn, the main driver of spreads on riskier loans during the financial crisis was the quality of bank credit portfolio. Thus, with worsening of the quality of credit portfolio, banks decided to reduce accessibility of loans to riskier borrowers. Macroeconomic and industry-specific risks had some bearing as well. Because the crisis developed in the housing market, banks presumably perceived this sector as riskier. During the second subperiod, i.e. *during the sovereign debt crisis*, in contrast to standards, which were broadly in line with the forecasted values, the average spreads and, to a somewhat lesser extent, spreads on riskier loans, displayed some laxity. Interestingly, banks did not change the required collateral. Thus, there was some diversification of banks' policy with respect to various borrowers (ore laxity with respect to the average ones, less laxity with respect to the riskier ones). Laxity was due to a good capital position of banks and developments in the real sector – positive shocks to investment lowered average spreads. There was also increased competition in the banking sector. It induced banks to apply looser policy with respect to average spreads to avoid losing the market share.

4.3. Robustness checks: results from other settings

Chi-square tests performed in models containing two variables from the lending survey do not reject the new set of imposed restrictions. In the respecified models, we can observe relationships between risks of the group $k= [1, 2, 3]$ and $k= [4, 5, 6]$. Impulse response functions (not depicted here) show that shocks to macroeconomic risks, to risks to the largest borrowers and to industry-specific risks, worsen banks' perception of their capital position and quality of their balance sheets (*npl*). Also, they change the perception of the degree of competition in the banking sector. In turn, innovations to drivers related to the banking sector do not induce changes in banks' perception of conditions in the real sector with two exceptions, however. Namely, shocks to both *npl* and capital position induce a worsening of banks' perception of risks related to the largest borrowers. This finding may mean that when banks observe a deterioration of their balance sheets, they reduce lending to the largest borrowers and expect some worsening of the borrowers' financial standing.

In general, the results of the alternative settings confirm the findings obtained from the baseline models (Figure 15, Figure 16). For LEs, they show that standards on both long-and short-term loans are mostly driven by shocks to the overall macroeconomic conditions, risks related to the largest borrowers and capital position. The latter seems to be somewhat more important for standards on short-term than on long-term loans. As suggested in Berrospide et

al. (2021), in the case of disruptions in the economy, it is less costly for capital constrained banks to cut short-term lending from a legal and contractual standpoint since the lender does not have to break any contractual terms of a pre-existing commitment. The results also confirm that monetary policy shocks play a significant role, and that their impact is lagged and increases with time. However, in contrast to the previous findings, the alternative settings suggest a larger role of the industry-specific shocks.

The results for SMEs are also very similar to those obtained from the baseline settings. Thus, lending standards on long- and short-term loans are driven by the overall macroeconomic conditions. Their impact is by far larger than the impact of other drivers related to the real sector. From the group of risks related to the banking sector, the quality of the loan portfolio plays the most important role.

Historical decompositions[7] confirm the results from the baseline models that before the GFC bank lending standards were driven towards laxity by the overall macroeconomic conditions. Later, in 2007, they were driven by shocks to monetary policy and own shocks to lending standards. However, the results for the time of the GFC for LEs somewhat differ from those obtained from the baseline models. This concerns 2008Q4, when lending policy was tightened the most. Namely, now the role of own shocks is much lower, whereas the overall macroeconomic conditions seem to explain a larger part of the variance of lending standards than before. Thus, it may be the case that in 2008Q4, the baseline models overestimated the impact of banks' own shocks to standards. Other observations are similar to those obtained from the baseline models and point to credit market conditions and capital as the principal drives of standards for LEs and in the case of SMEs, also of non-performing loans.

In another robustness check we have introduced inflation (on a year-on-year basis) into the baseline models for lending standards on long-term and short-term loans for LE and SME. This gives a possibility to verify robustness of the obtained monetary policy shocks. To reduce the number of estimated coefficients, we have confined the number of lags to one. This was also suggested by the Schwarz information criterion. To identify structural shocks, we have assumed that the interest rate depends contemporaneously on investment and inflation, that demand for credit (which is in real terms) and lending standards do not contemporaneously depend on inflation. The results showed a somewhat smaller impact of the monetary policy on bank lending policy, nonetheless the reactions of standards to monetary policy in most

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[7] To save space, in the paper we do not depict historical decompositions; they are available upon request.

cases were statistically significant. Inflation tended to explain a considerable part (17-19%) of the forecast error variance of standards for LEs and slightly less for SMEs. It is noteworthy that the role of the three main drivers of lending standards remained as in the baseline models. Finally, we replaced the POLONIA interest rate with the 3-moth money market rate, WIBOR3M, but it did not change the results.

All in all, the robustness checks with re-specified models brought qualitatively similar results to those obtained from the baseline settings.

5.   Summary and conclusions

Using data from Senior Loan Officer Opinion Surveys for Poland, we demonstrate how banks set lending standards, terms and conditions for the enterprise sector. The main results are following:

Standards on long-term loans for LEs are mostly driven by credit market sentiments, especially risks related to the largest borrowers, whereas for standards on short-term loans drivers related to the banking sector are important. **Standards on long-term and short-term loans for SMEs** are driven by the same factors, mostly related to the credit market sentiments. From the group of drivers related to the banking sector, the quality of bank credit portfolio matters more than the capital position.

Lending terms and conditions are more impacted by factors related to the banking sector than lending standards. Shocks to competition explain a relatively large part of variance of average spreads, whereas innovations to non-performing loans explain the variance of spreads on riskier loans. Naturally, the required collateral is more explained by risks related to the borrowers and the overall macroeconomic conditions. Some lending terms and conditions become softer/tighter after positive/negative shocks to the business activity;

Shocks to the business activity do not induce significant reactions of standards, but affect some T&C. **Monetary policy shocks** affect lending standards, terms and conditions. After monetary tightening, banks tighten their policy too. Also, monetary policy shocks affect banks' perception of credit market conditions, banks' own financial situation and competition in the credit market. Shocks to credit demand affect both lending standards and lending terms and conditions. A positive shock to demand for credit leads to a statistically significant tightening of bank lending policy. **Shocks to drivers related to the real sector** have a significant impact on these related to the banking sector. Negative shocks to credit market sentiments immediately worsen banks' perception of their own capital position and quality of their balance sheets; in turn, **shocks related to the banking sector** (with the exception of shocks related to competition) affect banks' perception of risks related to the largest borrowers.

