

Specialization, Risk, and Capital in Banking

Diversification is certainly the simplest and perhaps the oldest approach to managing the trade-off between portfolio risk and return. Unless the returns on the assets in the portfolio are perfectly positively correlated, the risk of a diversified portfolio will be less than the weighted average of the risks of the individual assets. Because diversification tends to reduce risk without a proportional reduction in returns, an overwhelming majority of commercial banks have diversified portfolios. Larger banks are usually organized into multiple specialized lines of business, each with a different mandate concerning customers, products, or distribution channels, but most large banks are quite diversified when the portfolios of these specialized businesses are consolidated. Smaller banks, operating within a limited local market, are constrained in their ability to diversify their loan portfolios, but generally hold a higher proportion of marketable securities whose returns are not tied to a particular geographic market. Because the returns between the loans and securities are imperfectly correlated, the effect is to diversify the overall risk of most small bank portfolios.¹

A much smaller number of banks have chosen to ignore the benefits of diversification and focus on a particular asset or liability product such as credit cards, residential or commercial real estate, corporate trust services, or small business lending. These banks have made a conscious strategic choice to forgo diversification and the accompanying reduction in risk. While the number of specialized commercial banks is relatively small, the number of specialized nonbanks is large and includes commercial and consumer finance companies, mortgage bankers, leasing companies, many thrift institutions, and some investment banks and insurance companies.

Specialization creates issues for regulators, especially in the area of capital requirements. Current risk-based capital standards are product-based and additive across products. An implicit assumption behind such a scheme is that the returns of different types of assets are perfectly

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positively correlated. This assumption is unlikely to hold across asset classes in a bank with a diversified portfolio, so that such a bank requires less capital than a specialized one. The convex nature of the relationship between risk and diversification creates a dilemma for regulators. Because capital requirements are product driven, requirements set at a level sufficient to shield specialized banks will overcapitalize

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diversified banks and they will find it difficult to earn an adequate rate of return. Conversely, if regulators reduce product capital requirements such that the average diversified bank is just adequately capitalized, then specialized banks investing in both high- and low-risk assets will be undercapitalized.

This article investigates specialization in banking and its effects on risk and return. The vehicle for doing so is a group of banks specializing in small business micro-loans (loans under \$100,000). The first section of the article discusses reasons why banks might choose to specialize and reviews previous studies of specialized banks. The second section then compares the group of banks specializing in small business lending with a matched set of diversified peers and finds that the experience of the specialized micro-lenders is similar in many important aspects to the experience of other types of specialized banks. The third section analyzes the interactions between the specialized institutions and the way risk-based capital requirements are calculated. The concluding section discusses the growth in the number of specialized banks and the need to revise the current approach to regulatory risk-based capital to better distinguish between specialized and diversified banks.

¹ Overall, however, the loan portfolios of smaller banks appear to be less diversified than those of large banks, as indicated by a greater variance in pretax return on assets. See McAllister and McManus (1992).

I. Specialization in Financial Services

Because of the expected reduction in portfolio risk associated with diversification, a decision to specialize implies incremental benefits that offset losing the benign effects of diversification.² The benefits arising from specialization are of four types: reductions in cost from operational scale efficiencies, reductions in cost from expertise, reductions in risk from scale, and increased marketing efficacy.

Economies of Scale in Operations

Perhaps the most straightforward explanation for specialization in banking is economies of scale in operations or distribution. To the extent that the servicing of a product or customer group requires lumpy dedicated investments not usable elsewhere, increases in product volumes will leverage the fixed portion of the expense base and decrease average unit costs. Moreover, as volumes increase, pools of variable expense may be identified that lend themselves to automation. When such automation occurs, it alters the relative proportion of fixed to variable expense and creates opportunities to further decrease unit costs by increasing volumes.

A key example of a lumpy dedicated investment is an information system. As a result, processing-intensive lines of business such as mortgage servicing, credit cards, and custody often exhibit substantial economies of scale and are associated with specialization, either as stand-alone institutions or as semi-autonomous lines of business within very large banks.

To the extent that changing technology and competitive conditions require new and larger fixed investments, one can expect both economies of scale and the minimum scale required to remain competitive to increase. In businesses with these types of dynamics, smaller competitors, unable to attain competitive unit costs at their existing volumes and unwilling to bear the business and financial risks associated with specialization, would withdraw by selling out to larger competitors. The latter would tend to become more specialized as the process of consolidation continues. Table 1 shows this process for the 100 hundred largest mortgage servicers. Over the period from 1989 to 1996, concentration ratios increased substantially. While

² In addition to forgoing the reduction in risk that accompanies diversification, a specialized bank relinquishes economies of scope that arise from joint production of multiple products. The extent of such economies of scope is a matter of controversy, however.

