Analyzing Corporate Loan Growth in Austria Using Bank Lending Survey Data

Conceptual Issues and Some Empirical Evidence

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This paper contributes to the emerging literature that makes use of Bank Lending Survey (BLS) data to shed light on the determinants of the growth of loans to enterprises. We examine the relationship between loan growth and information from the BLS using Bayesian model averaging. Our results suggest that in Austria volumes of corporate loans mainly react to changes in demand whereas supply effects play only a minor role. Moreover, the current crisis did not impair bank lending to enterprises beyond its influence on credit standards and loan demand. We find no indication for a credit crunch as defined by Bernanke and Lown (1991) in Austria. The evidence is less clear with regard to the broader definition of credit crunch by Owens and Schreft (1993) that also takes into account non-price conditions. In addition, this paper discusses the concept of credit standards and some methodical issues that have to be taken into account when using BLS data to analyze loan developments.

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With the onset of the current crisis, the growth of bank loans to nonfinancial corporations slowed down markedly in Austria – as in most other euro area countries –, and for some time, the volumes of outstanding loans even declined. In the face of this strong deceleration of loan dynamics, the question arises whether this slowdown has been caused mainly by lower demand or by reduced loan supply (and, regarding the latter, to what extent such a reduction constitutes a "credit crunch"). The identification of supply and demand aspects in the loan market has been treated broadly in the literature. However, disentangling supply and demand factors in empirical work is still constrained by the lack of suitable data.

This paper intends to contribute to the emerging literature that makes use of lending surveys to shed light on this issue. More specifically, we analyze the impact of supply and demand on the development of loans by Austrian banks to enterprises in the euro area using the Austrian results of the euro area Bank Lending Survey (BLS).[2] The BLS aims to provide qualitative information on the lending relationship between banks and the nonfinancial private sector (firms and households) in two ways. On the one hand, it provides timelier information on loan market developments than the monthly bank balance sheet reports. On the other hand, it facilitates the analysis of supply and demand conditions in the loan market, which the statistical data reported by banks do not reveal directly. It is the latter aspect that this paper wants to make use of. The BLS requires the credit managers of leading banks to regularly provide an assessment of their credit standards, which here – as in other studies that examine the BLS and its U.S. counterpart, the Senior Loan Officer Survey (SLOOS) – will

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[2] *Banks are considered "credit institutions" according to the MFI statistics, which define credit institutions as undertakings whose business is to receive deposits or other repayable funds from the public and to grant credits for their own account. "Enterprises" refer to nonfinancial corporations according to the European System of National and Regional Accounts (ESA 95).*

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be interpreted as loan supply, and of the loan demand they face. Therefore, the BLS should be able make a significant contribution to understanding the dynamics of loan aggregates.

One of the problems most studies in this field have to cope with is the shortness of the relevant time series. This holds not only for the BLS, which started in January 2003 (covering the fourth quarter of 2002), but also for the SLOOS. Although the Federal Reserve System's survey has a longer history than the BLS, the time series that some papers employ with respect to the SLOOS are not much longer than those that can currently be derived from the BLS because there were numerous changes in the design of the SLOOS questionnaire (Schreft and Owens, 1991).[3] Regarding BLS data, the ECB recently published a number of studies on the euro area.[4] Since the ECB has access to individual country data, these studies use a cross-country panel consisting of all countries that take part in the BLS in order to enlarge the number of observations and circumvent the limits deriving from the relative shortness of the BLS sample period. The time series that began in January 2003 has recently become long enough to allow for a first econometric analysis at the national level. Hence, the first papers using national BLS aggregates have emerged (Deutsche Bundesbank (2009) for Germany; Lacroix and Montornès (2009) for France). Del Giovane et al. (2011) and Blaes (2011) use the individual responses from larger national BLS samples (Italian and German, respectively) to assess the relative role of supply and demand factors behind bank lending to enterprises.

This paper contributes to the literature in the following ways: It is the first systematic empirical analysis of the Austrian BLS results and one of the first to study national BLS results. Moreover, it is one of the first empirical studies on the determinants of corporate loans in Austria since the onset of the crisis and thus contributes to the discussion on whether a credit crunch has been at work in Austria or not. Methodically, to the best of our knowledge, this is the first paper that uses Bayesian techniques to cope with the uncertainty arising from the limited a priori knowledge on how exactly the BLS variables affect loan growth.

This paper is organized as follows: Section 1 briefly discusses the BLS objectives and methodology as well as the representativeness of BLS results. Starting from there, section 2 explores the concept of credit standards in more detail. Section 3 discusses some conceptual issues that must be taken into account when using the BLS to analyze loan developments. Our empirical analysis is presented in section 4. Section 5 concludes.

1 The Bank Lending Survey

The Bank Lending Survey (BLS) has been conducted since January 2003. It addresses high-ranking credit managers at leading banks all over the euro area, asking them each quarter to provide their assessment of different aspects of credit standards, credit conditions and

[3] *For example, Lown et al. (2000) use data ranging from the third quarter of 1990 to the fourth quarter of 1998 (as well as from the third quarter of 1973 to the first quarter of 1984), and the time series employed by Lown and Morgan (2006) is not much longer, ranging from the second quarter of 1990 to the second quarter of 2002. Cunningham (2006) as well as Bayoumi and Melander (2008), who look at SLOOS data a few years later, have a longer time series at hand (from the second quarter of 1991 to the third quarter of 2007).*

[4] *De Bondt et al. (2010); Ciccarelli et al. (2010); Hempell and Kok Sørensen (2010); Maddaloni and Peydró (2011).*

loan demand. Since the BLS has a euro area-wide scope, all questions in the survey refer to loans granted to euro area residents in general. The BLS is based on a standard questionnaire consisting of 18 questions. Seven questions concern loans to enterprises, ten questions refer to loans to households (split into loans for house purchase and consumer loans/other lending) and the last question is an open question intended to capture those credit market developments that might not have been covered by the preceding questions.

The breakdown by sector and purpose essentially follows the MFI balance sheet items (BSI) statistics. In the case of loans to enterprises, questions on credit standards and loan demand are further broken down by loan maturity (short-term, i.e. with an original maturity of up to one year, and long-term) and enterprise size (large versus small and medium-sized enterprises, with the division line being an annual net turnover of EUR 50 million). For each of these loan categories, the respondents assess credit standards and loan demand, both in a backward-looking (over the previous three months) and a forward-looking (expectations over the following three months) manner. Hence, the first survey in January 2003 asked respondents to assess the developments in the fourth quarter of 2002 and to give their expectations for the first quarter of 2003. For total loans to enterprises, respondents are asked to detail the factors that have affected credit standards and loan demand and to indicate how the terms and conditions for approving loans have changed. For credit standards, the factors the questionnaire takes into account are the cost of funds and balance sheet constraints (cost of capital, access to market financing and the banks' liquidity position), pressure from competition (from competing banks, nonbanks and market financing) and the respondent banks' perception of risk (expectations regarding general economic activity, industry or firm-specific outlooks and the risk on required collateral). In 2008, the questions on the factors affecting credit standards and those on terms and conditions were enhanced by a breakdown by enterprise size. Apart from that, the main set of questions has remained unchanged throughout the survey period. However, numerous ad hoc questions have been added to the regular questionnaire, particularly since the onset of the crisis.

In the BLS questionnaire, credit managers are asked to indicate their estimates on a five-point scale ranging from "eased considerably" to "tightened considerably" for the questions concerning credit standards and from "decreased considerably" to "increased considerably" for the questions on loan demand. As it requests qualitative information on quarter-on-quarter changes, the BLS does not allow for drawing any conclusions about the absolute levels of credit standards and loan demand.

