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**The Number of Bank Relationships of SMEs:
A Disaggregated Analysis for the Swiss Loan Market**

by

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Abstract

The present paper investigates the number of bank relationships of small and medium-sized enterprises in Switzerland using survey data from 1996 and 2002. We differentiate between overall bank relationships and lending relationships and disaggregate the loan market with respect to firm sizes, industries and banking groups. On average, bank lending declined, while the role of housebank relationships increased in 1996-2002. The development of the number of bank relationships seems to have been demand-driven as well as supply-driven for medium-sized firms, but only supply-driven for very small and small firms. Supply-side reductions resulted from the merger between two big banks and changes in credit risk management at major banks.

JEL classifications: G21, G32

Keywords : relationship lending, housebank, loan market structure, multiple banks

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1. Introduction

In recent years, much research has been concerned with explaining the number of bank relationships of SMEs (small and medium-sized enterprises). Information-based theories of financial intermediation show that the optimal number of banks from which a small or young firm should lend is small. While according to Diamond's delegated monitoring model (Diamond 1984), a single bank relationship is most efficient if a firm lends once, models of repeated lending show that it is optimal to hold a few bank relationships.¹ By lending from more than one informed bank, the firm may save hold-up costs that arise if the first lending bank uses its superior information to extract monopoly rents through future loans (Sharpe 1990, Rajan 1992). However, it should not lend from many banks, because this would imply a higher probability of being credit rationed (Thakor 1996, Angelini/Di Salvo/Ferri 1998). The resulting "one-to-few" hypothesis has been confirmed for some countries such as Germany (Harhoff/Körting 1998, Elsas/Krahn 1998, Rätke 2005), the US (Petersen/Rajan 1994), Norway (Ongena/Smith 2001) and Sweden (Berglöf/Sjögren 1998), but not for the majority of countries in a cross-section analysis of 20 European countries (Ongena/Smith 2000b). The evidence of a large cross-country variation in the number of bank relationships with a prevalence of multiple banking relationships even at small firms has induced further theoretical and empirical research (Detragiache/Garella/Guiso 2000, Farinha/Santos 2002, Machauer/Weber 2000, Rätke 2005).

In empirical studies on the benefits of relationship banking to SMEs the number of bank relationships has been often used as a proxy for the strength of the bank-customer relationship or indicator of competition between credit granting banks.² However, it may also be an indicator of borrower quality or size (Machauer/Weber 2000). First, banking relationships of a firm may signal bad quality, because a high quality firm is more likely to get additional funds from the first informed lender (Petersen/Rajan 1994) or because multiple banking reduces monitoring incentives (Foglia/Laviola/Reedtz 1998). Secondly, large firms tend to hold more bank relationships than smaller ones, because they need larger loans or a wider range of bank services that a single bank might not be able to provide (Ongena/Smith 2001). Moreover, the number of bank relationships may be affected by characteristics of the banks or

¹ For surveys on relationship banking see Boot (2000), Ongena/Smith (2000a) and Elyasiani/Goldberg (2004).

² See e.g. Petersen/Rajan (1994), Cole (1998), Harhoff/Körting (1998, 2003), Machauer/Weber (1998), D'Auria/Foglia/Reedtz (1999), Ongena/Smith (2001), Ferri/Kang/Kim (2001), Menkhoff/Neuberger/Suwanaporn (2005); for an overview see Lehmann/Neuberger/Rätke (2004).

the stability of the banking sector, with a higher incidence of multiple banking relationships in more fragile environments (Detragiache/Garella/Guiso 2000).

An unresolved question not tackled in the literature yet is whether the observed number of bank relationships is determined by the demand side or the supply side. It may be demand-driven if it reflects the optimum number dependent on firm specific financial requirements, or supply-driven, if it reflects the availability of potential lenders or credit market concentration. In a highly concentrated regional or local banking market, a small number of banking relationships may simply reflect the fact that a firm's demand for more banking relationships is rationed. Especially the markets of loans to SMEs are local in nature, because they are characterized by asymmetric information. Banks can be seen as delegated monitors in these markets (Diamond 1984). The closer to the customers they are located the lower are their monitoring costs.³

Also a change in the number of bank relationships through time may be demand-driven or supply-driven. A decline may result from a supply-side reduction of the number of banks through a merger or through a change in banks' credit risk management, but also from a demand-side substitution of bank loans by alternative forms of finance. A thorough interpretation of the observed data thus requires a disaggregated analysis of both the demand side and the supply side. The present paper conducts such an analysis for the SME bank loan market in Switzerland disaggregated with respect to firm sizes, industries (manufacturing industry, trade/hotel and restaurant industry, services) and banking groups (big banks, cantonal banks, regional banks and savings banks, mutual banks, other banks).⁴ We seek to provide explanations for the change in the number of bank relationships of SMEs in the period 1996-2002, using a data set based on 1700 firm surveys in 1996 and 2002, respectively.

In the period 1996-2002, the domestic credit volume of Swiss banks decreased by 16.1%, which cannot be explained by a cyclical reduction of demand (Schacht 2005)⁵. Within this

³ Evidence indicates that local market areas for households and small businesses are generally appropriate for analyzing the competitive effects of bank mergers (Rhoades 1996, p. 344).

⁴ Cantonal banks are state-owned and have to take public interests into consideration. Their primary business area is the canton, but they also provide services beyond the cantonal borders since some years. Regional banks and savings banks provide services similar to those of the cantonal banks, but differ from these by their legal form and by a geographically more limited business area. Mutual banks (Raiffeisenbanken) are cooperative banks specializing in retail banking.

⁵ An economic slowdown can only be observed since the second half of 2000. It cannot explain why the credit volume declined most at the big banks (Schacht 2005, p. 79).

period, the supply side of the Swiss loan market was subject to profound changes: in 1998, the merger between UBS and SBC, two of the three Swiss big banks caused a substantial increase in market concentration (with a rise in the Herfindahl index from 1.998 to 2.450), which has thus reached the highest level in European banking markets (Schacht 2005).⁶ Moreover, especially big Swiss banks changed their credit risk management in these years. They introduced risk-adjusted pricing based on internal ratings in 1997, long before the consultations on the Basle II accord. This was a reaction to their large loan losses in the first half of the 1990s (Eidgenössische Bankenkommission 2003, p. 27, Schacht 2005, pp. 25). Other banks, especially the cantonal banks followed, but did not introduce risk-adjusted pricing to the same extent.⁷ Simultaneously, the demand for bank relationships is likely to have changed. On the one hand, progress in information technology tends to reduce personal communication, which leads to a higher standardisation of bank products and a lower binding of customers to their housebanks.⁸ This favours multiple banking relationships at a firm. On the other hand, firms may demand less lending relationships, because the availability of substitutes for bank loans has increased due to financial innovations or deregulations. A changing demand for bank relationships can refer to a broad range of banking services, or only to the lending business. Therefore, we will differentiate between overall bank relationships that refer to all banking services and lending relationships that refer to business loans in a narrow sense.