Table 1
*Concentration in Mortgage Servicing,
 1989 and 1996*

One Hundred Largest Mortgage Servicers ^a		
	December 31, 1989	December 31, 1996
Dollar Market Share (percent)		
Five Largest	19	32
Ten Largest	30	49
Twenty-Five Largest	51	73
Herfindahl Index ^b	.018	.033

^aIncludes commercial banks, thrift institutions, and mortgage companies.

^bThe Herfindahl Index is defined as the sum of the squared market shares of the individual competitors.

Source: *American Banker*.

very large banks may be able to attain minimum required scale in these processing-intensive businesses and still maintain a diversified portfolio of businesses and products, smaller banks soon have to make a strategic choice between exiting a processing-intensive business or attaining required scale but perforce becoming specialized.³

Specialized Lending Expertise

While economies of scale in operations or lumpy fixed investments are sufficient to explain specialization in functions such as origination or processing, they do not explain specialization in intermediation. The lending process does involve processing-related activities such as documentation and control of collateral, but the magnitude of potential economies of scale does not appear sufficient to cause specialized institutions to develop for most types of corporate lending. Instead, specialization in intermediation appears to be related to other factors, especially the development of specialized expertise.

Specialized expertise in lending can encompass a variety of types of knowledge. These include the

³ Securitization and other financial innovations may make it possible for smaller institutions to specialize in scale-sensitive functions such as servicing or origination without necessarily assuming the risk of an undiversified portfolio. By securitizing assets and selling them off, the bank separates the processing functions from the funding and risk-bearing functions. Securitizing assets involves legal and underwriting costs, however, so that the minimum issue size necessary to make securitization practical may still exceed that feasible for most banks.

ability to screen applicants based on their likelihood of default, to structure a particular loan so as to minimize exposure to loss, to value illiquid or heterogeneous collateral, and to manage the workout of problem loans so as to minimize net write-offs.⁴ Private banking clients, for example, may wish to borrow to purchase art, antiques, yachts, race horses, or resort properties. Such assets are often illiquid and difficult to value, but the willingness and ability to lend against such collateral may be key in attracting and retaining clients. Similarly, lenders may require industry knowledge if they are to effectively manage their risk exposure to such traditionally volatile industries as agriculture, real estate development, entertainment, or the garment industry.

To the extent a bank is able to accumulate and employ specialized lending expertise, it will experience either lower credit losses or lower operating expenses. A superior ability to distinguish among applicants with respect to their likelihood of default will translate into both lower credit write-offs and lower workout costs. Similarly, a superior ability to structure loans, evaluate collateral, or manage workouts should also result in lower net credit losses. Moreover, once the specialized procedures are learned, the incremental costs of an additional transaction may be substantially less than if the bank was executing the transaction for the first time or doing so only sporadically.

Specialized lending knowledge is often specific to a particular asset category and in many cases can only be obtained through experience. As a result, incremental volumes both leverage existing expertise and augment it. Over time, as such specialized lending expertise accumulates, it can become a source of competitive advantage and can lead to a concentration in a particular asset category. Because it is difficult for competitors to easily obtain this expertise, the competitive advantage it confers may be sustainable over time. Once again, depending on the size of the bank, specialty lending may have a greater or lesser effect on the overall risk profile of the portfolio. For large banks, the effect of a specialty lending area on the overall risk of the portfolio may be small, especially if the covariances of the returns on the different components of the

⁴ In a study comparing banks to finance companies, Carey, Post, and Sharpe (1996) found that finance company borrowers tend to be riskier than bank borrowers and that finance companies tend to specialize in equipment leasing and auto-related finance. It appears that finance companies deal with riskier borrowers but compensate through their expertise in structuring deals and monitoring their clients.

portfolio are small. For smaller banks, however, cultivation of specialized lending expertise can lead to substantial portfolio concentration and a loss of diversification.

Reductions in Credit Risk

While specialized lending knowledge translates directly into lower expected credit losses or operating expenses, it does not necessarily reduce credit risk. To see this, it is necessary to distinguish between expected credit losses and credit risk. The former is an expected amount and is often approximated by the simple average of historical loss rates. Credit risk

Credit risk represents unforeseen or unplanned losses and is often approximated by the standard deviation of credit losses.

represents the potential variation around this expected level. Credit risk thus represents unforeseen or unplanned losses and is often approximated by the standard deviation of credit losses. It would be conceptually possible to have low expected credit losses but high credit risk if the standard deviation of credit losses was high relative to the mean, and high expected credit losses but low credit risk if the standard deviation of losses was low relative to the expected level. Specialized lending expertise tends to reduce the level of expected losses, but its relationship to the standard deviation of losses is less straightforward.