The sample of banks covered by the BLS was designed to reflect the respective national banking markets as well as possible while at the same time keeping the number of banks in the country samples as small as possible. In Austria, five banks were selected for the BLS sample, a number that is comparable to that of other countries of approximately the same size (Berg et al., 2005; Waschiczek, 2003).

2 Credit Standards and Loan Demand

In the guidelines for the completion of the BLS questionnaire that are sent to participating banks' loan officers every quarter, credit standards are defined as "(…) the internal guidelines or criteria

which reflect a bank's loan policy. They are the written and unwritten criteria, or other practices related to this policy, which define the types of loan a bank considers desirable and undesirable, the designated geographic priorities, the collateral deemed acceptable and unacceptable, etc."

This means credit standards are those universal guidelines banks have in place for all potential borrowers at a given time. Thus, credit standards reflect a bank's ability and willingness to take on risks (= its risk attitude) as well as its business policy toward different sectors, industries, regions or risk categories or, in other words, they show what type of customer a bank wants as borrowers. Therefore, standards may well differ for potential borrowers from different sectors with the same perceived riskiness if a bank wants to expand its loan portfolio toward one particular sector. Conversely, a bank's risk attitude may change over time, so that credit standards may differ at different points in time for firms that constitute the same risk.[5]

In operational terms, credit standards include the written statements on how to arrive at a credit decision as well as oral communications and longstanding practices within banks that are not formally laid down in writing. They comprise all steps of the credit allocation process, ranging from the evaluation of the loan applicant (e.g. credit scoring models) and the project that is to be financed to the bank's internal loan approval process. Therefore, a change in credit standards can take various forms: It may mean switching to another risk assessment model, deciding to raise or to lower the loan volume threshold up to which loan decisions may be taken at the individual hierarchical levels within a bank, etc.

A change in credit standards may have different consequences. Tighter credit standards, for example, may find their expression in reduced loan volumes, higher interest rates or in tighter non-interest terms such as fees, collateral requirements, covenants and other elements (e.g. size, maturity, access conditions, etc.) or – as is likely in most cases – a combination of some of these factors. The actual terms and conditions pertaining to a loan, however, do not only reflect credit standards but also loan demand, as the terms of a loan contract are negotiated between the two parties involved and may therefore differ from what the bank (or the borrower) had in mind at the start of the negotiations. It may even be that credit standards are not implemented in an actual loan contract at all if the borrower considers the terms of such loan too disadvantageous or if the credit standards imply that the bank does not want to grant any new loans at all to borrowers in a specific sector or region.

There are two different views as to the reasons why credit policies fluctuate over time. One view relates changes in credit standards exclusively to bank-inherent factors. Such internal causes include a bank's funding position and other possible balance sheet constraints as well as changes in its credit allocation process. According to this view, credit standards are set independently of borrowers' creditworthiness and therefore, changes in credit standards can be interpreted as "pure credit supply effects" (Ciccarelli et al., 2010). This view complies with the widely

[5] *In this context, it must be noted that a distinction must be made between the risk attitude of a bank and the credit risk that a borrower constitutes.*

used definition of a credit crunch by Bernanke and Lown (1991), according to which a credit crunch is a significant leftward shift in the supply curve of bank loans, holding constant both the safe real interest rate and the quality of potential borrowers.

Alternatively, credit standards can also change with the credit risk that is associated with a borrower (both the actual credit risk as well as that perceived by the bank involved). This view corresponds to Owens' and Schreft's (1993) definition of a credit crunch as "a period of sharply increased non-price rationing (…) that involves a discontinuous increase in the use of credit rationing (…) that may (but need not) be independent of any change in borrowers' risk profile." However, a tightening of standards may manifest itself not only in non-price terms but also in higher interest rates or higher interest rate margins that exceed a certain reference rate (e.g. the policy rate or the money market rate).[6] The BLS allows for analyzing both concepts of a credit crunch as it contains information on the determinants of changes in lending standards. Considering these determinants, a change in granting loans constitutes a change in credit standards no matter whether it is motivated by a bank's internal factors or by an altered (perception of) risk associated with a certain borrower.

In contrast to credit standards, loan demand is not defined in the BLS guidelines. Usually, demand is defined as the quantity of a good or service a market participant is willing and able to buy at a given price, all other things being equal. In the context of corporate loans which are taken out to finance investment projects, enterprises will be willing and able to pay if the (expected) net present value of that project is higher than the (discounted) costs entailed by the price and non-price terms and conditions of the loan. From this relation, two specific characteristics of loan demand arise: On the one hand, the ability to pay entails a considerable degree of uncertainty concerning the assessment of the viability of the project that is to be financed. On the other hand, loan demand is not independent of the credit policies of the banking sector. Insofar as the level of interest rates (and other terms and conditions) depends on banks' loan policy, a change in credit standards can affect loan demand. Operationally, loan demand is not confined to formal loan applications but may also include other information on loan demand that loan officers collect.

3 Using BLS Data for Analysis: Data and Conceptual Issues

This paper is based on those Austrian results of the BLS[7] for which corresponding data for loans are available in the BSI statistics. We use data from the beginning of the survey (i.e. including the fourth quarter of 2002) up to and including the fourth quarter of 2011. This means that there are 37 data points available for our analysis. As the BSI statistics do not provide a breakdown of loans by firm size, we analyze total loans to enterprises as well as short-and long-term loans. In conformity with the euro area-wide scope of the BLS, loans refer to loans by all Austrian

[6] *In terms of the monetary transmission mechanism, the first category (when banks tighten/ease their credit standards because of bank balance sheet constraints) can be thought of as the bank lending channel and the second one (when credit standards follow banks' risk perceptions) as the balance-sheet channel.*

[7] *The Austrian results of the BLS are available at www.oenb.at/en/img/dl_umfrage_zum_kreditgeschaeft_im_euroraum-oesterreich_ergebnisse_tcm16-19007.zip.*

credit institutions to nonfinancial corporations in the euro area.

In principle, the BLS requests information on loan categories along the definitions of the BSI statistics. However, due to some conceptual differences, changes in credit standards or loan demand need not necessarily result in changes of loan volumes as reported in the BSI data, even if all other things remain equal. For one thing, changes in credit standards and loan demand influence gross new lending by banks. However, BSI data only report stocks of loans which means that the only changes that can be analyzed on the basis of BSI data are changes in stocks. To allow for calculating net transactions, the ECB adjusted these changes in stocks for reclassifications, revaluations, exchange rate and other non-transaction changes. However, these adjusted data do not account for redemptions.[8] A possible alternative could be using the MFI interest rate statistics, which feature data on loan volumes for new business. However, because these statistics are compiled with the aim of capturing interest changes as closely as possible, the definition of new business goes beyond gross new lending in order to include new negotiations and agreements on existing loans between customer and bank. Therefore, we decided to use data on net transactions for our analysis. To calculate the quarterly growth rate of loan volumes, we use seasonally adjusted values of both net transactions (in the numerator) and outstanding loan volumes (in the denominator).

Another issue to consider in this context is that the BLS survey question on credit standards refers to both loans and credit lines, while the BSI only covers outstanding loan volumes (= used credit lines). An easing of credit standards may result either in new loans or in new (or extended) credit lines; in the BSI loan data, the latter do not show up until the lines are actually used. Conversely, a tightening of credit standards may result in lower credit lines, but as long as credit lines are higher than the loan volumes drawn, this does not show up as a loan reduction in the BSI data. Along the same lines, credit standards refer not only to approved loans but to all loan applications, and lower loan demand may also lead to cuts in unused credit lines which, in turn, will not show up as a reduction in disbursed loans.