Before the global financial crisis, during the upturn of the business cycle, banks tended to loosen standards. Such policy was mostly driven by own shocks to the lending standards, terms and conditions, reflecting banks' increased appetite for risk, and by monetary policy innovations. During the GFC, bank decisions on lending policy were dominated by concerns about their capital position and risks related to the largest borrowers. Later, during the

sovereign debt crisis, bank lending standards on long-term loans for LEs did not change. However, standards on long-term loans for SMEs displayed some tightening, driven by concerns about macroeconomic conditions, banks' own preferences and monetary policy shocks. It means that over that time, banks conducted a different policy with respect to LEs and SMEs. There was also some divergence in bank policy with respect to lending terms and conditions. Namely, spreads on riskier loans and the required collateral remained stable whereas average spreads, driven by shocks to competition and perceived bank capital position, displayed some laxity.

The results show that when setting lending standards, banks consider mainly factors related to borrowers. In turn, lending T&C are more "specialized", some reflect more factors related to the banking sector, e.g. average spreads and spreads on riskier loans, whereas other, e.g. collateral, reflect factors related to the enterprise sector. Banks react to shocks to credit market sentiments rather than to the actual shocks to the real sector. Nonetheless, the latter have a significant impact on the former: positive shocks to business activity ameliorate banks' perception of the overall macroeconomic conditions, the situation of the largest borrowers and industry-specific conditions.

We confirm the operation of the credit channel in Poland and the significant impact of monetary policy shocks on bank lending policy. Thus, monetary policy may have some impact on credit cycles. Owing to the importance of factors related to the real sector for bank lending policy, it seems reasonable for the macroprudential policy to consider using borrower-based instruments to affect standards, terms and conditions.

Figures

Figure 1: Changes in standards on long-term loans for LEs
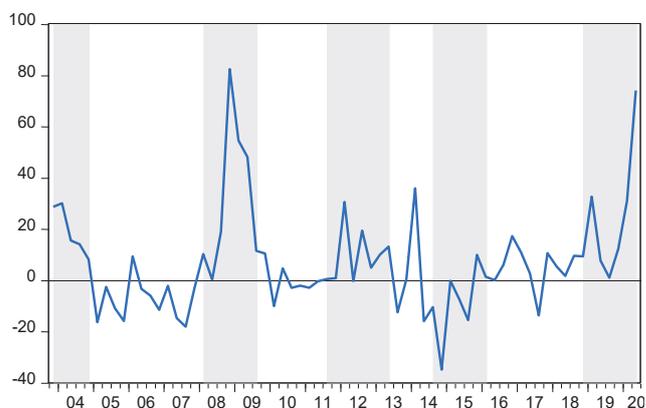

Figure 2: Variables used in estimates
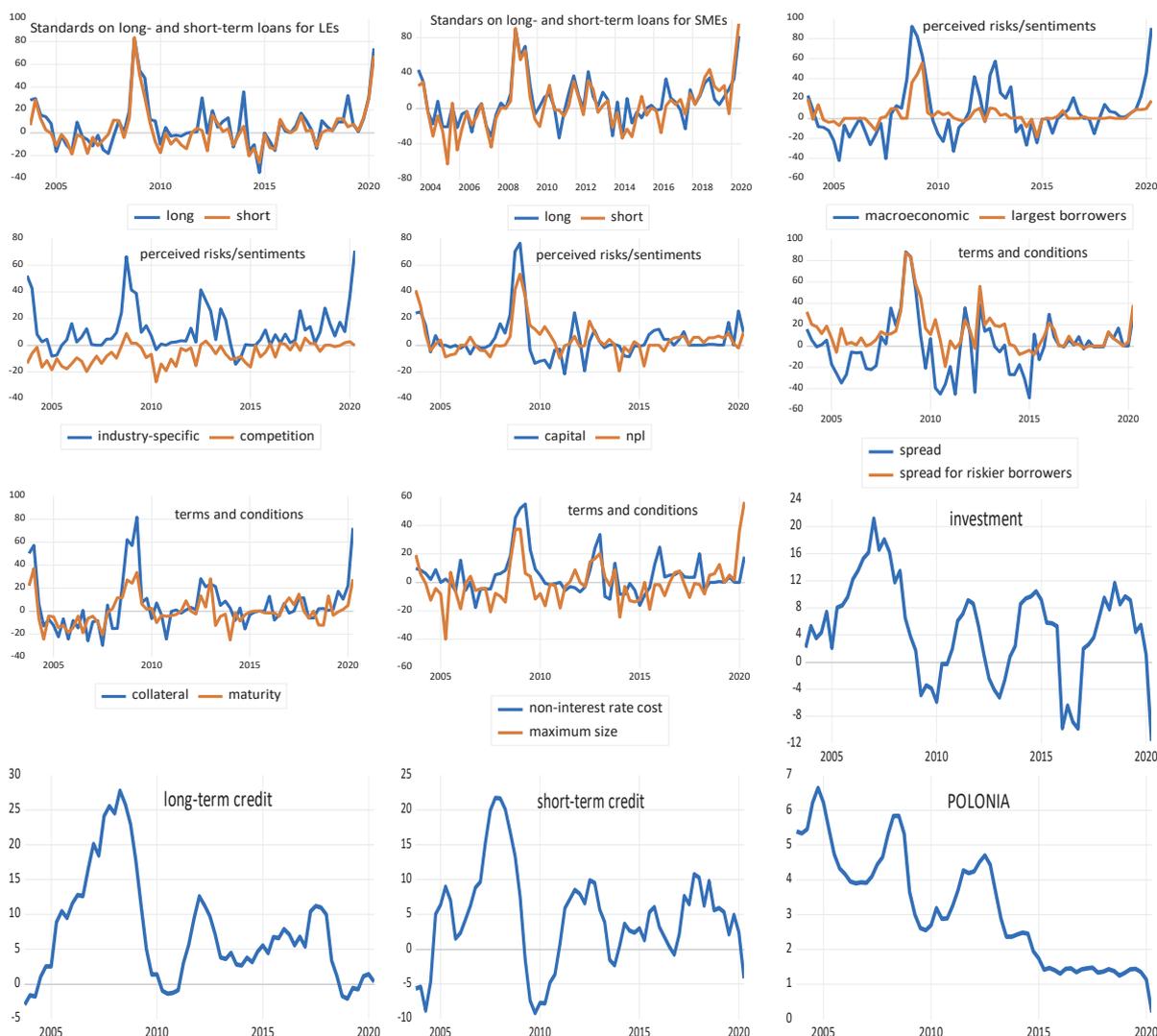
Source: Eurostat and NBP.