Nevertheless, it can be argued that specialization tends to reduce credit risk as well as expected credit losses. A basic and well-known statistical concept called the law of large numbers states that as the size of the drawn sample increases, the variance of the means of the sample decreases. An implication of this law is that as a bank increases the number of loans of the same size and type, the variance of expected losses on these loans will decrease. In effect, as the number of loans increases, credit risk decreases even if expected credit losses do not. Overall, the effect of specialization on credit risk will be the net effect of two opposing forces: an increase in credit risk due to a decrease in diversification across asset categories, and a decrease in credit risk due to the effect of the law of large

numbers on the credit risk of the specialized asset (see McAllister and McManus 1992).

While it is clear that a decline in expected credit losses, holding net interest margin and operating costs constant, will result in higher earnings for the bank, the effect of a decline in credit risk is more indirect and subtle. A decline in credit risk unaccompanied by a decline in expected credit costs does not affect expected earnings. Instead, it has an indirect effect through the amount of equity capital which the bank needs to hold as a shield against unforeseen losses. To the extent the potential magnitude of unplanned or unforeseen losses decreases, the bank will require less equity capital, and the same level of earnings will result in a higher return on equity for the shareholders. Since equity markets tend to reward increments to return on equity, the reduction in credit risk will translate into a higher stock price.

Increased Marketing Efficacy

Finally, specialization, particularly with respect to lending expertise, may result in enhanced marketing efficacy and faster growth. To the extent a bank employing specialized lending expertise is willing to make loans that other banks are not, or to do so on terms more advantageous to the borrower, it will have a competitive advantage in attracting new business. In addition, as the number of specialized transactions increases they generate information concerning customer needs, and the bank may become aware of opportunities to develop specialized products or services to meet these needs. Product specialists, for example, can be characterized as having narrow product lines but broad assortments within that narrow line (Kimball 1990). Thus, a mortgage banker offers only residential mortgages, but often a much greater variety of such mortgages than does a less specialized provider.

Over time, the bank may develop specialized distribution channels to more effectively attack its chosen target segment, or the bank's reputation within its chosen market segment may grow by word of mouth.⁵ As a result the bank may be able to attract applications from potential borrowers outside its normal service area. This is particularly important for smaller banks whose ability to generate new business

⁵ For example, all of the specialized micro-lenders discussed below have received national publicity by being listed by name in trade press articles as being "friendly" to entrepreneurs. See Griffin (1996).

is often constrained by a limited distribution system and the growth rate of the local market served. Specialization may permit smaller banks to achieve higher growth rates than diversified banks and transcend the limitations imposed by their local markets.

Previous Studies of Specialized Banks

In a 1990 study, Liang and Savage analyzed the characteristics of nonbank subsidiaries of bank holding companies for the years 1986 and 1987. These nonbank subsidiaries specialized in such lines of business as commercial finance, mortgage banking, consumer finance, or leasing, and they can be considered to be specialized institutions without deposit powers. Nonbank subsidiaries were found to have a higher but more variable return on assets (ROA) than their associated banks. As a result of the greater variance in returns, the nonbank subsidiaries held higher ratios of capital to assets than the more diversified associated banks. A measure of the probability of insolvency incorporating the size of profit margins, the variance in these margins, and the proportion of equity capital was calculated for both the nonbank and bank subsidiaries.⁶ Despite their higher capital ratios, the nonbank subsidiaries engaged in commercial finance, consumer finance, mortgage banking, and leasing had higher probabilities of insolvency. The specialized nonbank subsidiaries were found to be high-return/high-risk relative to the associated diversified banks. Because most of the activities of the nonbank subsidiaries could have been performed by the associated banks, Liang and Savage attributed the existence of the specialized nonbank subsidiaries to a desire to evade the restrictions on interstate banking that then existed.⁷

In a 1991 article, Eisenbeis and Kwast examined the performance of a group of commercial banks specializing in real estate loans. The sample consisted of banks holding at least 40 percent of assets in real estate loans for some part of the period from 1978 to 1988. Overall, Eisenbeis and Kwast found the real estate specialists to have higher but less variable ROAs than the control group of diversified banks. Moreover, unlike the nonbank subsidiaries analyzed by Liang and Savage, the specialized real estate banks held

lower ratios of capital to assets than the diversified control group. Using the same measure of the probability of insolvency as Liang and Savage, Eisenbeis and Kwast found that the specialized banks had on average a lower risk of insolvency than the diversified banks.