Our analysis is based on the aggregate BLS survey answers received from all banks in the Austrian sample. Answers are aggregated using a diffusion index which weights the response option "somewhat" by 0.5 and the response option "considerably" by 1. This is also the way the OeNB regularly publishes the national results of the BLS survey. Of course, the choice of these weighting factors is somewhat arbitrary. Alternatively, an analysis might be based only on the difference between the percentage of banks reporting a tightening of lending standards and the percentage of banks reporting a softening of credit standards ("net percentage"), but this would mean disregarding the degree of tightening indicated by the reporting banks. However, this metric, which the ECB employs in its regular reports, is not completely free of arbitrariness, either, as it can be thought of as a diffusion index which assigns the same weight to both a slight and a considerable tightening (or easing) of credit standards. Therefore, the

[8] *Since the beginning of 2009, the OeNB collects data on gross volumes of new loans and of credit lines to enterprises and households. However, currently the time series are still too short for empirical analysis.*

same problem of discretion as to the weighting of answers arises while at the same time the additional information about the different degrees of tightening (easing) is lost. Moreover, from a more practical point of view, the diffusion index allows for a higher granularity of the possible values of the time series. With n banks in the sample, using net percentages yields $(2n+1)$ possible results, whereas the diffusion index yields almost twice as many $(4n+1)$. This is especially relevant in the case of Austria, where the sample size is small.

Previous papers have looked at aggregate time series as well as at the individual responses of banks participating in the respective surveys. Studies that explore microeconomic issues tend to use banks' individual responses.[9] Papers that address macroeconomic questions focusing on the development of the overall loan aggregates and their determinants mostly use national aggregates. While from an econometric point of view, it might be tempting to use banks' individual responses as a sample and to match their answers with data on their lending, at least in the Austrian case conceptual concerns discourage such an approach. The BLS has been designed to yield results on an aggregated basis (and not to monitor the lending behavior of individual banks). Therefore, the Austrian panel in the BLS has been put together in order to obtain an aggregated time series that is representative of the national banking system. As the number of banks in Austria is very high by international comparison while at the same time the number of Austrian banks included in the BLS has to be kept low given the small size of the Austrian market, the coverage ratio of the Austrian sample is rather low. Additionally, time series on loan developments at the individual bank level have been distorted over the past years by mergers and acquisitions as well as split-ups and reorganizations that took place within the respective banking groups.

4 Empirical Analysis

4.1 Descriptive Analysis

The average quarterly growth rate (seasonally adjusted) of loans (all maturities) by Austrian banks to nonfinancial corporations amounted to 1.0% over the entire sample period (table 1 and chart 1). Splitting our sample in a pre-crisis (Q4 02 to Q2 08) and a crisis (Q3 08 to Q4 11) subsample, we observe higher average growth rates (1.2%) in the pre-crisis period than in the crisis period (0.7%). The same pattern holds for long-term loans (1.7% before versus 1.2% after the onset of the crisis) while short-term loans fell, on average, during the crisis (–0.6%) and grew only moderately before (+0.3%).[10] In 2003, the first full year of the sample period, loans to enterprises fell almost as strongly as at the height of the crisis in 2009 (–0.15% versus –0.24%, measured by average quarterly rates).

Banks tightened their credit standards for corporate loans in 21 quarters, eased them 6 times, and left them unchanged in 10 quarters. In relative terms, tightening was more frequent before (15 out of 23 quarters) than after

[9] *A case in point is Berger and Udell (2004), who applied bank-level information of U.S. banks' lending standards to test their institutional memory hypothesis on the behavior of bank loan officers as an explanation for the procyclicality of bank lending. In the same vein, Bassett et al. (2011) use bank level data from the U.S. survey to measure loan supply shocks.*

[10] *Note that these results are sensitive to the exact definition of the crisis period. If the third quarter of 2007 is defined as the onset of the crisis, the growth of total and long-term loans is higher in the crisis period.*

Table 1

Descriptive Statistics – Austria

	Loans (growth rate in %)			Standards			Factors			Demand		
	Total	Short-term	Long-term	Total	Short-term	Long-term	Cost of funds and balance sheet constraints	Competitive pressure	Risk perception	Total	Short-term	Long-term
	Whole period (Q4 02 to Q4 11, n = 37)											
Unchanged, %	0.00	0.00	0.00	27.03	29.73	45.95	24.32	37.84	10.81	29.73	24.32	21.62
Tightened[1], %	16.22	51.35	5.41	56.76	37.84	45.95	54.05	8.11	45.95	48.65	43.24	29.73
Eased[1], %	83.78	48.65	94.59	16.22	16.22	16.22	21.62	54.05	43.24	21.62	32.43	48.65
Minimum	–0.92	–5.06	–1.96	–0.50	–0.50	–0.60	–0.47	–0.03	–0.50	–0.30	–0.40	–0.40
Maximum	3.71	4.59	3.75	0.10	0.10	0.20	0.10	0.17	0.17	0.20	0.20	0.30
Median	0.62	–0.10	1.33	–0.10	0.00	0.00	–0.03	0.03	0.00	0.00	0.00	0.00
Mean	1.03	–0.00	1.47	–0.09	–0.04	–0.10	–0.06	0.03	–0.07	–0.05	–0.04	0.03
Standard deviation	1.25	2.45	1.24	0.15	0.14	0.18	0.12	0.05	0.17	0.12	0.13	0.16
	Pre-crisis period (Q4 02 to Q2 08, n = 23)											
Unchanged, %	0.00	0.00	0.00	13.04	30.43	43.48	21.74	30.43	8.70	30.43	26.09	17.39
Tightened[1], %	13.04	39.13	8.70	65.22	34.78	47.83	56.52	8.70	43.48	34.78	43.48	17.39
Eased[1], %	86.96	60.87	91.30	21.74	34.78	8.70	21.74	60.87	47.83	34.78	30.43	65.22
Minimum	–0.92	–5.06	–1.96	–0.30	–0.30	–0.50	–0.23	–0.03	–0.43	–0.20	–0.20	–0.10
Maximum	3.53	4.59	3.53	0.10	0.10	0.20	0.07	0.17	0.17	0.20	0.10	0.30
Median	0.89	0.82	1.97	–0.10	0.00	0.00	–0.03	0.03	0.00	0.00	0.00	0.10
Mean	1.24	0.34	1.65	–0.08	–0.02	–0.08	–0.04	0.04	–0.04	–0.01	–0.03	0.10
Standard deviation	1.32	2.56	1.38	0.12	0.12	0.15	0.08	0.05	0.15	0.11	0.11	0.13
	Crisis period (Q3 08 to Q4 11, n = 14)											
Unchanged, %	0.00	0.00	0.00	50.00	28.57	50.00	28.57	50.00	14.29	28.57	21.43	28.57
Tightened[1], %	21.43	71.43	0.00	42.86	42.86	42.86	50.00	7.14	50.00	71.43	42.86	50.00
Eased[1], %	78.57	28.57	100.00	7.14	28.57	7.14	21.43	42.86	35.71	0.00	35.71	21.43
Minimum	–0.78	–4.38	0.20	–0.50	–0.50	–0.60	–0.47	–0.03	–0.50	–0.30	–0.40	–0.40
Maximum	3.71	3.15	3.75	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.20	0.10
Median	0.55	–0.66	0.94	0.00	0.00	0.00	–0.03	0.00	–0.03	–0.10	0.00	–0.05
Mean	0.69	–0.58	1.16	–0.11	–0.07	–0.14	–0.09	0.02	–0.11	–0.11	–0.05	–0.08
Standard deviation	1.09	2.22	0.95	0.19	0.18	0.22	0.16	0.03	0.19	0.10	0.17	0.15

Source OeNB.