Figure 3: Impulse responses to structural VAR innovations, model with risks related to the largest borrowers and standards for LEs
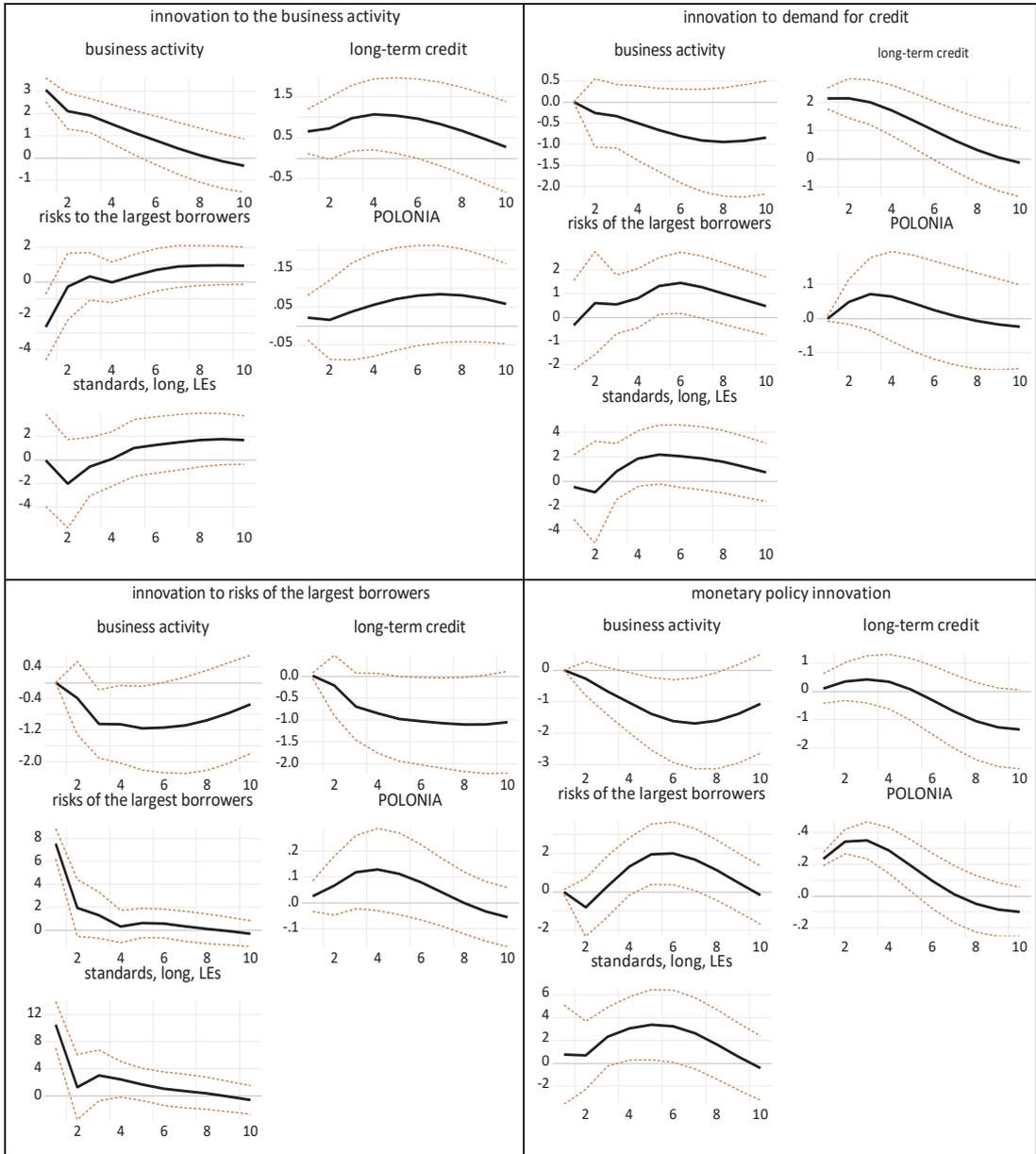
Figure 4: Impulse responses to structural VAR innovations, model with banks' perception of the quality of their assets and standards for SMEs
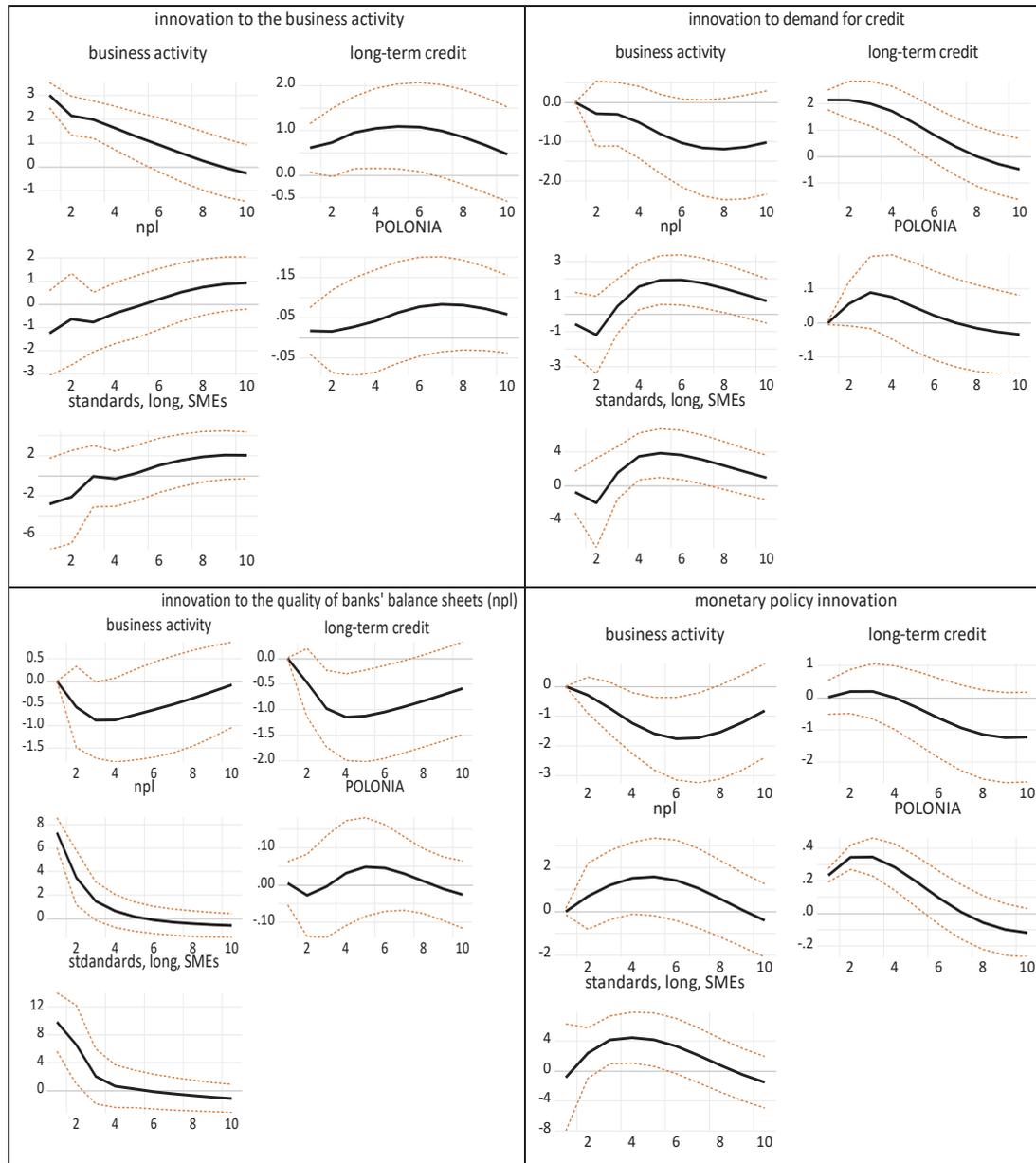
Figure 5: Variance decomposition of standards on long-term loans for LEs and SMEs