Most specialized banks focus on relatively risky assets and are aggressive lenders, earning higher but more variable returns.

To some extent the contradictions between the findings of Liang and Savage on the one hand and Eisenbeis and Kwast on the other with respect to risk and the probability of insolvency can be explained by the level of aggregation adopted by the latter. When the sample of specialized real estate banks was disaggregated into banks specializing in low-risk residential real estate, higher-risk commercial real estate, and very risky real estate development, the latter two groups had higher probabilities of insolvency. The banks specializing in low-risk residential mortgages tended to be low risk, while banks specializing in riskier types of real estate lending tended to be higher risk.

Overall, Eisenbeis and Kwast found the specialized real estate banks to be more aggressive lenders, with greater loan-to-asset ratios. In addition, the specialized banks had lower loan losses but higher non-interest expenses. Eisenbeis and Kwast attributed the higher earnings at the real estate specialists to a combination of greater aggressiveness and expertise in lending, as evidenced by the higher ratios of loans to assets and lower loan losses. Together these were sufficient to offset the higher expense ratios at the specialized banks. Unlike the nonbank subsidiaries where the motivation for specialization appeared to be marketing related, the real estate banks based their specialization on lending expertise.⁸

In two articles, Sinkey and Nash analyzed a group of specialized credit card banks over the peri-

⁶ The measure of the probability of insolvency was the Z-statistic, discussed below.

⁷ A second possible motive was to use the nonbank subsidiaries as a vehicle to hold risky assets that would not be subject to scrutiny by bank examiners.

⁸ In a recent study Canner and Passmore (1997) analyze banks specializing in real estate loans to low-income borrowers or in low-income areas. They do not analyze the riskiness of a such a specialization but find that such banks do not appear to be less profitable than more diversified banks.

ods from 1984 to 1991 and 1989 to 1995 (Sinkey and Nash 1993; Nash and Sinkey 1996). A credit card bank was defined as holding 75 percent or more of its assets as credit card loans. Sinkey and Nash found results similar to those of Liang and Savage: Credit card banks had higher and more variable ROAs than the control group of diversified banks. The credit card banks on average had higher capital-to-asset ratios, but this was insufficient to offset the greater variability in returns. As a result, credit card banks had higher probabilities of insolvency.⁹

Certain commonalities tend to emerge from these studies of diverse types of specialized banks. With the exception of the residential real estate lenders of Eisenbeis and Kwast, most specialized banks focus on relatively risky assets and are more aggressive lenders, as evidenced by higher loan-to-asset ratios. As a result, specialized banks tend to earn higher but more variable returns. This greater variance in returns is associated with higher capital-to-asset ratios. Nevertheless, despite the higher capital ratios, probabilities of insolvency tend to be greater at specialized banks. Although specialized banks in general can be characterized as high-risk/high-return, they differ in the driving motives for their specialization. Liang and Savage found marketing-related issues to be important for nonbank subsidiaries, whereas Eisenbeis and Kwast found the specialized real estate lenders to possess superior lending expertise.

II. Specialized Micro-Lenders

To investigate the effects of specialization on return and risk, a sample of 14 banks specializing in small business micro-loans, loans under \$100,000, was identified. This sample consisted of all commercial banks with 40 percent or more of assets in unsecured and secured micro-loans on both June 30, 1995 and June 30, 1996.¹⁰ While a larger number of banks met the 40 percent criterion on either date, restricting the sample to the 14 that met it on both ensures that the sample banks were focused on micro-lending over an

⁹ Sinkey and Nash did not discuss the motivations for specialization in credit cards, but emphasized the high returns and high growth rates experienced by these banks.

¹⁰ The 40 percent criterion for specialization is similar to that used by Eisenbeis and Kwast (1991). Because the total loan-to-asset ratio at most banks varies from 50 to 70 percent, 40 percent of assets in a particular loan category implies that that type of loan comprises from 55 to 80 percent of the loan portfolio.

extended period of time.¹¹ While the sample of specialized micro-lenders is small, an analysis of their experience generates insights that are consistent with those from previous studies of other types of specialized banks.

All of the 14 specialized micro-lenders are small, averaging only \$32 million in assets as of June 30, 1991, and none had assets over \$100 million on that date. Almost all were located in small towns or rural areas. Of the 14, none was located in a city with a population greater than 60,000, and six were located in towns with a population less than 15,000. Only two banks were located in counties with a population greater than 150,000.