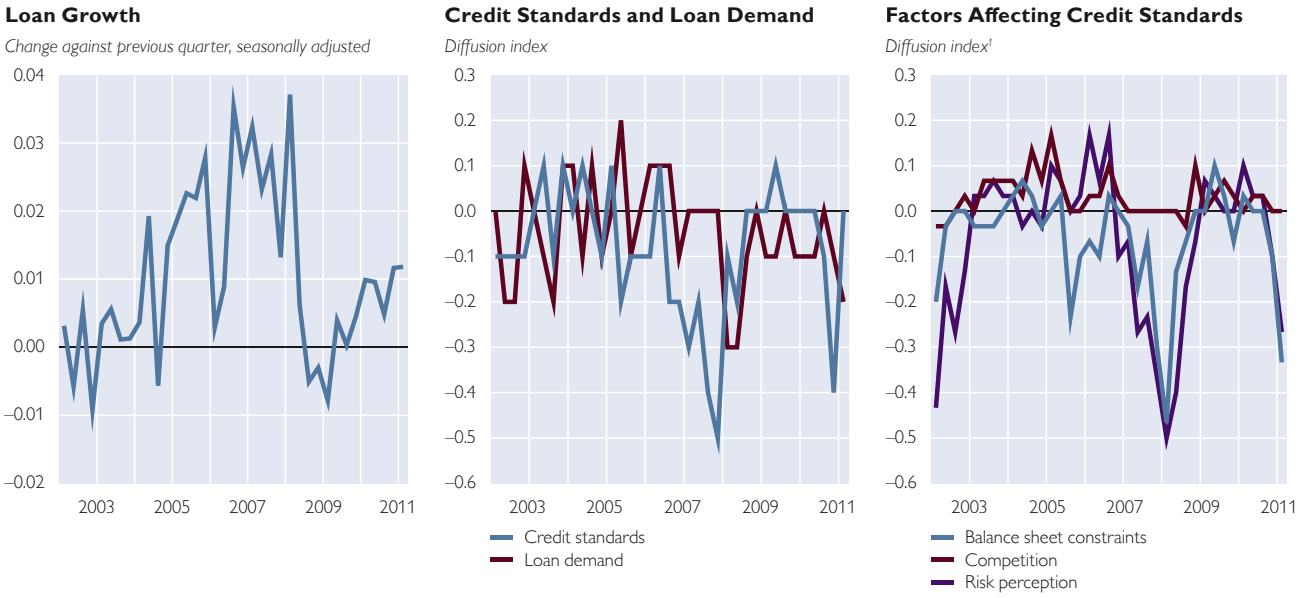
[1] For loan growth, "tightened" refers to a drop in loans and "eased" to an increase.

the onset of the crisis (6 out of 14 quarters). However, measured by the average diffusion index, (net) tightening was somewhat stronger during the crisis (–0.11) than before (–0.08). Standards for long-term loans were tightened more frequently and to a somewhat stronger degree than standards for short-term loans.

According to the BLS, loan demand fell slightly in all but two years (2006 and 2007). Overall, we observe a net drop in demand for total loans and short-term loans and a slight increase for long-term loans. Demand for loans across all maturities decreased during the crisis period. This drop was most pronounced in the first year of the crisis. According to the BLS responses to the question on demand factors, companies' financing needs affected loan demand more than the use of alternative finance.

Chart 1

Total Loans Granted to Enterprises



Source: OeNB.

[1] Mean of individual underlying factors.

4.2 Modeling Framework

In our analysis, we regress the seasonally adjusted quarterly growth rate of loans to enterprises on the BLS supply and demand variables. For this purpose, we employ an autoregressive distributed lag model, i.e. the explanatory variables are composed of lagged values of both the dependent variable and the independent variables. Lags are included because, given the nature of credit standards, it can be expected that there is some time lag between the moment when a bank takes the strategic decision to change its credit standards or enterprises express their loan demand and the time when this is reflected in the loan data reported by the bank.

For one thing, this time lag has purely operational reasons. It may take some time between the decision-taking by the responsible bodies within a bank and the actual implementation of the decisions by staff dealing with customers in bank branches. Additional time is required to process loan applications, to arrange the loan and finally to pay out the funds and record the claim on the banks' balance sheet. Moreover, credit standards may affect credit lines before they affect actually disbursed loans. For example, a tightening of lending standards may lead to a cut in credit lines. If such a reduction is below what the customer has actually drawn, the actual amount outstanding may be unaffected. To complicate matters further, the lag between a change of standards and the resultant change of outstanding loans need not be constant. As pointed out above, a change in lending standards need not lead to a change of the quantity of loans granted, but it can also affect their price, which is the interest rate charged, and other non-interest rate terms and conditions. Therefore, two equivalent episodes of e.g. tightening may have different effects on loan growth. As a final point, loan demand may affect loan volumes differently at different points in time (e.g. at

different points of the business cycle) so that the same degree of tightening may have different effects. For the purpose of estimation, a crucial point is how many lags to consider at most in the model as the number of parameters to be estimated increases with the number of lags. We allow for a maximum number of three lags because it seems reasonable that it should not take more than three quarters of a year until changes in standards or demand become visible in actual loan developments.

We estimate two specifications: Specification 1 takes the information on loan supply in the BLS into account by including the diffusion index for the change in banks' credit standards as applied to the approval of loans or credit lines. Specification 2 should help gain additional insights into the role of supply-side factors by using the survey questions on the factors affecting credit standards (as described in section 1). This should allow for distinguishing between the pure credit supply view of loan cutbacks and the broader notion that also accounts for changes in risk. In this respect, Hempell and Kok Sørensen (2010) find for the euro area, and Del Giovane et al. (2011) for Italy, that both capital constraints and banks' risk perceptions exert a significant (negative) influence on loan growth. For Germany, Blaes (2011) shows that the bank-related supply factor helps explain the slowdown in lending during the crisis period. To incorporate these factors in our analysis and at the same time limit the number of explanatory variables, we condense the data on the factors that affect credit standards by using principal component analysis (Hempell, 2007; Blaes, 2011). By doing so, we were able to extract one factor related to balance sheet constraints (variable: "balance sheet") and one factor that reflects risk considerations (variable: "risk"). However, factor extraction with respect to competition was not successful, probably due to the low variation in this variable. Consequently, in addition to the demand variable specification 2 includes the risk and balance sheet variables. Note that we estimate specification 2 for all maturities, even though the BLS question on factors affecting credit standards refers to total loans.