a)   *Model with macroeconomic risk, LEs*

b) *Model with macroeconomic risk, SMEs*

c)   *Model with industry-specific risk, LEs*

d) *Model with industry-specific risk, SMEs*

e) *Model with risk of the largest borrowers , LEs*

f) *Model with risk of the largest borrowers, SMEs*
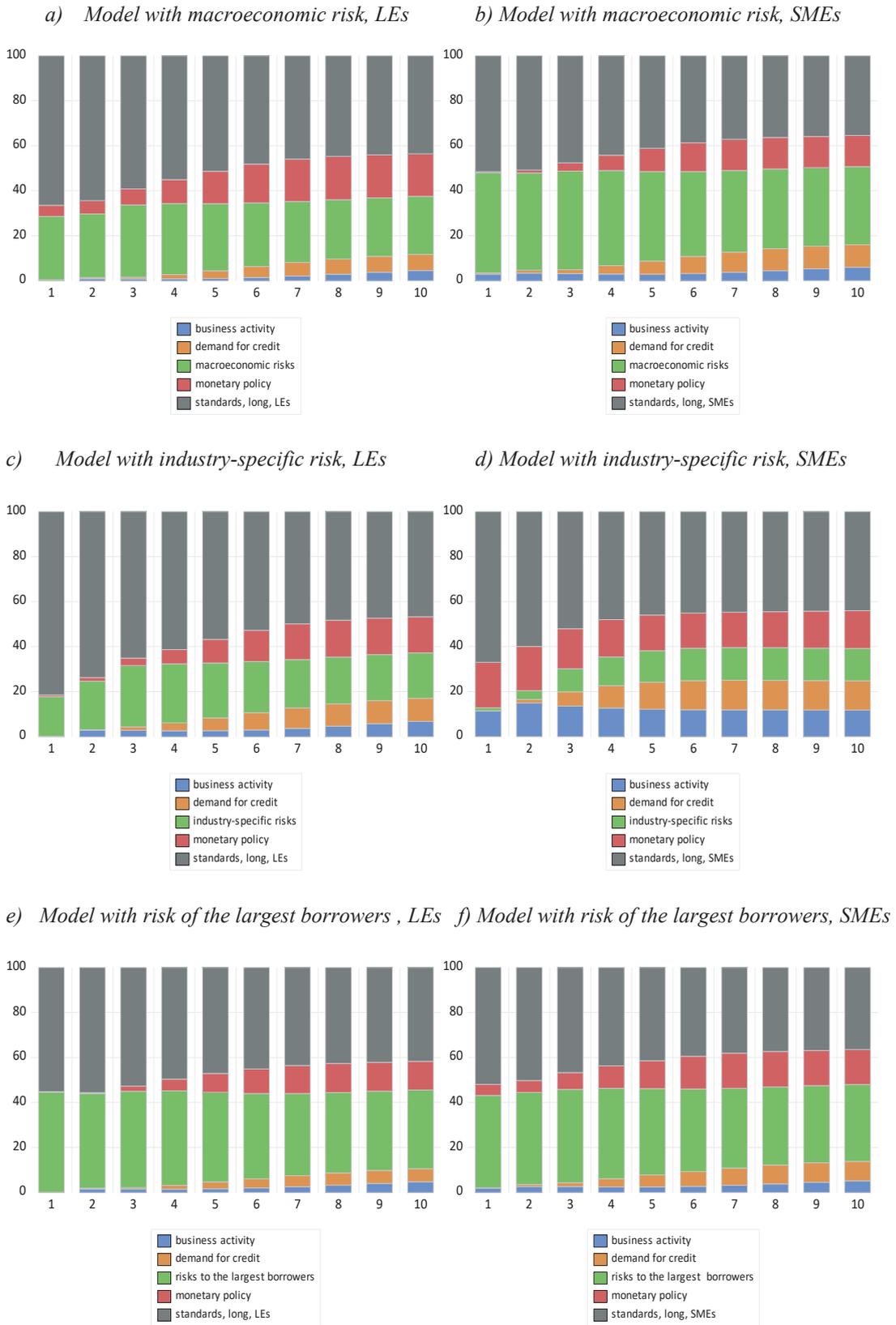
Figure 6: Variance decomposition of standards on long-term loans for LEs and SMEs