To permit comparisons, each specialized micro-lender was paired with a diversified peer bank located in the same state. Each peer bank was matched to the corresponding micro-lender in terms of asset size (± 10 percent of assets as of December 31, 1991, the beginning of the period under study) and, to the extent possible, location. This matching controls for influences on performance unrelated to the degree of specialization, such as regional market conditions and bank size. Because so many of the specialized micro-lenders were located in small towns or counties, it was impossible in most cases to match banks in the same town or county. Only one of the 14 matched pairs is located in the same county. Most of the peers, however, are also located in small towns, with only two located in towns with a population greater than 15,000.

Table 2 shows averages for major balance sheet ratios and performance measures for the specialized micro-lenders and the matched peers for June 30, 1993, the first date on which data on loans of less than \$100,000 in size were broken out.

Asset Structure at Micro-Lenders

Table 3 compares the asset structure of the specialized micro-lenders to that of the matched peers at

¹¹ Data on bank commercial loans broken down by size of loan are available only since 1993 and for the midyear call date. The total number of banks with micro-loans greater than 40 percent of assets was 96 in 1993, 45 in 1994, 35 in 1995, and 27 in 1996. Of these, only 14 banks met the 40 percent criterion for both 1995 and 1996. The average proportion of small business loans to total assets for the 14 banks and the number of these banks with a proportion greater than 40 percent on each date are as follows: 1993: 35.2 percent and 8; 1994: 44.5 percent and 11; 1995: 47.6 percent and 14; 1996: 48.5 percent and 14. The fluctuation in the number of specialized micro-lenders is discussed in Appendix 2, accompanying this article.

Table 2
Comparison of Specialized Micro-Lenders and Diversified Peers, June 30, 1993
 Percent (except for \$ assets)

	Averages for Specialized Micro-Lenders	Averages for Peer Banks
Total Assets (\$ thousands)	\$37,631	\$38,112
Cash/Assets	7.93	4.72
Loans/Assets	66.15	54.60
Securities/Assets	14.91	30.58
Micro-Loans/Assets	35.15	13.28
Total Deposits/Assets	89.82	88.54
Non-Interest-Bearing Deposits/Assets	18.56	12.26
Equity/Assets	8.34	10.32
Net Interest Margin	4.56	4.53
Non-Interest Expense/Assets	4.38	3.33
Fees/Net Revenue	26.99	15.31
Loan Loss Provision/Assets	.25	.17
Return on Assets	1.21	1.40
Return on Equity	16.30	14.45

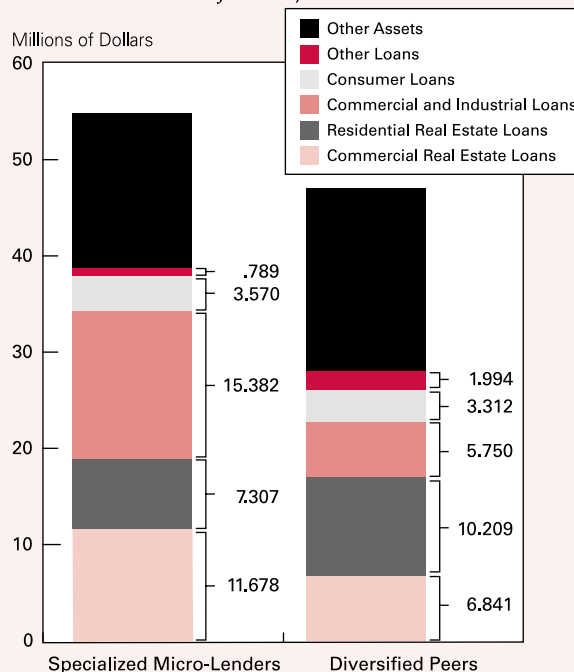
Source: Call reports.

six-month intervals over the five-year period from June 30, 1991 to June 30, 1996. The micro-lenders were substantially more aggressive in originating loans than the peer banks, as indicated by their higher ratio of total loans to assets. Indeed, at the beginning of the study period, the specialized micro-lenders had an average loan-to-asset ratio almost 15 percentage points higher than the average of the matched peers.

The higher loan ratios of the micro-lenders are due not only to higher proportions of commercial loans, but also to higher ratios of real estate loans. The ratio of real estate loans to assets at the micro-lenders exceeded that of the peer banks by slightly more than 10 percentage points at the beginning of the period and widened to 15 percentage points at the end of the period. The more aggressive lending stance of the micro-lenders can also be seen in Figure 1, which shows a breakdown of assets. The micro-lenders held substantial amounts of residential as well as commercial real estate loans. Even consumer loans, which might be considered an area of little interest for a small bank focused on commercial lending, are not substantially lower at the specialized banks. At the beginning of the period the micro-lenders actually had a higher ratio of consumer loans to total assets than

Figure 1

Asset Composition at Specialized Micro-Lenders and Peers
 June 30, 1996



did the peer banks, although a small differential in favor of the latter had emerged by June 30, 1996.