So far, there is hardly evidence on the number of bank relationships in Switzerland. We only know of the cross-country evidence for large corporations in the year 1996, where Switzerland belongs to the countries with the lowest number of lending relationships (Ongena/Smith 2000b). The median number of bank relationships used for cash management purposes was two, and 41.7% of Swiss firms maintained only one bank relationship. Our sample for smaller firms supports this finding and shows that the concentration of lending relationships in Switzerland has even increased until 2002. We find different developments of

⁶ For studies on the impact of this merger on competition in the retail banking segment see Neven/von Ungern Sternberg (1998) and Egli/Rime (1999). The latter already showed large effects of a hypothetical UBS-SBC merger in 1997 on the Herfindahl indices for different retail banking markets.

⁷ The interest rate spread between the best and the worst rating of an SME borrower is higher at the biggest banks than at the cantonal banks. From 1997 to 1998, the average interest rate on SME loans was raised by 3% at the big banks, but only by 1.2% at the cantonal banks (Task Force KMU 1999, p. 7, Schacht 2005, p.54).

⁸ For the US, there is evidence that the information revolution has induced small firms to choose more distant lenders and communicate with them in more impersonal ways, thus gaining greater access to credit (Petersen/Rajan 2002). On the effects of technological progress on the EU banking markets see ECB (1999).

the bank relationships for different customer segments and banking groups, which we seek to explain on the basis of theoretically-derived hypotheses. While for medium-sized firms, the development of the number of bank relationships can be explained by changes in demand and supply, for the smallest and small firms it can be only explained by supply-side changes. Especially the merger between two of the three biggest banks caused a reduction in loans and bank relationships to very small and small enterprises, which was not compensated by an increase at other banks. This result is consistent with theoretical expectations and previous evidence for the US and Italy. Our findings do not only put into perspective the results of other empirical studies, but also the numbers reported by some banks with respect to their market shares in lending.

The rest of the paper is structured as follows. Section 2 describes the data set, our measurements of the number of bank relationships and hypotheses. Section 3 presents our empirical analysis for the different measurements. Section 4 summarizes the results and draws conclusions.

2. Data, measurements and hypotheses

2.1. Data

Our source of information about bank relationships are surveys of firms in 1996 and 2002, conducted by the market research institution DemoSCOPE on behalf of the Verband Schweizerischer Kantonalbanken VSKB (association of Swiss regional banks). By phone interviews of managers who are responsible for the finance of their firms a sample of about 1700 cases was obtained in both years. The basic population comprises Swiss SMEs with 1 to 199 employees. The sample was apportioned according to the size classes 1-3, 4-9, 10-49 and 50-199 employees. Within these classes, the interviews were allocated to the cantons proportionally to the actual number of firms. The allocation of the interviewed firms to the size classes is evenly stratified. This means that conclusions for the total population can be drawn on the basis of the single size classes by weighting with their actual proportions. We adjusted the size classes of the survey to those of the Swiss business and loan statistics, defining the following three categories: “very small firms” with 1-9 employees, “small firms” with 10-49 employees and “medium-sized firms” with 50-249 employees. To aggregate single observations over firm sizes or industries, they must be weighted according to the actual size

structure or industry structure. The most recent census of Swiss enterprises yields the structure of SMEs shown in table 1.

Table 1: Structure of SMEs in Switzerland in 2001

	manufacturing industry		trade/hotel and restaurant industry		services		total
1-9 employees	60,609	22.5%	86,248	32.0%	122,885	45.6%	269,742
	80.4%	19.8%	89.4%	28.2%	91.8%	40.2%	88.2%
10-49 employees	12,101	39.7%	9,104	29.9%	9,267	30.4%	30,472
	16.05%	4.0%	9.4%	3.0%	6.9%	3.0%	10.0%
50-249 employees	2,680	47.9%	1,138	20.3%	1,775	31.7%	5,593
	3.55%	0.9%	1.2%	0.4%	1.3%	0.6%	1.9%
total	75,390	24.7%	96,490	31.6%	133,927	43.8%	305,807

Explanation: In the manufacturing industry 80.4% of all enterprises (60,609 out of 75,390) are very small, while 22.5% of the very small enterprises (60,609 out of 269,742) belong to the manufacturing industry. 19.8% of all SMEs are very small enterprises in the manufacturing industry.

Source: own composition

2.2 Measurements of bank relationships

Firm surveys on the number of bank relationships may ask for overall bank relationships that result from the whole range of banking services or lending relationships that result from a bank loan. Because of alternative forms of external finance and internal finance, not all firms hold a lending relationship. Hence, we can differentiate between three levels of possible relationships (see table 2). The first level describes the overall bank relationships of all firms in the sample. The next two levels refer to the sub-sample of the borrowing firms. On level 2 we still ask the firms for their overall bank relationships, while on level 3 we ask them for their lending relationships.

Another measure for the strength of a bank-customer relationship is the incidence of a housebank or main bank relationship versus additional or ‘minor’ bank relationships. A housebank is usually defined as the major lender of a firm and does not preclude that the firm holds multiple banking relationships. For German universal banks the incidence of a housebank status has been shown to be positively related to the bank’s share of borrower debt financing, but negatively related to the firm’s number of bank relationships (Elsas 2005). Hence, the observation that a firm holds only one or a small number of lending relationships is an indicator of a housebank relationship. While the latter is always a lending relationship, additional or ‘minor’ bank relationships can refer to bank loans as well as other bank services.

Table 2: Three levels of bank-customer relationships

	Firms in the sample	Bank-firm relationships
Level 1	all firms	overall bank relationship
Level 2	borrowing firms	overall bank relationships (at least 1 lending relationship)
Level 3	borrowing firms	lending relationships

Source: own composition

Most of the previous empirical studies on relationship banking measure the number of bank relationships by considering only lending relationships (Petersen/Rajan 1994, Elsas/Krahenen 1998, Machauer/Weber 2000, Harhoff/Körting 1998, 2003, Berglöf/Sjögren 1998, Detragiache/Garella/Guiso 2000, Ongena/Smith 2001, Ferri/Kang/Kim 2001, Farinha/Santos 2002). Exceptions are Cole (1998) who asks all firms for the number of sources of financial services and Ongena/Smith (2000b) who ask all firms for the number of banks they use for cash management services. Since, however, short-term lending is one of the most important activities in cash management, the numbers of bank relationships in the latter sample do not differ much from those in the other studies (Ongena/Smith 2000b, pp.32). Also the observations for the number of lending relationships in these studies are not directly comparable because they consider different types of bank loans (e.g. some include lines of credit, others not).