One of the aspects that every analysis of loan developments covering the past few years has to take account of is how to gauge the effect of the crisis. In this regard, we follow – in principle – Hempell and Kok Sørensen (2010), Blaes (2011) and Del Giovane et al. (2011), who employ a crisis dummy that takes the value of 1 from the third quarter of 2007 to the fourth quarter of 2009.[11] However, we define the crisis period from the third quarter of 2008 to the end of our sample because our analysis shows that the bankruptcy of Lehman Brothers and its consequences exerted more influence on Austrian banks than the earlier subprime crisis. The crisis dummy is included as an intercept dummy but in the robustness tests, we also interact it with the BLS variables. Furthermore, as the reporting of provisions on loans in the underlying Austrian statistics were changed in the second quarter of 2005, we additionally include a dummy variable corresponding to this quarter.[12]

[11] *Hempell and Kok Sørensen (2010) additionally use the information provided by the special crisis-related ad hoc questions to examine the relative importance of the various factors behind supply restraints before and since the beginning of the crisis. However, for Austrian data these variables are strongly correlated with the balance sheet variable. Therefore, we did not use them in the present analysis.*

[12] *Starting with the reporting date of June 30, 2005, data on loans have been reported as nominal values.*

The BLS supply and demand variables should reflect all determinants of loan growth. However, it is not clear, a priori, which of these variables should be included in the model and which lags should be taken into account. In principle, this problem could be circumvented by including all variables with the maximum number of lags in the regression. However, the estimation of such a model is not reasonable as the scarcity of data calls for a relatively parsimonious model. One approach to obtain a smaller model is to estimate a large number of models and compare them according to various criteria (e.g. goodness of fit) and then select a single model (stepwise model search). However, such an approach has some drawbacks: The decision which model to select may depend on the procedure applied and the sequence in which models are tested against each other. Additionally, a sequential application of simple significance tests means that the exact significance level cannot be computed (see e.g. Freedman, 1983). Furthermore, by focusing on a single model any inference about loan determinants and any assessment of the capability of the BLS to capture loan dynamics do not take into account model uncertainty. To cope with these problems, we apply Bayesian model averaging (BMA).[13] BMA does not aim to select a single best model but takes all possible models into account and assigns to them a probability that reflects how likely a model is given the data. Hence, BMA allows making inference unconditional on model specification. Eventually, we aim to obtain the posterior distribution (or some of its moments) of the parameters of interest. The posterior distribution combines information from the data and the prior that reflects prior (i.e. before knowledge of the relevant data) beliefs about the coefficient values. The relatively high variance of the chosen prior reflects our prior uncertainty about the coefficient values. Additionally to priors on the coefficients, it is also necessary to decide on model priors that reflect an initial belief about the likelihood of each model.[14] For calculations, we use the R[15] package BMS developed by Feldkircher and Zeugner (2009).

Below we will focus on the following outcomes of the BMA analysis: First, the posterior inclusion probability (PIP), which reflects the importance of a specific variable in explaining loan developments. The inclusion probability is calculated as the sum of the posterior model probability over all models that include this variable, where the posterior model probability reflects how likely each model is given the data.[16] Second, we obtain the posterior mean for each variable. The posterior mean corresponds to a weighted aver-

[13] *For a recent overview on model averaging in economics, see e.g. Moral-Benito (2011).*

[14] *For the results shown below we use the BRIC g-prior ($g = max(N,K^2)$) and a beta-binomial model prior (Ley and Steel, 2009) with prior model size $K/2$, where K is the number of explanatory variables and N the number of observations. The number of burn-ins is 500,000 and the number of iterations two million. We applied other priors as well, but our main results prove to be unaffected by the prior used.*

[15] *R is a language and environment for statistical computing and graphics (see R Development Core Team, 2011).*

[16] *If we write the relationship to be estimated as $y = X\beta+\varepsilon$, where y denotes loan growth, X is the matrix of explanatory variables (including a constant and the lagged dependent variable) and ε a random shock, we can write the PIP of a specific variable (say X_i) as $PIP_{X_i} = Prob(\beta_i \neq 0 \mid y, X) = \sum_{j:\beta_i \neq 0} p(M_j \mid y, X)$ where $p(M_j \mid y, X)$ is the posterior model probability of model j. The latter is computed as $p(M_j \mid y, X) = (p(y \mid M_j, X)\, p(M_j)) / (p(y \mid X))$, where $p(y \mid M_j, X)$ is the marginal likelihood of model j, $p(M_j)$ the prior model probability and $p(y \mid X)$denotes the integrated likelihood, which is constant over all models.*

age of the means of the posterior densities of the parameters over all models (unconditional mean) or over only those models in which the variable is present (conditional mean).[17] The weights used are the posterior model probabilities. Furthermore, as measure of dispersion we calculate the posterior standard deviation that does not only take into account parameter uncertainty conditional on a specific model but also the uncertainty of the parameter estimates across different models.

4.3 Results

Table 2 shows the cumulative posterior probability that at least one lag of the explanatory variables is included[18] and the simple PIP for the crisis dummy. From the table we can infer that lagged loan growth plays an important role in determining current loan growth. Furthermore, demand contributes to the explanation of loan growth whereas the supply-related variables only play a minor role. The posterior inclusion probability for the crisis dummy is relatively low. This suggests that the crisis did not affect loan growth over and above its impact via supply and demand.

Showing the results for the different lags included in the analysis, table 3 takes a closer look at the results for total loans. For the interpretation of the posterior inclusion probability, the classification suggested by Raftery (1995) may be useful: Raftery calls the evidence for a regressor weak if it has a PIP of between 50% and 75%, positive for a PIP between 75% and 95%, strong if the inclusion probability falls within the range of 95% to 99% and very strong for a PIP above 99%. Table 3 is in line with the observation derived from table 2 that demand variables are more important for loan developments (i.e. have a higher inclusion probability) than supply variables. Regarding lag length, our results show that the second lag is particularly important for loan developments, which suggests that it takes about two quarters for changes in demand to have an effect on loan developments. Additionally, table 3 shows the posterior mean and the posterior standard errors. The coefficients (and standard errors) are conditional on

Table 2

Cumulative Posterior Inclusion Probability

	Total loans		Short-term loans		Long-term loans	
	Specification 1	Specification 2	Specification 1	Specification 2	Specification 1	Specification 2
Loan growth	**0.96**	**0.92**	0.36	0.20	**0.94**	**0.84**
Standards	0.41		0.38		0.27	
Balance sheet		0.26		0.21		0.11
Risk		0.15		0.29		0.25
Demand	**1.00**	**0.97**	**0.79**	0.47	**0.91**	**0.77**
Crisis dummy	0.10	0.04	0.09	0.04	0.11	0.08

Source: Authors' calculations, OeNB.

Note: Probabilities above 0.5 in bold print.

[17] *The conditional mean (table 2) is computed as* $E(\beta_i \mid y, X) = \sum_{j:\beta_i \neq 0} p(\beta_i \mid y, X, M_j) p(M_j \mid y, X)$.

[18] *Formally, the Cumulative Posterior Inclusion Probability of variable i corresponds to* $Prob((\beta_{i,t-1} \neq 0) \vee (\beta_{i,t-2} \neq 0) \vee (\beta_{i,t-3} \neq 0) \mid y, X)$, *where* $t-s, s = 1,2,3$ *denotes the time lag.*

Table 3

Estimation Results for Total Loans – Austria

		Specification 1			Specification 2		
Variable	Lag	PIP	Posterior mean	Posterior standard deviation	PIP	Posterior mean	Posterior standard deviation
Loan growth	1	0.12	0.15	0.17	0.12	0.15	0.17
	2	**0.93**	**0.42**	**0.12**	**0.93**	**0.42**	**0.12**
	3	0.12	0.12	0.14	0.12	0.12	0.14
Standards	1	0.21	–0.21	0.14			
	2	0.25	0.21	0.12			
	3	0.10	0.07	0.14			
Balance sheet	1				0.06	–0.15	0.23
	2				0.20	0.27	0.14
	3				0.04	0.02	0.17
Risk	1				0.07	–0.21	0.23
	2				0.05	0.13	0.21
	3				0.08	0.22	0.20
Demand	1	**0.65**	**0.29**	**0.11**	0.41	0.29	0.12
	2	**0.99**	**0.56**	**0.12**	**0.96**	**0.57**	**0.13**
	3	0.12	0.13	0.14	0.05	0.11	0.16
Dummy 2005		**0.77**	**–0.31**	**0.10**	**0.63**	**–0.32**	**0.11**
Crisis dummy		0.10	0.07	0.13	0.04	0.03	0.14

Source: Authors' calculations, OeNB.