Table 4 shows the breakdown of small business loans under \$100,000 for both the micro-lenders and the peer banks for the period from June 30, 1993 through June 30, 1996, the period for which data by size of loan are available.¹² The micro-lenders have substantially higher ratios of both commercial and industrial (C&I) and real-estate-secured micro-loans. Over the three-year period, the diversified peer banks show no trend in either C&I or real-estate-secured

¹² Small business loans under \$100,000 are classified either as commercial and industrial loans, some unknown proportion of which may be secured by inventory, receivables, or equipment, or as loans secured by nonfarm, nonresidential real estate. The fact that a small business loan is secured by commercial real estate does not necessarily indicate that the proceeds of the loan were used to finance real estate. An unknown proportion of such loans may be used to finance working or fixed capital, with the real estate simply acting as collateral. In addition, to the extent owners of small businesses use sources such as home equity loans or credit card lines as sources of credit, some small business lending may appear as consumer loans.

Table 3

Asset Portfolios of Specialized Micro-Lenders and Diversified Peers, June 30, 1991 to June 30, 1996

Percent of Assets

Panel A: Averages for Specialized Micro-Lenders							
Date	Cash	Fed Funds Sold	Securities	Total Loans	C&I Loans	Real Estate Loans	Consumer Loans
6/30/91	7.56	9.92	12.55	65.35	25.56	29.22	8.83
12/31/91	8.52	8.27	15.43	64.07	24.86	29.45	8.38
6/30/92	9.20	6.46	15.18	65.90	24.98	31.42	8.25
12/31/92	8.52	8.56	14.62	64.61	24.06	31.71	7.72
6/30/93	7.93	7.03	14.91	66.15	23.48	34.25	7.16
12/31/93	8.22	7.78	14.80	65.51	22.93	34.24	6.86
6/39/94	8.42	3.81	14.53	69.60	25.50	36.00	6.75
12/31/94	7.58	3.93	14.85	69.95	25.74	36.60	6.27
6/30/95	7.32	5.62	12.43	70.80	26.40	37.32	5.75
12/31/95	7.80	6.75	12.96	68.39	25.74	35.68	5.67
6/30/96	7.10	4.22	13.01	70.89	28.28	35.31	5.91
Mean	8.01	6.58	14.12	67.38	25.23	33.75	7.05

Panel B: Averages for Diversified Peers							
Date	Cash	Fed Funds Sold	Securities	Total Loans	C&I Loans	Real Estate Loans	Consumer Loans
6/30/91	6.37	9.04	30.46	50.97	12.45	18.45	8.63
12/31/91	6.86	6.50	30.33	53.46	12.14	18.85	7.99
6/30/92	6.18	6.24	28.79	56.25	12.02	20.53	7.90
12/31/92	6.07	7.85	29.42	54.46	10.69	20.17	7.47
6/30/93	4.72	8.00	30.58	54.60	11.17	19.83	7.48
12/31/93	5.22	7.79	30.63	54.26	11.12	19.38	7.19
6/39/94	5.62	6.52	30.53	55.38	11.41	19.27	7.47
12/31/94	4.89	4.42	29.86	58.45	11.84	21.10	7.33
6/30/95	4.85	6.12	26.85	59.68	12.19	20.93	7.55
12/31/95	4.69	7.47	26.52	58.84	11.10	20.76	7.63
6/30/96	4.29	6.47	27.49	59.14	12.12	20.15	7.73
Mean	5.43	6.95	29.22	55.95	11.66	19.95	7.67

Source: Call reports.

micro-loans. In contrast, the micro-lenders show increasing ratios of both C&I and real-estate-secured micro-loans. By 1996, the micro-lenders had almost 49 percent of their assets and 68 percent of their loan portfolio in micro-loans, compared to approximately 12 percent of assets and 21 percent of loans for the diversified peers.

If the micro-lenders were more active than the matched peers in originating loans, then other areas of the asset portfolio must necessarily reflect this. Indeed, most of the funds for the enhanced lending activity at the micro-lenders comes from lower holdings of securities, as shown in Table 3. The ratio of securities to total assets at the micro-lenders averaged

more than 15 percentage points lower than at the diversified peers over the five-year period of the study.