In the following analysis of the Swiss loan market, we will focus on bank-customer relationships on levels 2 and 3. The number of borrowing firms is defined as the number of firms that use an investment credit, a working capital credit or a mortgage credit granted by a bank. The resulting ratio of the number of borrowing firms to the number of all firms, the so-called bank loan ratio, is an indicator of the importance of bank finance to the firms in our sample:

$$\text{Bank loan ratio} = \frac{\text{number of borrowing firms}}{\text{number of all firms}}$$

The number of a firm's overall bank relationships is obtained from its answers to the survey question "At which bank or banks is your firm a customer?". Its mean over all firms (borrowing firms) is given by the ratio of the total number of overall bank relationships to the number of all firms (borrowing firms), which we will call bank relationship ratio:

$$\text{Bank relationship ratio of all firms (level 1)} = \frac{\text{number of overall bank relationships}}{\text{number of all firms}}$$

$$\text{Bank relationship ratio of borrowing firms (level 2)} = \frac{\text{number of overall bank relationships}}{\text{number of borrowing firms}}$$

The number of a firm's lending relationships results from its answers to the survey question „At which bank or banks does your firm use an investment credit, a working capital credit or a mortgage credit?”. Its mean over all borrowing firms is given by the ratio of the total number of lending relationships to the number of borrowing firms, which we will call lending relationship ratio:

$$\text{Lending relationship ratio of borrowing firms (level 3)} = \frac{\text{number of lending relationships}}{\text{number of borrowing firms}}$$

Analogously, bank loan ratios, bank relationship ratios and lending relationship ratios can be calculated on a more disaggregated basis for different kinds of loans and different banking groups.

2.3 Hypotheses

Before investigating the development of the above ratios, we formulate hypotheses about expected changes in demand and supply. Theoretically, changes in the demand for bank loans, bank relationships or lending relationships may result from a change in the substitutability with respect to alternative forms of finance or from a change in the customers' preferences or attitudes. The substitutability of bank services is likely to increase, first, due to financial innovations and technological change that reduce transaction costs and thus customers' switching costs. Secondly, it may increase by regulatory changes, which ease the capital market access of SMEs or reduce barriers of entries for non-bank intermediaries. At the same time, customers may feel less bound to their housebanks, and develop preferences towards multiple banking relationships.

A demand-side substitution of bank finance by alternative forms of finance or of one bank by another can also be supply-induced, if e.g. some banks become more restrictive in their lending policy and demand higher risk premiums. We try to disentangle these supply-induced demand changes from “pure” demand changes by considering firms of different size. Small, informationally opaque firms are more likely to get rationed and have less access to alternatives of bank finance than larger firms. Therefore, we expect that “pure” demand

changes are to be found mainly at the larger, medium-sized firms. With respect to the demand for bank loans, we hypothesize:

H1: The number of bank loans decreased at larger firms (medium-sized firms), because they have substituted investment credits, working capital credits or mortgage credits by alternative forms of finance ('reduction of demand').

The demand for the number of bank relationships or lending relationships, however, is likely to have increased due to a decline in the binding of customers to their housebank or an increased willingness to hold multiple banking relationships. Since larger firms need a larger range of financial services and more or larger loans to be diversified at several banks than smaller firms, we expect a larger increase of the number of relationships at larger firms:

H2: The number of bank relationships or lending relationships increased at larger firms (medium-sized firms), because these feel less bound to their housebanks and wish to use a larger number of banks for different financial services or larger loans ('increase in demand').

Changes in the supply of bank loans, bank relationships or lending relationships may result from changes in the number of banks in the market (market structure) or from changes in the banks' strategies (market conduct). Considering the merger between the two biggest banks UBS and SBC, we expect that it affected all SMEs. Since the services offered by the big banks are differentiated and thus not perfectly substitutable to the services provided by the other banking groups,⁹ the merger-induced supply reduction cannot be compensated by other banks, so that we expect an overall supply reduction. Moreover, the supply reduction is likely to be largest at relatively small and opaque firms. For this class of borrowers, relationship lending is superior to other forms of financing, resulting from the banks' comparative advantage in screening and monitoring. If the information generated by the bank-firm relationship cannot be fully transferred to other lenders, these firms are especially vulnerable to shocks that affect banks, which may result from mergers. Also changes in management or restructuring after a merger can cause a loss of soft information especially on these firms. (Bonaccorsi di Patti/Gobbi 2003, p. 7). This view is supported by previous evidence for other countries. In the US, banks involved in mergers tended to reduce their portfolio share of small

⁹ The big banks offer their products nationwide. They have a centralised credit office where all applications are technically handled. The cantonal and regional banks have better access to local markets due to closeness to their customers. This is an advantage especially when offering loans to the smallest enterprises.

business loans (Berger/Udell 1989 and Berger/Demsetz/Strahan 1999). Recent studies for Italy showed that consolidation disrupted above all credit relationships of small businesses (Sapienza 2002), without however reducing credit availability, because borrowers are able to find other sources of credit (Bonaccorsi di Patti/Gobbi 2003).¹⁰ Multiple banking relationships seem to insure Italian firms against idiosyncratic shocks to banks (Detragiache/Garella/Guiso 2000). However, we do not expect that this also holds for Switzerland, where multiple banking does not prevail.¹¹ Thus, we hypothesize

H3: The number of bank loans, bank relationships and lending relationships decreased at the big banks, because two of the biggest banks merged. Because of imperfect substitutability, the reduction at the big banks was only partially compensated by an increase at other banks. This applies especially to relatively small firms and opaque or intangible industries ('reduction of supply').

Considering the banks' strategies, the changes in credit risk management with introduction of risk-adjusted pricing (mainly by the big banks and bigger cantonal banks) are likely to have reduced the supply of loans and banking relationships, especially to firms with relatively high credit risk and information opacity. Again, these are above all very small and small enterprises or firms with intangible assets. Hence, we hypothesize

H4: The number of bank loans, bank relationships and lending relationships decreased at relatively small firms and opaque or intangible industries, because major banks (big banks and bigger cantonal banks) restructured their portfolios or introduced risk-adjusted pricing with higher requests for information about borrower quality. This induced these firms to increase the number of their relationships with other banks ('reduction of supply').

¹⁰ For a review and discussion on the available evidence see Bonaccorsi di Patti/Gobbi (2003).