Note: Results for coefficients with a PIP of above 0.5 in bold print.

inclusion, i.e. they are calculated as a weighted average of the coefficient values of only those models in which the respective variable is included. This makes it possible to compare coefficients to estimates obtained from standard regressions. Furthermore, the coefficients are standardized, i.e. all variables are normalized such that their mean is zero and their standard deviation is one. In this way, it is easy to compare the effects of the different explanatory variables on loan growth as standardized coefficients indicate by how many standard deviations loan growth changes if an explanatory variable increases by one standard deviation.

The signs of the coefficients are by and large as expected, i.e. higher demand or loosened credit standards lead to stronger loan growth. An increase in demand by one standard deviation (corresponding to a rise of the diffusion index by 0.12 points) leads to a maximum increase in loan growth by 0.56 standard deviations (corresponding to approximately 0.7 percentage points). The maximum impact occurs two quarters after the change in demand. According to our results, balance sheet or risk considerations do not help explain loan growth. In this sense, the empirical results of this paper do not give any indication for a credit crunch.

The results presented above are corroborated when looking at the five best models, i.e. the five models with the highest posterior model probability (table 4). Loan growth and demand (both with a lag of two periods) are included in all of the five best models. Demand with a lag of one period and the 2005 dummy are included in the best model and two further models out of the best five models. Table 4 also gives us some insight into model uncertainty. For total loans, the posterior

Table 4

Best Models

Specification 1						
Variable	Lag	1	2	3	4	5
Loan growth	1					
	2	×	×	×	×	×
	3					
Standards	1					
	2					×
	3					
Demand	1	×		×		×
	2	×	×	×	×	×
	3					
Dummy 2005 Crisis dummy		×	×			×
Posterior model probability		0.17	0.13	0.06	0.06	0.03

Specification 2						
Variable	Lag	1	2	3	4	5
Loan growth	1					
	2	×	×	×	×	×
	3					
Balance sheet	1					
	2					×
	3					
Risk	1					
	2					
	3					
Demand	1		×		×	
	2	×	×	×	×	×
	3					
Dummy 2005 Crisis dummy		×	×			×
		0.16	0.12	0.12	0.08	0.07

Source: Authors' calculations, OeNB.

Note: The table shows the explanatory variables included in the five best models as well as the posterior model probability both for specification 1 and specification 2. x indicates that the variable is considered in the model; for variables that are not considered, the cell is left blank.

model probability of the best model amounts to 17% (16% in specification 2). The posterior model probabilities of the five best models together amount to 45% (55%) but are very low from the third (fourth) model on. For specification 1 we can also enumerate and estimate all potential models by ordinary least squares and compare the models by different tests with the aim of extracting a "best model." For total loans by Austrian banks, the model selected using this approach is the same as the best model under the Bayesian approach.

To gain some insight into the explanatory power of the present estimation results, we estimate the best model (i.e. the model with the highest posterior model probability) and the median model (i.e. the model including all variables with a PIP above 0.5) by OLS and calculate the corresponding adjusted R^2.[19] For total loans, the adjusted R^2 amounts to 0.68 for specification 1 and to 0.61 for specification 2. Including further variables (e.g. gross fixed investment, GDP, interest rates) or a term that interacts the BLS variables with the crisis dummy does not change our main results. With regard to short-term loans, the BLS variables do not allow us to model loan growth in a meaningful way. This may be due to the high volatility of short-term loans. Short-term loans are repaid within one year. Hence, the difference between the issuance of new loans, to which the BLS questions refer, and the net transactions recorded in the BSI statistics is particularly pronounced. For long-term loans, the adjusted R^2 amounts to 0.57 and the results suggest that loan developments are mainly driven by demand.

[19] *The quality of BMA results is often judged by their forecasting accuracy. However, with regard to the present data, a forecasting exercise does not make much sense given the small number of observations.*

4.4 Putting the Austrian Results into Perspective

The prominent role of demand in explaining Austrian loan developments distinguishes the present results from comparable studies covering other regions. Those studies mostly find that both in the euro area (De Bondt et al., 2010; Hempell and Kok Sørensen, 2010) and in the United States (Lown et al., 2000; Cunningham, 2006; Bayoumi and Melander, 2008) credit standards influence loan developments more strongly than demand. Papers on individual euro area countries come to the same conclusion (e.g. Blaes (2011) for Germany and Lacroix and Montornès (2009) for France).

To put the Austrian results into context, we re-ran the estimation for total loans for Germany and the euro area.[20] This makes it possible to compare our results with those of studies covering these regions. Additionally, a comparison with Germany could be informative because of the considerable structural similarities of the Austrian and German financial sectors (both are bank-based financial systems with a large number of banks and relationship banking playing a strong role). In Austria and Germany, loan volume growth was quite similar and consistently below the euro area average before the crisis. Additionally, macroeconomic developments in Austria and Germany were relatively comparable both before and after the onset of the crisis.

Table 5 presents the cumulative PIP for total loans in Germany and the euro area. It shows that both in Germany and in the euro area supply-side factors play a more important role in explaining the growth of total loans than demand factors. This result is in line with the results obtained by the studies mentioned above that employ a different methodology (which implies that the different result for Austria is not attributable to methodological reasons). Furthermore, the results obtained from specification 2 suggest that in Germany, supply-side factors affected loan growth mainly through risk considerations whereas in the euro area, balance sheet-related reasons had more influence. Additionally, the PIP of the crisis dummy is relatively high for the euro area in specification 1[21]. Hence, the crisis had a stronger impact on loan growth than what can be explained by changes in credit standards or loan demand. These results suggest that a credit crunch as defined by Bernanke and Lown (1991) may have taken place in the euro area. With regard to total loans, our results further suggest that demand factors affect loan growth in the euro area while they seems to play no role in explaining loan volume growth in Germany. This

Table 5

Cumulative Posterior Inclusion Probability
Total Loans – Germany and the Euro Area

	Specification 1		Specification 2	
	Germany	Euro area	Germany	Euro area
Loan growth	**1.00**	**1.00**	**1.00**	**0.99**
Standards	**0.89**	**0.60**		
Balance sheet			0.27	**0.72**
Risk			**0.52**	0.30
Demand	0.14	**0.63**	0.07	0.33
Crisis dummy	0.07	**0.64**	0.04	0.15

Source: Authors' calculations, Deutsche Bundesbank, ECB.