Another way for the micro-lenders to fund higher levels of loans would be to decrease holdings of liquid assets. However, as shown in Table 3, the micro-lenders actually held higher ratios of cash and cash equivalents than did the diversified peers, although the latter held higher ratios of fed funds sold. Overall, the level of liquid assets, defined as the sum of cash and fed funds sold, averaged approximately 2 percentage points higher at the micro-lenders. This higher level of liquidity may reflect their lower levels of securities available to act as a secondary liquidity

Table 4
Small Business Micro-Loans at Specialized Micro-Lenders and Diversified Peers,
June 30, 1993 to June 30, 1996
 Percent of Assets

Date	Commercial & Industrial Micro-Loans		Nonfarm, Nonresidential Real Estate Micro-Loans		Total Micro-Loans	
	Micro- Specialists	Diversified Peers	Micro- Specialists	Diversified Peers	Micro- Specialists	Diversified Peers
6/30/93	20.70	9.46	14.35	3.81	35.05	13.28
6/30/94	23.01	10.24	18.60	3.85	41.61	14.09
6/30/95	26.40	8.68	21.24	3.36	47.64	12.04
6/30/96	28.27	8.25	20.24	3.78	48.51	12.03

Source: Call reports.

reserve. It may also be related to the higher levels of non-interest-bearing demand deposits at the micro-lenders, discussed below.¹³

Over the five-year period from June 30, 1991 to June 30, 1996, both groups of banks show shifts in their portfolio composition. As shown in Table 3, both increased their loan-to-asset ratios over the period but the increase was greater at the diversified banks. The greater increase at the diversified banks may not indicate a relative increase in their appetite for risk, but instead it may represent a conjunction of greater capacity and a cyclical increase in loan demand accompanying the long business expansion of the mid 1990s.

The two groups of banks did differ in how they financed the increased lending. As can be seen in Table 3, the diversified banks did so by decreasing both liquid assets and securities. The micro-lenders did so by decreasing the proportion of fed funds sold. Both groups of banks shifted away from consumer loans, with the micro-lenders shifting more aggressively than the diversified peers.

Overall, the micro-lenders appear to be much more aggressive lenders than the diversified peers, showing substantially higher ratios of all types of loans to assets at the beginning of the period studied. Over the period, both groups of banks increased the proportion of loans held, but the micro-lenders focused on small business micro-lending, while the diversified peers did not. Thus, the micro-lenders can

be characterized as having a greater appetite for lending in general as well as being focused on a particular market segment.

Liability Structure at Micro-Lenders

The difference in asset structure between the micro-lenders and the diversified peer banks has reverberations in their liability structure, shown in Table 5. In particular, while the two groups of banks have roughly comparable ratios of total deposits to assets, the micro-lenders have a substantially higher proportion of non-interest-bearing deposits to assets.¹⁴ Over the five-year period from June 30, 1991 to June 30, 1996, the ratio of non-interest-bearing deposits to assets at the micro-lenders averaged 18.7 percent, compared to 12.5 percent at the matched peers. Because non-interest-bearing deposits are primarily business-related demand deposits, the higher ratios at the micro-lenders may be related to their higher proportions of loans. Behavioral studies of small businesses have shown a substantial proportion to be relationship-oriented, preferring to concentrate both their borrowing and their deposit transactions at a single bank (Elliehausen and Wolken 1990). The greater propensity to lend evidenced by the micro-lenders may result in the latter attracting a corresponding higher proportion of non-interest-bearing demand deposits.

¹³ Conceivably the higher levels of liquidity at the micro-lenders may simply reflect differences in managerial style. The management of the micro-lenders may be so focused on loan origination that they pay less attention to managing the bank's liquidity.

¹⁴ As neither group of banks relies on borrowed funds to a significant degree, the slightly higher ratio of deposits to assets at the micro-lenders is due to a corresponding lower ratio of equity to assets, as discussed below.

Table 5
Liability and Capital Structure of Specialized Micro-Lenders and Diversified Peers,
June 30, 1991 to June 30, 1996
 Percent of Assets

Date	Total Deposits		Non-Interest-Bearing Deposits		Equity Capital	
	Micro-Specialists	Diversified Peers	Micro-Specialists	Diversified Peers	Micro-Specialists	Diversified Peers
6/30/91	90.64	85.12	17.97	10.99	7.91	13.55
12/31/91	91.07	87.92	17.09	11.66	7.52	10.93
6/30/92	90.65	88.83	18.02	11.85	7.61	10.30
12/31/92	90.79	88.87	18.76	12.97	7.78	10.18
6/30/93	89.82	88.55	18.56	12.26	8.34	10.32
12/31/93	89.64	87.74	19.81	13.50	8.37	10.23
6/30/94	88.80	87.05	18.95	13.74	8.66	10.32
12/31/94	88.18	86.26	19.67	14.21	8.78	10.83
6/30/95	87.78	86.15	18.28	12.23	8.47	11.26
12/31/95	88.06	86.23	19.48	12.56	8.68	11.24
6/30/96	87.55	86.50	18.94	11.76	8.88	11.13
Mean	89.36	87.20	18.68	12.52	8.27	10.93

Source: Call reports.