¹¹ In the cross-country study of Ongena/Smith (2000b), Italy is the country with the highest number of lending relationships. In 1996, the median number was 12, while it was 2 in Switzerland.

3. Empirical analysis

3.1. The bank loan ratio

The bank loan ratio in an industry is calculated by the weighted sum of the observed bank loan ratios in the single firm size classes, where the weights correspond to the actual ratios of the firm size classes in that industry (see table 1).¹² For the whole SME sector, the bank loan ratio was 48.5% in 2002, which means that less than half of all firms have a bank loan. Table 3 shows the bank loan ratios for the three industries and firm size classes in 2002 as well as their changes from 1996 to 2002.

Obviously, bank loan ratios tend to increase with firm size and are higher in the manufacturing industry than in the other sectors. A demand-side explanation is that larger firms and firms in the manufacturing industry need more loans to finance investments in physical capital than smaller firms or firms in the non-manufacturing sector. A supply-side explanation is that small, informationally opaque firms and firms in intangible industries with less collateral are more likely to be credit rationed or to obtain loans at higher costs than larger firms or firms with more tangible assets.

Also the changes in the bank loan ratios from 1996 to 2002 differ substantially between industries and firm size classes. We examined the significance of the difference between a bank loan ratio in 2002 and 1996 for all 16 cases in table 3. The results are reported by the respective z-values in parentheses and the 90%, 95% and 99% significance levels.¹³

¹² For the manufacturing industry, e.g., we obtain $54.1\% \times 80.4\% + 73.8\% \times 16.05\% + 73.1\% \times 3.55\% = 57.9\%$

¹³ The variations in the significance levels are partly due to the different sizes of the sub-samples underlying the single fields. Note that the significance tests for the sums over industries and firm sizes indicate significant differences only for the sample, since they are not based on a weighted basic population. E.g. in table 2, the change of the weighted average in the services sector -9.4% results from the difference between 50.7% (1996) and 41.3% (2002) and not from the sum of the weighted differences in the single size classes.

Table 3: Bank loan ratios of SMEs in Switzerland (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services		weighted average	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	54.1%	-1.7% (0.371)	49.6%	-8.2% (2.019)**	39.9%	-9.4% (2.288)**	46.2%	-7.4% (2.812)***
10-49 empl.	73.8%	+4.0% (0.921)	61.9%	-9.2% (1.509)	54.7%	-8.8% (1.196)	64.4%	-3.8% (0.661)
50-249 empl.	73.1%	-9.2% (2.576)***	71.1%	+7.7% (1.042)	72.3%	+7.7% (0.991)	72.5%	+0.1% (1.061)
weighted average	57.9%	-1.4% (1.615)	51.0%	-8.2% (1.529)	41.3%	-9.4% (2.285)**	48.5%	-7.2% (2.818)***

* 90% significance; ** 95% significance; *** 99% significance

Explanation: The significance levels over all firm sizes for a given industry (last row) and all industries for a given size class (right column) refer to the respective sub-sample and not to the weighted average calculated for the whole sample

Source: own calculation

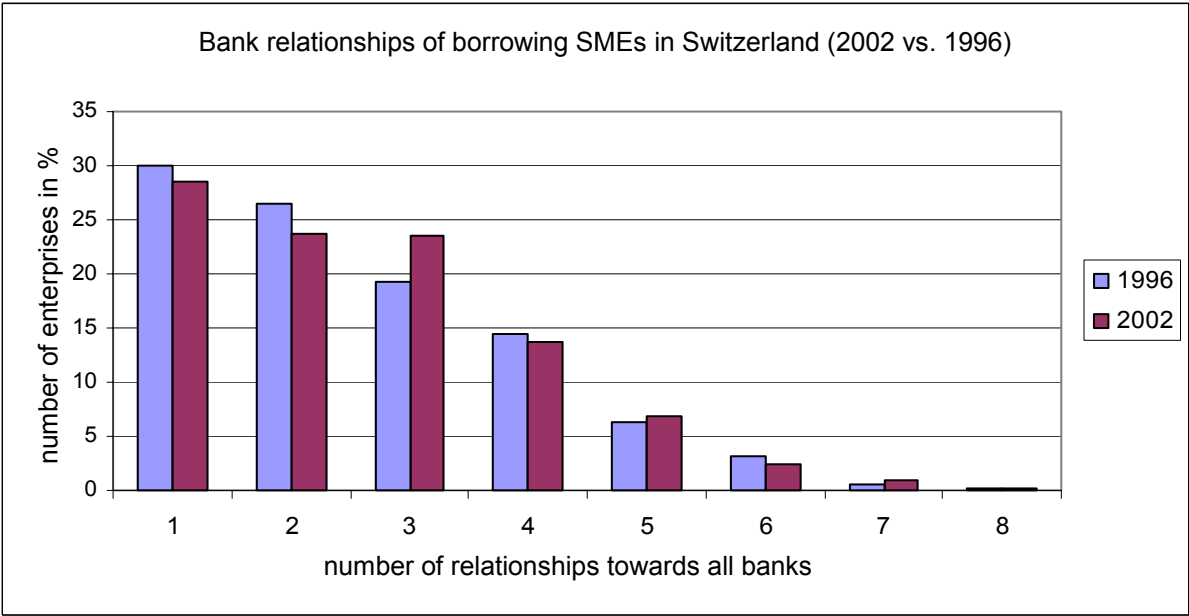
We observe substantial reductions of bank loan ratios from 1996 to 2002: the average bank loan ratio of SMEs decreased significantly by 7.2 percentage points from 55.7% in 1996 to 48.5% in 2002. To find out whether this reduction has been demand-driven or supply-driven according to the above hypotheses, we investigate the developments for different firm sizes and industries.

The results of the significance tests reported in table 3 yield most support for the ‘reduction of supply’ hypotheses H3 and H4: comparing different size classes, the reduction is significant only at the very small firms (-7.4 percentage points to 46.2%). Comparing different industries, the reduction is significant only in the services sector (-9.4 percentage points to 41.3%). Consistent with H1, we find that in the manufacturing sector, a significant reduction occurred only at medium-sized firms (-9.2 percentage points to 73.1%) which have easier access to alternative forms of finance than smaller firms.

3.2. The number of bank relationships of borrowing firms

For the sub-sample of all borrowing firms, we investigate the number of overall bank relationships (level 2 in table 2). Figure 1 shows the frequency distribution of the number of relationships towards all banks in 2002 compared to 1996.