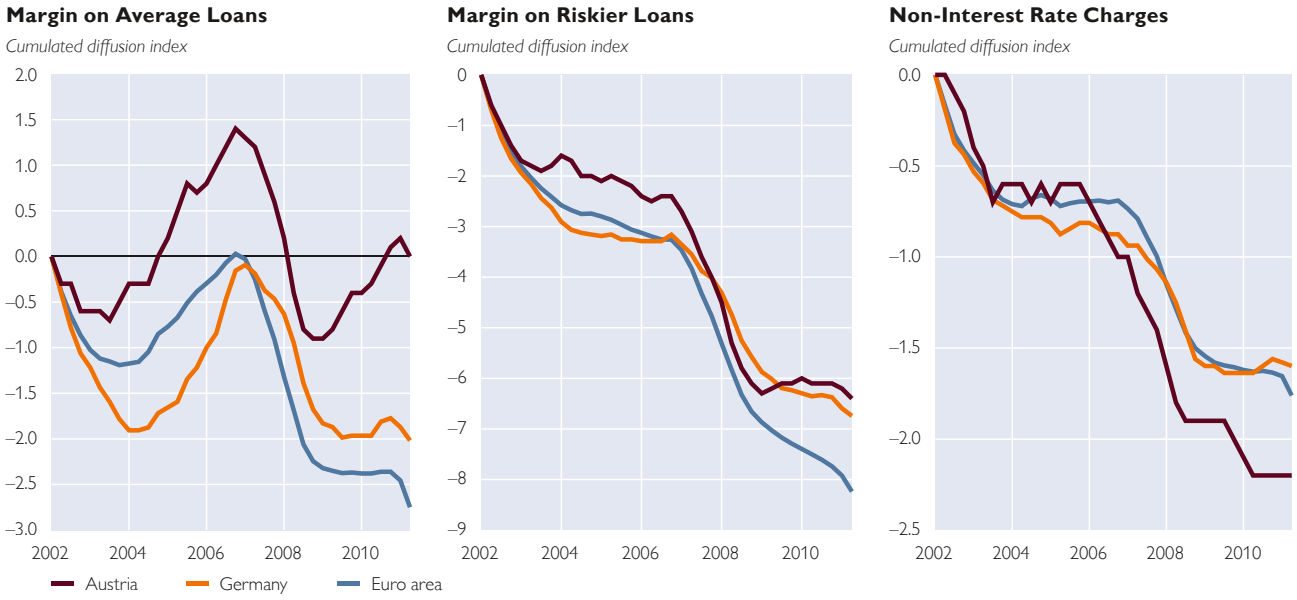
Note: Probabilities above 0.5 in bold print.

[20] *BLS data for the euro area were obtained from the ECB website and for Germany from the website of the Deutsche Bundesbank.*

[21] *In specification 2, the balance sheet and risk variables are likely to absorb some of the crisis effects and thereby to reduce the inclusion probability of the crisis dummy.*

Chart 2

Terms and Conditions – Price Elements



Source: OeNB, Deutsche Bundesbank, ECB.

result is also remarkable because even though credit standards were tightened to a much greater extent in Austria than in Germany, the quarterly growth rate of loans to nonfinancial corporations was higher in Austria than in Germany in 17 out of 37 quarters of the sample period.

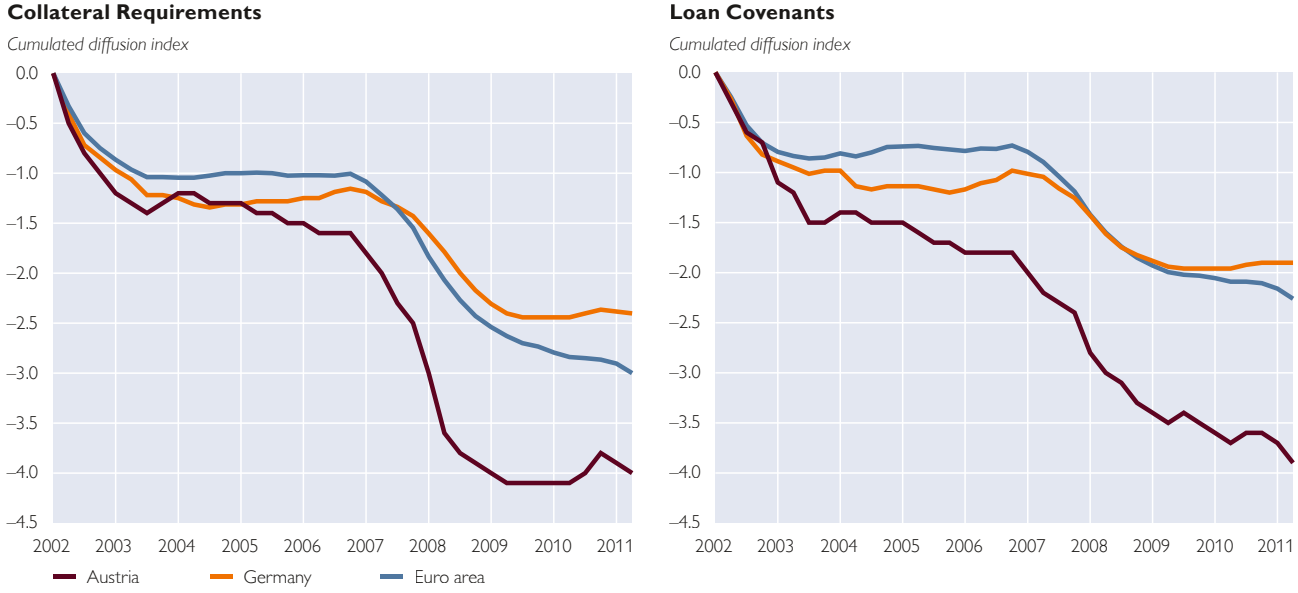
There may be two possible explanations for these differences between Austria and Germany. The first relates to the different development of the BLS demand variable. On average, loan demand increased in Germany whereas it dropped in Austria. It is possible that the impact of credit standards is muted in a low demand environment. This effect was probably most pronounced during the crisis. Even though in both countries standards were tightened and loan growth slowed down during the crisis, according to the BLS loan demand decreased considerably in Austria whereas it rose in Germany.

The second potential explanation for the different effects of credit standards on loan growth relates to terms and conditions. As pointed out above, credit standards not only affect loan volumes but can also influence the terms and conditions of a loan – which are either the price (interest rate and non-interest rate charges, i.e. fees) or all the other specific obligations agreed upon by the lender and the borrower that are part of a loan contract. The BLS requests information on various elements of such loan stipulations. A simple graphical analysis might provide some preliminary insight into the relationship between credit standards and price and non-price terms. To make it easier to capture developments over time in the charts, we depict the cumulated diffusion index values of the changes of the various terms and conditions according to the BLS instead of the original values.

Looking at the price elements of loans (chart 2), we see that banks in Austria and Germany have tightened the margins on riskier loans much more

Chart 3

Terms and Conditions – Collateral and Covenants



Source: OeNB, Deutsche Bundesbank, ECB.

strongly than those on average loans whereas in the euro area as a whole, margins on average loans were tightened more strongly. Concerning non-interest rate charges, there were no significant differences. So overall, in price terms, BLS results for Austria and Germany do not indicate many differences.

Regarding the non-price aspects (chart 3), it is striking that Austrian banks tightened loan covenants and collateral requirements to a considerably higher degree than did banks in Germany and the euro area as a whole. This did not happen only during the crisis but already in the years before the crisis, when Austrian banks tightened these two price elements to a much higher degree than German or euro area banks. So it might have been the case that in Austria part of the tightening of credit standards may have been effected by stricter loan covenants and higher collateral requirements rather than by curbing volumes. While tighter credit standards in Germany much more often meant the denial of a loan and led to lower growth rates.

5 Conclusions

This paper aims to assess whether BLS data help explain changes in loan volumes in Austria – as derived from the BSI statistics – and seeks to provide some evidence on whether loan developments can be attributed to demand or to supply factors. We find that at least the development of total loans to enterprises can be reasonably associated with supply and demand information from the BLS. The explanatory power of the BLS is highlighted by the fact that the inclusion of additional variables from other sources neither considerably contributes to the explanation of total loan growth nor changes our main results substantially. According to the present results, loan volumes change mainly because of changes in the demand variable, whereas – in contrast to the findings for Germany

and the euro area as a whole – supply-side effects play only a secondary role.

Another finding is that in view of the low inclusion probability of the crisis variable, the crisis did not impair the volumes of bank lending to enterprises above its impact on credit standards (both on balance sheet factors and risk perception) and loan demand (via reduced investment spending, lower mergers and acquisitions activity, etc.). That is to say, the crisis did not affect the usual lending relationship between enterprises and banks. In other words, the slowdown (and for some time, even reduction) in lending volumes observed after the onset of the crisis was more or less in line with macroeconomic fundamentals. This is confirmed by the fact that banks did not tighten credit standards more often, and only somewhat more pronouncedly, during the crisis than before, and also the tightening of covenants and collateral requirements was not a pure crisis phenomenon.