a) *Model with capital risk, LEs*

b) *Model with capital risk, SMEs*

b) *Model with risk of npl, LEs*

d) *Model with risk of npl, SMEs*

e) *Model with risk of competition, LEs*

f) *Model with risk of competition, SMEs*
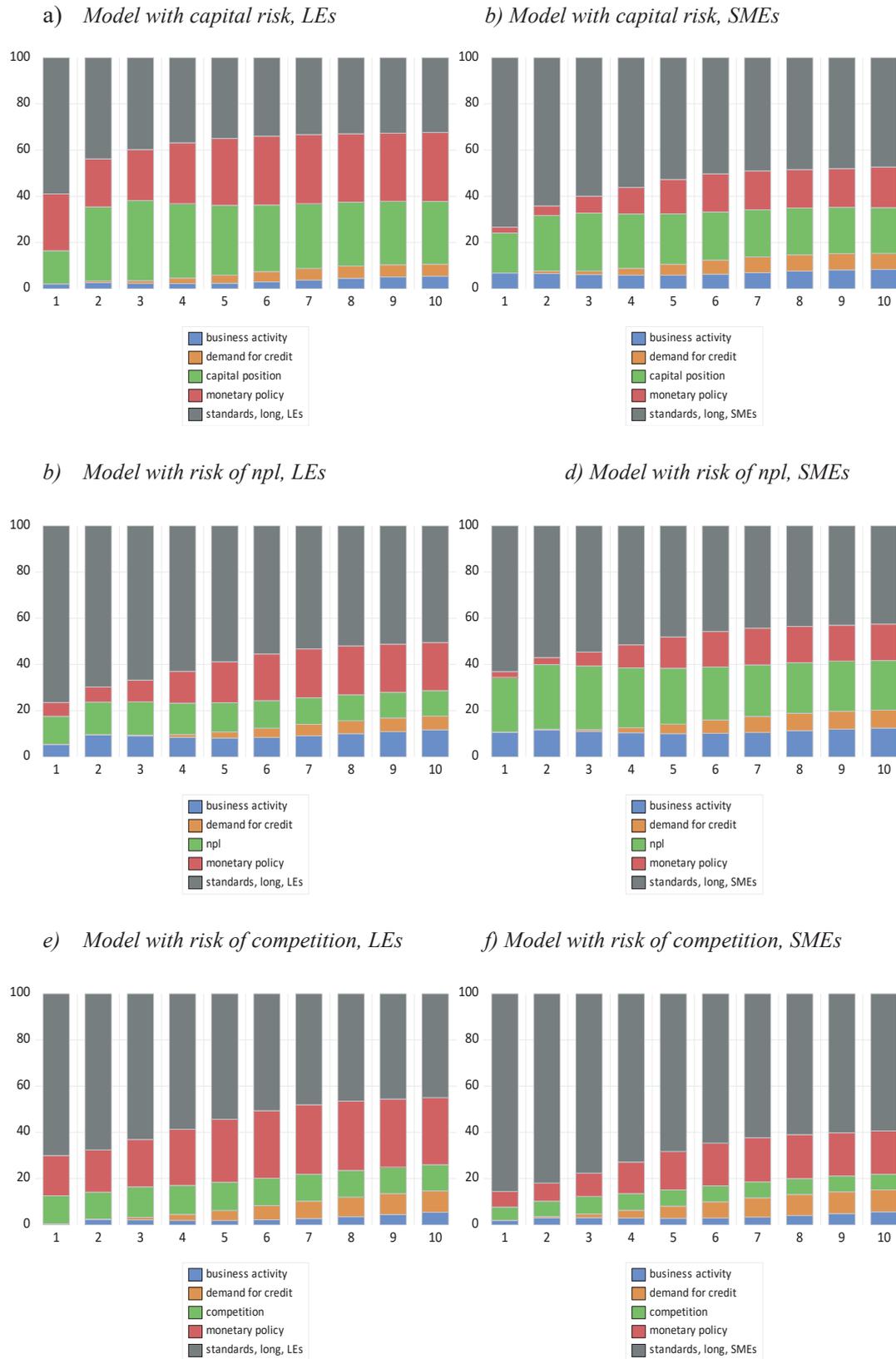
Figure 7: Variance decomposition of standards on short-term loans