Figure 1: Bank relationships of borrowing SMEs in Switzerland (2002 vs. 1996)



Source: own calculations

Consistent with the ‘one-to-few’ hypothesis, the number of bank relationships of Swiss SMEs is low: in 2002, 75% of the borrowing firms held one to three bank relationships, with nearly 30% having a relationship to a single bank. Only about 10% of the borrowing firms held relationships to five or more than five banks.

The mean number of bank relationships, the above-defined bank relationship ratio, is shown in table 4 for 2002 compared to 1996. In both years, it was 2.1 for all borrowing SMEs. A disaggregated view shows that the bank relationship ratio increases with firm size in all industries. This indicates that larger firms need more bank relationships because they demand a wider range of bank services.

Table 4: Bank relationship ratios of borrowing SMEs towards all banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services		weighted average	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	1.86	-0.05 (0.155)	1.89	+0.09 (0.668)	2.23	-0,01 (0.266)	2.04	+0.02 (0.671)
10-49 empl.	2.51	-0.18 (1.197)	2.29	+0.03 (0.088)	2.94	+0.28 (0.657)	2.57	+0.02 (0.473)
50-249 empl.	3.58	+0.08 (0.546)	3.30	+0.05 (0.226)	3.06	+0.54 (2.156)**	3.36	+0.27 (1.174)
weighted average	2.03	-0.09 (1.655)*	1.95	+0.08 (2.313)**	2.29	+0.01 (1.343)	2.11	+0.01 (1.134)

* 90% significance; ** 95% significance; *** 99% significance

Explanation: The significance levels over all firm sizes for a given industry (last row) and all industries for a given size class (right column) refer to the respective sub-sample and not to the weighted average calculated for the whole sample

Source: own calculation

Looking at the changes from 1996 to 2002, we observe that the average number of bank relationships over all borrowing firms remained stable (with an insignificant increase by 0.01 percentage points). However, the number of bank relationships was significantly reduced by borrowing firms in the manufacturing industry (-0.09 percentage points) and significantly increased by those in the trade/hotel and restaurant industry (+0.09 percentage points). While these changes are very small, we observe a remarkable increase in the bank relationship ratio of the medium-sized services enterprises (+0.54 percentage points). This is consistent with a rising demand for bank relationships or lending relationships by these firms according to H2. In the non-services sectors, we also observe an increase in the number of bank relationships at medium-sized enterprises, which is, however, insignificant.

Given that in the period under investigation the supply of potential bank relationships was reduced by the merger between two of the three biggest banks and by changes in credit risk management of major banks, it is surprising that we do not find support for the ‘reduction of supply’ hypotheses H3 and H4. To examine the developments on a more disaggregated level, we look at the bank relationship ratios for different banking groups.

Table 5: Bank relationship ratios of borrowing SMEs towards big banks and cantonal banks (2002 vs. 1996)

Bank relationship ratios of borrowing SMEs towards big banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	0.49	-0.35 (3.005)***	0.64	-0.30 (3.403)***	0.80	-0.37 (3.008)***
10-49 empl.	0.81	-0.70 (6.229)***	0.78	-0.58 (3.898)***	1.13	-0.28 (1.311)
50-249 empl.	1.42	-0.69 (8.084)***	1.30	-0.73 (3.968)***	1.30	-0.19 (0.753)

Bank relationship ratios of borrowing SMEs towards cantonal banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	0.48	-0.01 (0.120)	0.38	-0.05 (0.955)	0.52	-0.04 (0.715)
10-49 empl.	0.60	-0.05 (0.843)	0.58	+0.09 (0.999)	0.70	+0.02 (0.111)
50-249 empl.	0.78	+0.07 (1.437)	0.70	+0.06 (0.573)	0.74	+0.12 (0.130)

90% significance; ** 95% significance; *** 99% significance

Source: own calculations

Table 5 shows the bank relationship ratios towards the banks with the highest market shares, the big banks and the cantonal banks. We observe that the demand for services at these banks increases with firm size. Since in 2002 each firm had access only to one cantonal bank¹⁴, but to two big banks (versus three big banks in 1996), the bank relationship ratio towards the big banks always exceeds that towards the cantonal banks.

Consistent with H3, we observe a significant reduction of the number of bank relationships towards the big banks in 7 out of the 9 fields in table 5, which was not compensated by an increase in the number of bank relationships towards the cantonal banks in the period 1996-2002. In 1996, the medium-sized borrowing firms held on average 1.9 relationships (not reported in table 5) to the hitherto three big banks, while in 2002 they held on average 1.4

¹⁴ Even if cantonal banks offer some services (mainly private banking) beyond cantonal borders, this does not affect the SME loan markets. In fact, each SME has access only to the cantonal bank of the canton where it is located.

relationships to the remaining two big banks.¹⁵ Thus, in 2002, they still held on average more than one relationship to a big bank, but only in three out of four cases a relationship to a cantonal bank. An explanation is that medium-sized firms have comparatively more complex financing needs and use more bank services for their international businesses, which are provided to a larger extent by the big banks than by the cantonal banks.¹⁶ Thus, relationships to cantonal banks and big banks are not perfect substitutes. Another explanation is that the loan volumes demanded by the medium-sized firms (with an average credit limit of 13 millions CHF) cannot be provided by a single (big) bank. Since the overall bank relationships of the borrowing firms go beyond their lending relationships, we cannot conclude whether the observed changes result from the lending business or from other bank products.

In the services sector, the reduction in the number of bank relationships towards the big banks is significant only at the smallest firms. This is consistent with our expectation that these firms were more affected by the big banks' merger (H3) or their risk-adjusted pricing than the larger firms (H4), but also with our expectation that only the larger firms increased their demand for the number of bank relationships (H2), thus substituting the bank relationship loss through the merger by a new relationship to the second big bank.

Table 6 shows the bank relationship ratios towards the remaining banks, i.e. mutual banks, regional banks and savings banks, and other banks (without Post).

¹⁵ This weighted average is not reported in table 4.

¹⁶ In 2002, 16 % of the SMEs used international bank services, 70 % of which were provided by the big banks. This is about four times the volume provided by the cantonal banks, in 1996 as well as in 2002 (source: own calculations).