Although loan growth cannot be attributed to either pure credit supply effects or banks' risk considerations, the relatively minor role of both the crisis dummy and the supply variables indicates that in Austria, there was no credit crunch as defined by Bernanke and Lown (1991) during the observation period. Regarding the broader definition of credit crunch provided by Owens and Schreft (1993), according to which a credit crunch occurs when non-price loan conditions significantly increase, the evidence is less clear. Chart 3 shows that tighter credit standards manifested themselves in stricter loan covenants and collateral requirements. However, given the purely qualitative nature of the BLS survey it is difficult to tell whether these increases were "significant" enough to qualify as a credit crunch. Even less can be said about the reasons for tightening covenants and collateral requirements in the first place, as the BLS does not require respondents to state the reasons behind such changes. However, given the strong correlation between credit standards and terms and conditions for loans, it would stand to reason that the same factors were at play in both cases. Moreover, this tightening of terms and conditions did not only take place during the crisis, but was observed during the entire observation period.

Given the conceptual issues discussed in this paper, a number of caveats must be taken into account when interpreting the results. A major point in this context is that the BLS questions refer to newly extended loans (including credit lines) whereas BSI statistics record changes in loan volumes. As soon as the new statistics on gross loan volumes provide a time series long enough for empirical analysis, it will be worthwhile to repeat the investigation with this new series. In interpreting the present results, one should also bear in mind that they are based on a relatively short time period, which calls for a parsimonious model and hence a limited number of explanatory variables. Even though the inclusion of further variables did not affect our main results, it may still be useful to undertake a more comprehensive analysis as soon as the available time series is long enough.

A further issue that country-specific studies have to take into account is the euro area-wide scope of the BLS. This means that the available data refer to loans granted across the euro area as a whole, and therefore the potential to make country-specific statements is somewhat limited. To gain some insight into these potential limitations, we re-estimated specification 1 using data on total loans by Austrian banks to Austrian corporations as the dependent

variable. While using this new loan variable reduced the explanatory power of the model, it did not affect our main conclusions (e.g. the relevance of the demand variable). Furthermore, the reduced explanatory power gives some indication that banks indeed have their euro area operations in mind when answering the BLS questionnaire. A potential extension to the present paper is to directly use the BLS information on both terms and conditions and on prices for loans. Additionally, the responding loan officers' expectations on future developments of credit standards and loan demand could be assessed for their usefulness in forecasting loan growth.

References

Bassett, W. F., M. E. Chosak, J. C. Driscoll and E. Zakrajsek. 2011. Identifying the Macroeconomic Effects of Bank Lending Supply Shocks. Paper presented at the Federal Reserve Day Ahead Conference on Financial Markets & Institutions. Federal Reserve Bank of Kansas City. January 6.

Bayoumi, T. and O. Melander. 2008. Credit Matters: Empirical Evidence on US Macro-Financial Linkages. IMF Working Paper 08/169.

Berg, J., A. Van Rixtel, A. Ferrando, G. de Bondt and S. Scopel. 2005. The Bank Lending Survey for the Euro Area. ECB Occasional Paper 23.

Berger, A. and G. Udell. 2004. The Institutional Memory Hypothesis and the Procyclicality of Bank Lending Behavior. In: Journal of Financial Intermediation 13. 458–495.

Berlin, M. 2009. Bank Credit Standards. In: Federal Reserve Bank of Philadelphia Business Review Q2. 1–10.

Bernanke, B. and C. Lown. 1991. The Credit Crunch. In: Brookings Papers on Economic Activity 2. 204–248.

Blaes, B. 2011. Bank-Related Loan Supply Factors During the Crisis: An Analysis Based on the German Bank Lending Survey. Deutsche Bundesbank Discussion Paper. Series 1. 31/2011.

Ciccarelli, M., A. Maddaloni and J.-L. Peydró. 2010. Trusting the Bankers: A New Look at the Credit Channel of Monetary Transmission. ECB Working Paper 1228.

Cunningham, T. J. 2006. The Predictive Power of the Senior Loan Officer Survey: Do Lending Officers Know Anything Special? Federal Reserve Bank of Atlanta Working Paper 2006-24.

De Bondt, G., A. Maddaloni, J.-L. Peydró and S. Scopel. 2010. The Euro Area Bank Lending Survey Matters: Empirical Evidence for Credit and Output Growth. ECB Working Paper 1160.

Del Giovane, P., G. Eramo and A. Nobile. 2011. Disentangling Demand and Supply Effects in Credit Developments: A Survey-Based Analysis for Italy. In: Journal of Banking & Finance 35(10). 2719–2732.

Deutsche Bundesbank. 2009. Bank Lending Survey: An Interim Assessment and Current Developments. In: Monthly Report January. 15–30.

Feldkircher, M. and S. Zeugner. 2009. Benchmark Priors Revisited: On Adaptive Shrinkage and the Supermodel Effect in Bayesian Model Averaging. IMF Working Paper 09-202.

Freedman, D. A. 1983. A Note on Screening Regression Equations. In: The American Statistician 37(2). 152–155.

Hempell, H. S. 2007. Credit Constraints in the Euro Area? – Bankers' Perceptions. Analysis of First Results from the Bank Lending Survey of the Eurosystem. In: Kredit und Kapital 1/2007.

Hempell, H. S. and C. Kok Sørensen. 2010. The Impact of Supply Constraints on Bank Lending in the Euro Area – Crisis Induced Crunching? ECB Working Paper 1262.

Lacroix, R. and J. Montornès. 2009. Analysis of the Scope of the Results of the Bank Lending Survey in Relation to Credit Data. In: Banque de France Quarterly Selection of Articles 16. Winter 2009–2010. 33–51.

Ley, E. and M. F. Steel. 2009. On the Effect of Prior Assumptions in Bayesian Model Averaging with Applications to Growth Regressions. In: Journal of Applied Econometrics 24(4). 651–674.

Lown, C., D. Morgan and S. Rohatgi. 2000. Listening to Loan Officers: The Impact of Commercial Credit Standards on Lending and Output. In: Federal Reserve Bank of New York Economic Policy Review 6. 1–16.

Lown, C. and D. Morgan. 2006. The Credit Cycle and the Business Cycle: New Findings Using the Loan Officer Opinion Survey. In: Journal of Money, Credit, and Banking 38(6). 1575–1597.

Maddaloni, A. and J.-L. Peydró. 2011. Bank Risk-Taking, Securitization, Supervision, and Low Interest Rates: Evidence from the Euro Area and the U.S. Lending Standards. In: The Review of Financial Studies 24(6). 2121–2165.

Moral-Benito, E. 2011. Model Averaging in Economics. Banco de Espana Documentos de Trabajo 1123.

Owens, R. E. and S. L. Schreft. 1993. Identifying Credit Crunches. Federal Reserve Bank of Richmond Working Paper 93-2.

R Development Core Team. 2011. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing. Vienna. ISBN 3-900051-07-0.

Raftery, A. E. 1995. Bayesian Model Selection in Social Research. In: Sociological Methodology 25. 111–163.

Schreft, S. L. and R. E. Owens. 1991. Survey Evidence Of Tighter Credit Conditions: What Does It Mean? In: Economic Review. Federal Reserve Bank of Richmond. March. 29–34.

Waschiczek, W. 2003. The Bank Lending Survey for the Euro Area – Background, Objectives and Results for Austria. In: Focus on Austria 3. OeNB. 122–139.