a) *Model with macroeconomic risk, LEs*

b) *Model with macroeconomic risk, SMEs*

c) *Model with industry-specific risk, LEs*

d) *Model with industry-specific risk, SMEs*

e) *Model with risk of the largest borrowers, LEs*

f) *Model with risk of the largest borrowers, SMEs*
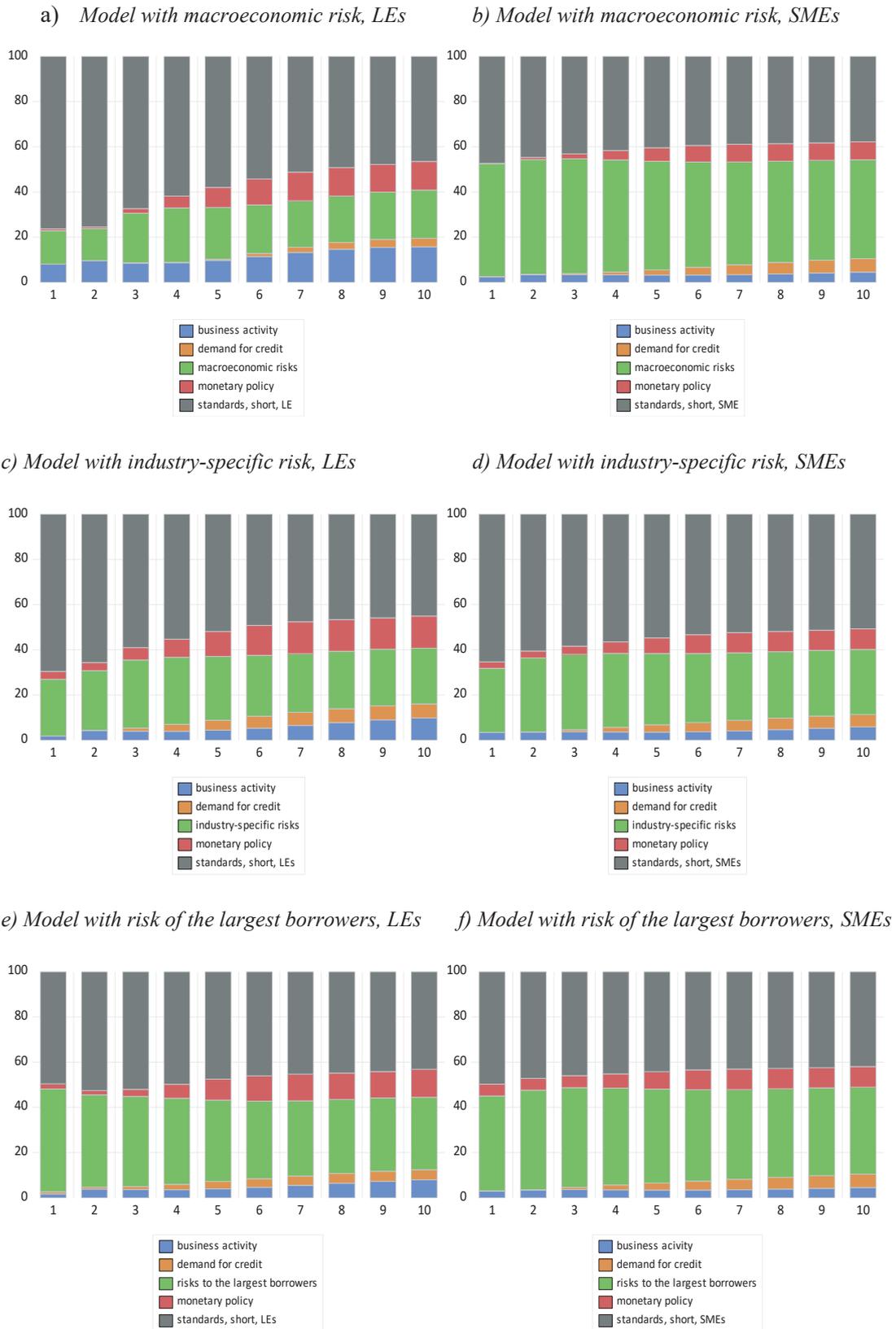
Figure 8: Variance decomposition of standards on short-term loans

a) *Model with capital risk, LEs*

b) *Model with capital risk, SMEs*

c) *Model with risk of npl, LEs*

d) *Model with risk of npl, SMEs*

e) *Model with risk of competition, LEs*

f) *Model with risk of competition, SMEs*

Figure 9: Historical decompositions: standards on long-term loans for LEs, 2004Q2-2008Q2

a) *Model with macroeconomic risks*

b) Model with risks of the largest borrowers

c) *Model with capital risk*

Figure 10: Historical decompositions: standards on long-term loans for SMEs, 2004Q2-2008Q2

a) Model with macroeconomic risk

business activity | demand for credit | macroeconomic
monetary policy | std SMEs | total shocks

b) Model with risk of the largest borrowers

business activity | demand for credit | largest borrowers
monetary policy | std SMEs | total shocks