Table 6: Bank relationship ratios of borrowing SMEs towards remaining banks (2002 vs. 1996)

Bank relationship ratios of borrowing SMEs towards mutual banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	0.34	+0.03 (0.521)	0.25	+0.05 (1.169)	0.34	+0.12 (2.121)**
10-49 empl.	0.29	+0.03 (0.506)	0.19	+0.06 (1.099)	0.28	+0.07 (0.878)
50-249 empl.	0.18	+0.01 (0.241)	0.09	+0.07 (1.493)	0.11	-0.03 (0.393)

Bank relationship ratios of borrowing SMEs towards regional banks and savings banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	0.22	+0.01 (0.174)	0.19	-0.01 (0.261)	0.24	+0.08 (1.680)*
10-49 empl.	0.20	+0.04 (0.812)	0.22	+0.08 (1.310)	0.23	+0.05 (0.598)
50-249 empl.	0.23	+0.04 (0.952)	0.11	-0.02 (0.378)	0.09	-0.01 (0.160)

Bank relationship ratios of borrowing SMEs towards other banks (without Post) (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	0.08	+0.01 (0.403)	0.14	+0.09 (2.843)***	0.11	-0.02 (0.711)
10-49 empl.	0.17	+0.07 (1.966)**	0.14	0.00 (0.493)	0.26	+0.07 (0.997)
50-249 empl.	0.36	+0.04 (0.929)	0.47	+0.05 (0.375)	0.26	+0.07 (0.958)

* 90% significance; ** 95% significance; *** 99% significance

Source: own calculations

The remaining banks usually hold a quarter to a third of all bank relationships. Among them, the mutual banks have a dominant position in the market segment of the very small firms. Examining the changes in the period 1996-2002, we observe that the bank relationship ratios of the largest SMEs (medium-sized firms) towards the remaining banks remained stable. Thus, there is no support for hypothesis H2. However, the evidence that most of the very

small and small firms which lost bank relationships towards the big banks increased their bank relationships towards remaining banks (in 4 out of 18 fields significantly), is consistent with H4. In 2002, very small services enterprises hold significantly more relationships with mutual banks, regional banks and savings banks, and very small firms in the trade/hotel and restaurant industry as well as small manufacturing firms hold significantly more relationships with other banks.

The group of the remaining banks does not include the Post (or its business segment PostFinance), which was a possible bank relationship in 2002, but not in 1996. As shown in table 7, the bank relationship ratios towards the Post in 2002 close the gaps between the overall changes in the bank relationship ratios and the sums of the changes within the groups considered above.

Table 7: Bank relationship ratios of borrowing SMEs towards the PostFinance in 2002

	manufacturing industry	trade/hotel and restaurant industry	services
1-9 empl.	0.26	0.30	0.22
10-49 empl.	0.43	0.38	0.34
50-249 empl.	0.61	0.63	0.57

E.g.: differences in manufacturing industry for 1-9 employees:

cantonal banks:	-0.01	
big banks:	-0.35	The difference over all banks was -0,05.
mutual banks:	+0.03	The ratio towards the PostFinance of 0.26
regional/savings banks:	+0.01	added to -0.31 is -0.05.
other (without Post):	<u>+0.01</u>	
Sum:	-0.31	

Source: own calculations

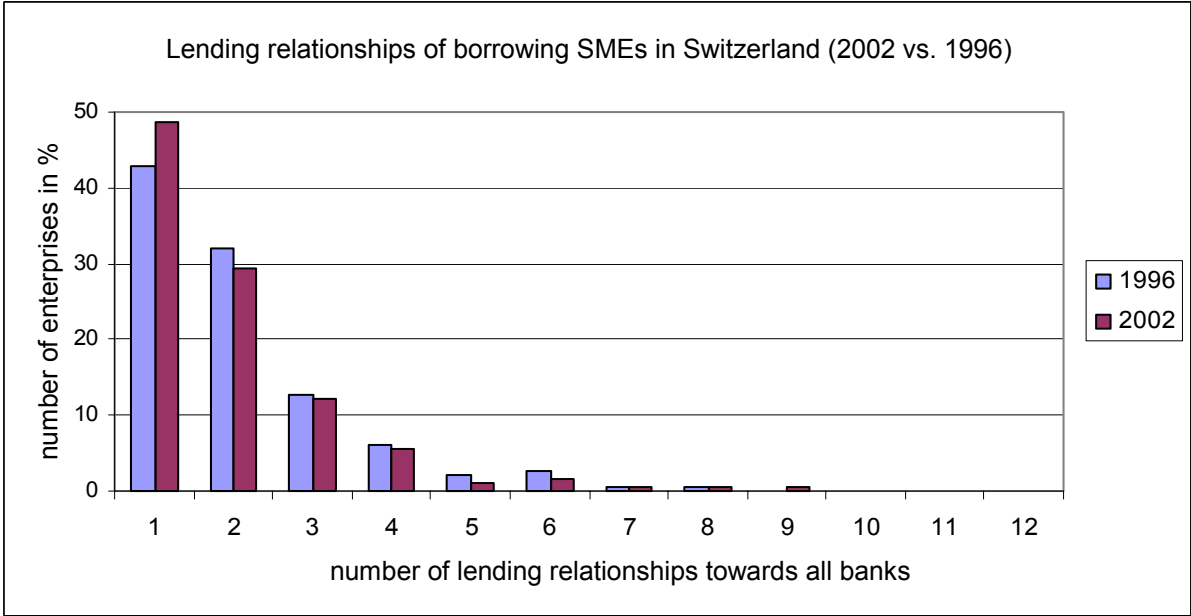
Thus, SMEs have substituted relationships with the Post for relationships with other, especially big banks. To see whether this substitution also concerns the loan market, we will examine the lending relationship ratios on level 3.¹⁷

¹⁷ According to a press release on 17th february 2004, the PostFinance has reached total assets of 43 billion CHF, a market share of about 66% in payments transactions and more than 250,000 SME relationships of its holding company *Die Post*. The credit limits of its standardised loan products, which were not offered yet in the period of our investigation, are in the range of 0.1 to 10.0 million CHF.

3.3. The number of lending relationships of borrowing firms

On level 3, we investigate the number of lending relationships of the borrowing SMEs. Figure 2 shows the frequency distribution of the number of lending relationships towards all banks in 2002 compared to 1996.

Figure 2: Lending relationships of borrowing SMEs in Switzerland (2002 vs. 1996)



Source: own calculations

Obviously, the lending relationships are more concentrated than the bank relationships. In 2002, nearly half of all borrowing SMEs lent only from one bank and four out of five (78%) lent from one or two banks. 10% of the borrowing firms held four or more than four lending relationships. Since 1996, concentration in the lending relationships has increased.

The mean number of lending relationships, the above-defined lending relationship ratio, is shown in table 8 for 2002 compared to 1996. For the whole sample, it was 1.59 in 2002, after 1.99 in 1996. The latter corresponds to the medium number of 2 for larger Swiss firms in the sample of Ongena/Smith (2000b) for the same year. A disaggregated view on our sample shows that in all industries larger firms hold more lending relationships than smaller firms. This is consistent with the evidence for other countries (Machauer/Weber 2000, Ongena/Smith 2001) and indicates that larger firms diversify their lending relationships to save hold-up costs or that the banks share the higher risks of the larger loans demanded by these firms.

Table 8: Lending relationship ratios towards all banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services		weighted average	
	2002	vs. 1996	2002	vs. 1996	2002	vs. 1996	2002	vs. 1996
	(z-value)		(z-value)		(z-value)		(z-value)	
1-9 empl.	1.66	+0.32 (0.469)	1.46	-1.00 (1.372)	1.56	-0.30 (0.568)	1.55	-0.40 (1.220)
10-49 empl.	2.01	+0.00 (1.902)*	1.70	-0.66 (1.834)*	1.77	-0.79 (0.962)	1.84	-0.44 (2.592)** *
50-249 empl.	2.60	-0.60 (1.450)	2.66	+0.95 (0.248)	1.94	-0.28 (0.026)	2.40	-0.16 (1.056)
weighted average	1.75	+0.21 (2.756)***	1.50	-0.94 (0.837)	1.58	-0.34 (0.885)	1.59	-0.40 (2.366)**

90% significance; ** 95% significance; *** 99% significance

Explanation: The significance levels over all firm sizes for a given industry (last row) and all industries for a given size class (right column) refer to the respective sub-sample and not to the weighted average calculated for the whole sample

Source: own calculations

Contrary to the bank relationship ratio over all banks, which remained stable in the period 1996-2002, the lending relationship ratio over all banks declined significantly by 20% (0.4 percentage points). This decline seems to be concentrated on small firms and on non-manufacturing industries. In the manufacturing industry, the number of lending relationships increased significantly. To test our hypotheses about changes in demand and supply, we again disaggregate the lending relationship ratio with respect to different banking groups.

Table 9 shows the lending relationship ratios towards the three banking groups with the highest market shares: the big banks, the cantonal banks and the mutual banks. Their combined share of the market for SME loans was 90% in 2002.

Table 9: Lending relationship ratios towards different banking groups (2002 vs.1996)

Lending relationship ratios towards big banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services		weighted average	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	0.49	-0.04 (1.657)*	0.57	-0.64 (2.338)**	0.55	-0.39 (2.516)**	0.54	-0.40 (4.048)***
10-49 empl.	0.78	+0.25 (3.224)***	0.74	-0.60 (2.621)***	0.83	-0.47 (0.773)	0.78	-0.42 (4.113)***
50-249 empl.	1.35	-0.59 (3.248)***	1.30	+0.09 (1.862)*	1.04	-0.11 (0.037)	1.24	-0.27 (3.315)***
weighted average	0.57	-0.11 (5.413)***	0.59	-0.63 (2.736)***	0.58	-0.40 (2.242)**	0.58	-0.40 (6.163)***

Lending relationship ratios towards cantonal banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services		weighted average	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	0.55	+0.16 (0.442)	0.35	-0.34 (0.920)	0.48	-0.07 (0.053)	0.45	-0.11 (0.021)
10-49 empl.	0.64	+0.00 (0.728)	0.59	+0.01 (0.456)	0.49	-0.30 (1.026)	0.58	-0.09 (0.624)
50-249 empl.	0.86	+0.06 (1.992)**	0.81	+0.41 (1.598)	0.70	-0.13 (0.026)	0.80	+0.06 (2.274)**
weighted average	0.57	+0.12 (0.871)	0.38	-0.30 (0.903)	0.49	-0.09 (0.395)	0.47	-0.10 (1.150)

Lending relationship ratios towards mutual banks (2002 vs. 1996)

	manufacturing industry		trade/hotel and restaurant industry		services		weighted average	
	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)	2002	vs. 1996 (z-value)
1-9 empl.	0.32	+0.16 (1.611)	0.27	+0.07 (2.177)**	0.23	+0.15 (3.013)***	0.26	+0.12 (4.008)***
10-49 empl.	0.25	+0.15 (2.408)**	0.07	+0.00 (0.237)	0.17	+0.13 (2.113)**	0.17	+0.10 (3.115)***
50-249 empl.	0.06	-0.05 (1.107)	0.11	+0.11 (1.460)	0.04	-0.06 (1.008)	0.06	-0.03 (1.054)
weighted average	0.30	+0.16 (2.325)**	0.24	+0.06 (1.778)*	0.23	+0.15 (2.965)***	0.25%	+0.12 (4.039)***

* 90% significance; ** 95% significance; *** 99% significance

Explanation: The significance levels over all firm sizes for a given industry (last row) and all industries for a given size class (right column) refer to the respective sub-sample and not to the weighted average calculated for the whole sample.

Source: own calculations

The lending relationship ratios towards the big banks declined on average and in 14 out of the 16 respective fields, mostly at a significance level of 95-99%. This supports the ‘reduction of supply’ hypothesis H3. The decline is largest at the very small and small firms and in the non-manufacturing industries (which tend to have less tangible assets), consistent with H3, but also with H4. Despite the merger, the lending relationship ratio of the largest, i.e. medium-sized firms declined only slightly from 1.51 to 1.24, while that of the smallest firms declined sharply from 0.94 to 0.54. The number of lending relationships towards the cantonal banks remained stable on average, but increased significantly for medium-sized firms. This supports our ‘increase in demand’ hypothesis H2. At the mutual banks, we observe a significant increase in the number of lending relationships, both on average and in 10 out of the 16 respective fields. This may be induced by a reduction of supply at the big banks or cantonal banks consistent with hypotheses H3 and H4. Since the medium-sized firms did not increase their lending relationships to the mutual banks, we find no evidence in favour of H2 here.

Regarding the very small and small firms, we conclude that they have significantly substituted lending relationships with big banks by those with mutual banks. This does not seem to be a pure merger effect, because also the cantonal banks lost market shares towards these firms. Hence, lending to this customer segment may have become less attractive to both big banks and cantonal banks because of comparatively low profitability. Their portfolio restructurings seem to have significantly reduced the number of lending relationships towards very small and small firms, in line with H4. Considering that in 2002, each firm had access to one cantonal bank, two big banks, one mutual bank and other minor banks, we can derive the following ranking of banks from table 9: very small and small firms held more lending relationships to their local cantonal bank than to the larger big bank, and very small firms lent even more often from their local mutual bank than from the second big bank. The medium-sized firms, however, lent about as often from the larger of the two big banks as from the local cantonal bank.

Unlike the bank relationships on level 2, the lending relationships towards the above banking groups were not substituted by those towards the PostFinance. Hence, the substitution effect observed above (table 7) results from payments or other non-lending businesses. Note, however, that this observation holds for 2002, and not for today. In 2004, the PostFinance entered the nation-wide market for SME loans with standardised credits. This market entry has enhanced competition above all in the segment of the very small and small SMEs.