c) Model with npl risk

business activity | demand for credit | npl
monetary policy | std SMEs | total shocks
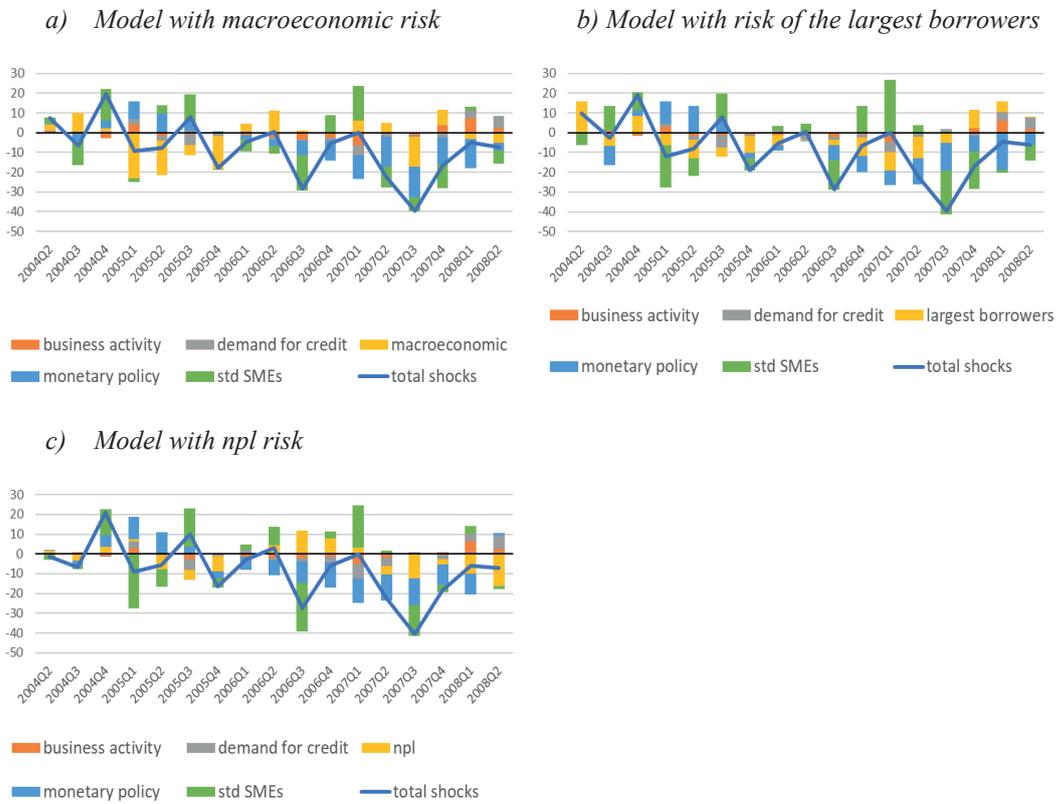
Figure 11: Historical decompositions: standards on long-term loans for LEs, 2008Q3-2012Q4

a) *Model with macroeconomic risk*

legend:
- business activity
- demand for credit
- macroeconomic
- monetary policy
- std LEs
- total shocks

b) *Model with risk of the largest borrowers*

legend:
- business activity
- demand for credit
- largest borrowers
- monetary policy
- std LEs
- total shocks

c) *Model with capital risk*

legend:
- business activity
- demand for credit
- capital
- monetary policy
- std LEs
- total shocks

Figure 12: Historical decompositions: standards on long-term loans for SMEs, 2008Q3-2012Q4

a) *Model with macroeconomic risk*

business activity ■ demand for credit ■ macroeconomic
■ monetary policy ■ std SMEs — total shocks

b) *Model with risk of the largest borrowers*

■ business activity ■ demand for credit ■ largest borrowers
■ monetary policy ■ std SMEs — total shocks

c) *Model with risk of npl*

■ business activity ■ demand for credit ■ npl
■ monetary policy ■ std SMEs — total shocks

Figure 13: Historical decompositions of variance of selected T&C, 2004Q2-2008Q2

a) Average spreads, model with competition risk

b) Spreads for riskier borrowers, model with npl risk

c) Collateral, model with macroeconomic risk
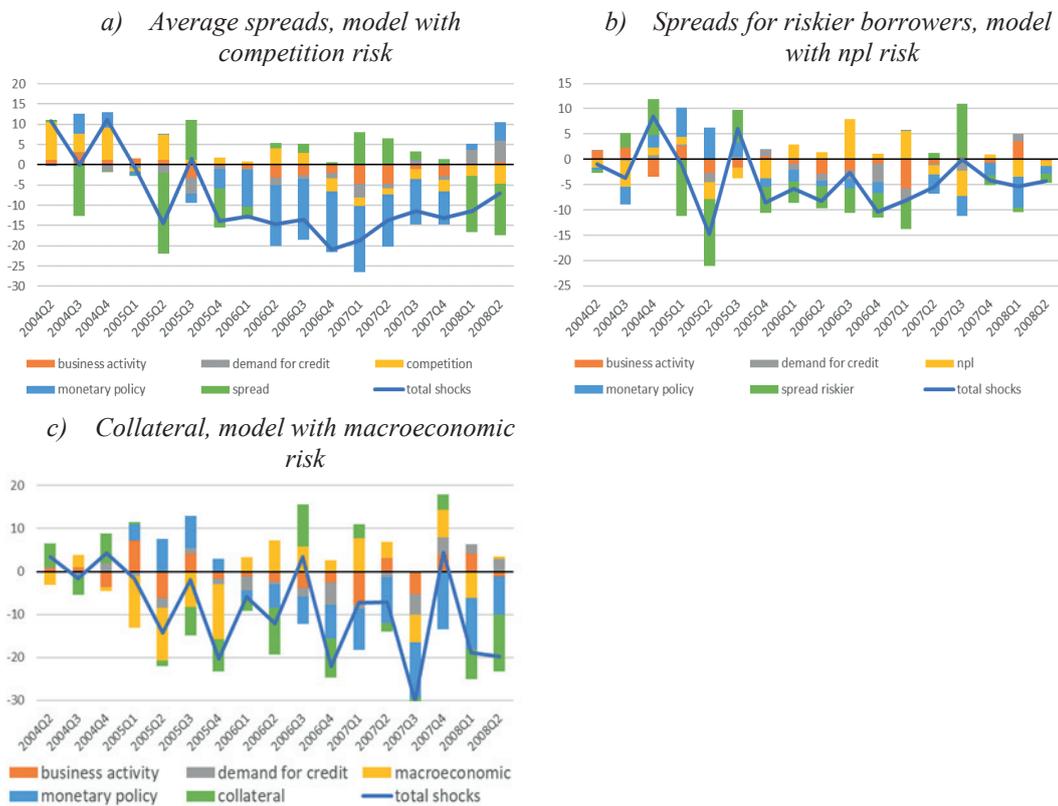
Figure 14: Historical decompositions of variance of selected T&C, 2008Q3-2012Q4

a) Average spreads, model with competition risk

business activity | demand for credit | competition | monetary policy | spread | total shocks

b) Spreads for riskier borrowers, model with npl risk

business activity | demand for credit | npl | monetary policy | spread riskier | total shocks

c) Collateral, model with macroeconomic risk

business activity | demand for credit | macroeconomic | monetary policy | collateral | total shocks