Especially the mutual banks, which gained significant loan market shares from the big and cantonal banks in this segment¹⁸, are facing a new competitor by the PostFinance now.

4. Summary and conclusions

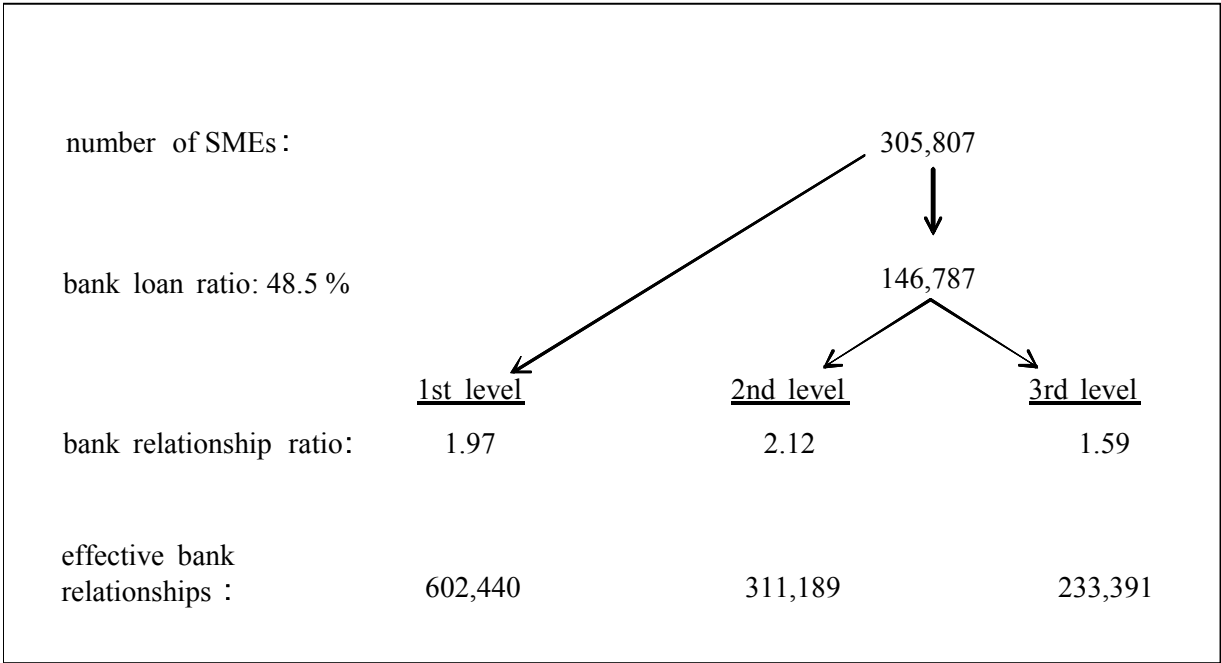
The present paper analysed the number of bank relationships of Swiss SMEs based on firm survey data in the years 1996 and 2002. Beyond the usual measurement of lending relationships in the literature, we considered bank relationships at three different levels: bank relationships of all firms (level 1), bank relationships of the borrowing firms (level 2), and lending relationships of the borrowing firms (level 3). While a lending relationship necessarily results from a bank loan, a bank relationship may also result from other financial services provided by the bank.

Figure 3 summarizes our quantitative findings for the number of bank relationships of Swiss SMEs in 2002. The total of 305,807 SMEs held 602,000 bank relationships, which implies an average number of bank relationships of 1.97¹⁹ at level 1. The bank loan ratio of 48.5% indicates that less than half of all SMEs have a lending relationship to a bank beyond the current account. This ratio has declined significantly since 1996 (by 7.2 percentage points). For the borrowing firms, which use an investment credit, a working capital credit or a mortgage credit, the average number of bank relationships is 2.11 at level 2. This number has remained stable since 1996. However, on average borrowing firms hold only 1.59 lending relationships at level 3. Thus, lending relationships are much more concentrated than overall bank relationships. The average number between one and two indicates that the housebank relationship is dominant in the SME loan market of Switzerland. Contrary to the general expectation of a declining role of housebank relationships in Continental Europe, this concentration has increased significantly since 1996 (from an average number of lending relationships of 1.99). Thus, multiple banking relationships do not insure Swiss SMEs against idiosyncratic shocks to banks or against the extraction of monopoly profits in the highly concentrated Swiss banking market.

¹⁸ mostly as a second bank relationship or for loan volumes not larger than 0.5 million CHF.

¹⁹ This number is representative, because the single observations for different firm sizes and industries were weighted according to the actual firm size and industry structure of SMEs obtained from the most recent census of Swiss firms in 2001.

Figure 3: Number of bank relationships of SMEs in 2002 at different levels



Source: own calculations

The present paper found explanations for these developments by investigating the bank relationships disaggregated according to firm sizes, industries and banking groups. Thus, we were able to test hypotheses about demand-driven versus supply-driven developments for three different relationship measures. They postulate (1) a decline in the demand for bank loans due to their substitution by alternative forms of finance, (2) an increase in the demand for multiple bank relationships due to a lower binding of customers to their housebank, (3) a reduction in the supply of bank relationships because of the merger between two big banks and (4) a reduction in the supply of bank relationships because of portfolio restructurings or changes in credit risk management by major banks. We found differential evidence for these hypotheses in different customer segments, which can be broadly summarized as follows: for medium-sized firms, the development of the number of bank relationships was demand-driven as well as supply-driven: they partially reduced their financing by bank loans, but increased their number of bank relationships. Their relationships to the big banks were hardly affected by the merger, which indicates that these customers were able to switch to the remaining big bank, which seems to have been actively engaged in gaining larger customers. The development of the number of bank relationships of the very small and small firms, however, was driven mostly by a reduction in supply: their financing by bank loans and their bank

relationships with big banks decreased remarkably due to the merger and portfolio restructurings by big banks. Therefore, the smallest and small firms redirected their demand towards mutual banks.

Finally, our disaggregated view on the number of bank relationships puts into perspective the results of previous empirical studies as well as the numbers reported by some banks with respect to their market shares in lending. For example, the number of 140,000 SME customers reported by the UBS (UBS Handbook 2003/2004, p. 25) indicates the number of bank relationships, but not lending relationships. Given the total numbers in figure 3, this means that this bank has relationships with about 46% of all SMEs, but its market share of all bank relationships to SMEs (on level 1) is only about 23%. The absolute number of lending relationships is far below the reported number of bank relationships. Obviously, further comparable research is required in this area.

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