Figure 15: Robustness checks. Decomposition of variance of standards on long-term loans for LEs

a) *Model with macroeconomic and capital risks*

b) *Model with macroeconomic and npl risks*

c) *Model with industry-specific and capital risks*

d) *Model with industry-specific and npl risks*

e) *Model with risks of the largest borrowers and capital*

f) *Model with risks of the largest borrowers and npl*

Figure 16: Robustness check. Decomposition of variance of standards on long-term loans for SMEs

a) *Model with macroeconomic and capital risks*

b) *Model macroeconomic and npl risks*

c) *Model with industry-specific and capital risks*

d) *Model with industry-specific and npl risks*

e) *Model with risk of the largest borrowers and capital*

f) *Model with risk of the largest borrowers and npl*
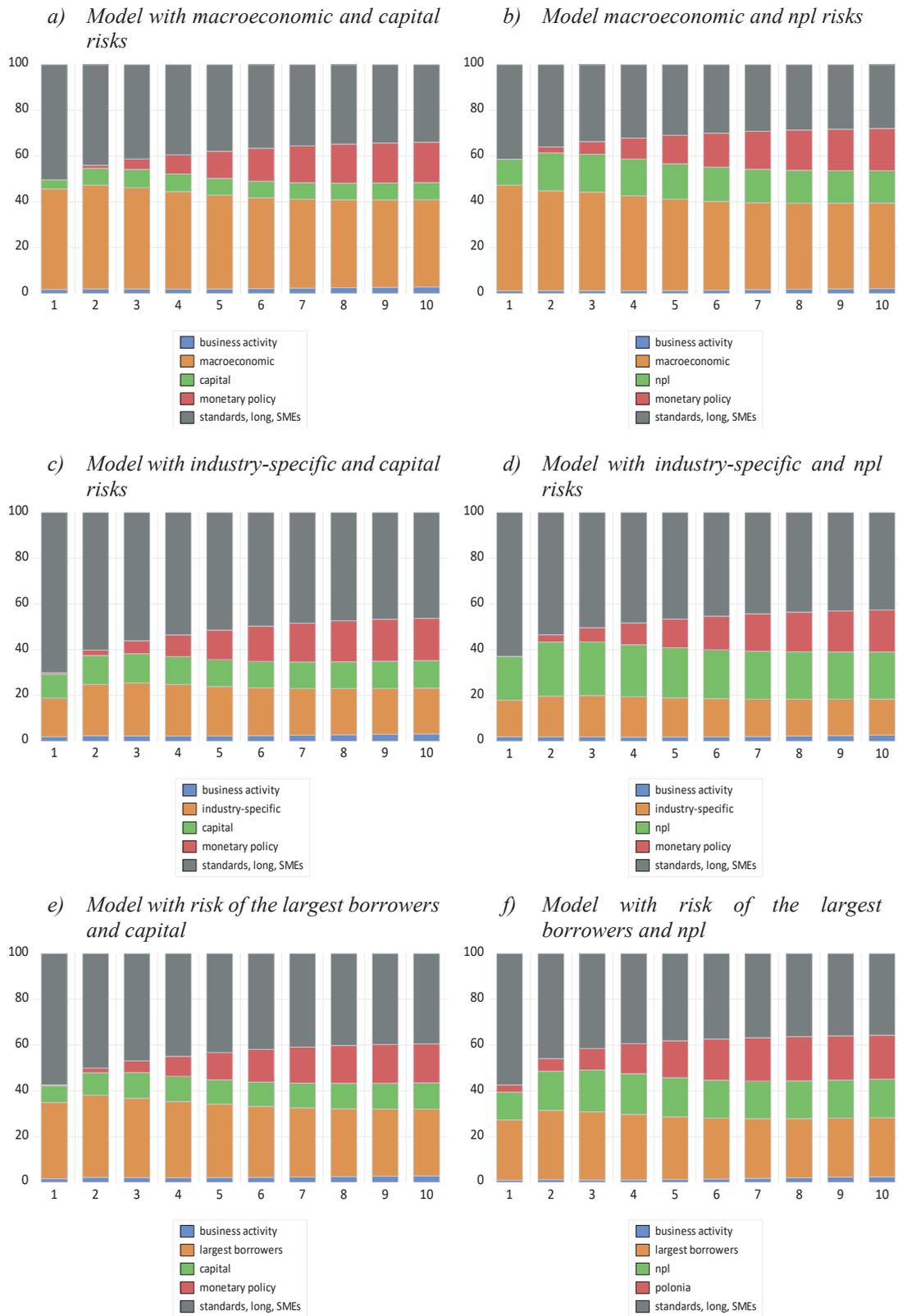
Variable	Transformation	Source
Loans to the corporate sector in the domestic currency, long-term – for investment and real property acquisition; short-term – for working capital and in current account, real, y/y	$((\ln(loans_t)-\ln(investment\_deflator_t))-(\ln(loans_{t-4})-\ln(investment\_deflator_{t-4})))*100$	NBP, Eurostat, own calculations
Investment deflator, 2010 =100	The log of, s.a.	Eurostat
Investment, Poland, chain linked, 2010	s.a., corrected for working days, $100*(\ln(investment_t)-\ln(investment_{t-4}))$	Eurostat
POLONIA, percent per annum	Quarterly average of the daily overnight rate; missing observations for 2003.4-2004.4 supplemented with quarterly average of the daily WIBOR overnight rate	NBP, Reuters
Lending standards (on long term and short-term credits to: (i) LE, and (ii) SME)	Multiplied by (-100)	NBP (SLOOS)
Lending terms and conditions: spread, spread for riskier borrowers, non-interest rate cost, maximum size, maximum maturity, required collateral	Multiplied by (-100)	NBP (SLOOS)
Declared drivers of lending policy: overall macroeconomic conditions, risks related to the largest borrowers, industry-specific risks, capital position, *npl*, competition	Multiplied by (-100)	NBP (SLOOS)

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Figures and Schemes

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