Table 5 also shows a difference between the micro-lenders and the matched peers with respect to the amount of equity capital carried. Over the five-year period from June 30, 1991 to June 30, 1996, the micro-lenders had an average ratio of equity to assets of 8.3 percent, the matched peers, 10.9 percent. One explanation for this outcome could be that management at the micro-lenders have a higher tolerance for risk.

Income and Expense

Table 6 shows major line items for revenues and expense for both the micro-lenders and the matched peers for the six-month periods between December 31, 1991 and June 30, 1996. Over that period the net interest margin at the micro-lenders averaged 4.89 percent, compared to 4.60 percent at the diversified peers. In addition, the micro-lenders had higher levels of fee income, averaging 1.80 percent compared to 0.82 percent at the diversified peers. Indeed, the ratio of fee income to total net revenue at the micro-lenders averaged 27 percent over the period, substantially higher than the 15 percent at the diversified peers. The high ratios of fee income to total net revenue exhibited by the micro-lenders are atypical for small banks and are usually found only at much larger banks. Thus, the

strategic decision to focus on small business lending appears to have resulted in substantially higher revenues at the micro-lenders.¹⁵ Overall, net revenue at the micro-lenders averaged 6.69 percent of assets, compared to 5.42 percent at the diversified peers.

While the micro-lenders had substantially higher revenues than did the diversified peers, they also had higher levels of operating expense. Over the period studied, the ratio of non-interest expense to assets was substantially higher at the micro-lenders, averaging 4.36 percent, compared to only 3.43 percent at the diversified peers. Once again, these higher levels of non-interest expense arguably are due to differences in asset and liability composition between the micro-lenders and the diversified peers. In particular, the higher levels of lending at the micro-lenders would involve additional expense in connection with loan origination and processing, ongoing credit monitoring, workouts, and servicing the higher levels of non-interest-bearing demand deposits.

¹⁵ While the higher levels of net interest income are probably caused by the higher proportions of loans and non-interest-bearing deposits at the micro-lenders, they could conceivably be due to more aggressive asset/liability management. In contrast, the higher levels of fee income at the micro-lenders could only be due to differences in their customer mix, since fee income would not be affected by asset/liability policy.

Table 6
Revenues and Expenses of Specialized Micro-Lenders and Diversified Peers,
December 31, 1991 to June 30, 1996
 Percent of Assets

Panel A: Averages for Specialized Micro-Lenders										
	Net Interest Margin	σ_{NIM}	Non-Interest Income	σ_{NII}	Non-Interest Expense	σ_{NIE}	Provision for Loan Losses	σ_{PROV}	Pretax ROA	σ_{ROA}
12/31/91	4.21	1.35	1.69	1.45	4.32	2.25	.79	1.09	1.34	1.03
6/30/92	4.70	.89	1.57	1.48	4.54	1.70	.73	1.27	1.19	.64
12/31/92	4.78	.77	1.65	1.84	4.53	2.23	.73	1.15	1.75	.93
6/30/93	4.56	1.29	1.59	1.63	4.38	2.18	.25	.68	1.53	1.12
12/31/93	5.17	1.43	2.24	2.23	4.55	2.35	.59	1.15	2.34	.99
6/30/94	4.87	.97	1.68	1.43	4.33	2.24	.49	1.02	1.72	.63
12/31/94	5.32	1.04	2.06	1.93	4.43	2.48	.46	1.04	2.54	.80
6/30/95	5.29	1.05	1.77	1.74	4.28	2.17	.46	.89	2.35	1.08
12/31/95	5.13	1.07	1.82	1.42	4.19	2.37	.49	.92	2.37	1.04
6/30/96	4.89	.77	1.69	1.31	4.07	2.31	.47	.92	2.04	.90
Mean	4.89	1.06	1.80	1.65	4.36	2.23	.54	1.01	1.92	.92

Panel B: Averages for Diversified Peer Banks										
	Net Interest Margin	σ_{NIM}	Non-Interest Income	σ_{NII}	Non-Interest Expense	σ_{NIE}	Provision for Loan Losses	σ_{PROV}	Pretax ROA	σ_{ROA}
12/31/91	4.56	.88	.86	.75	4.07	1.85	.36	.63	1.00	1.81
6/30/92	4.63	.87	.82	.63	3.69	1.55	.46	.56	1.33	1.14
12/31/92	4.78	.84	.95	.94	3.69	1.51	.25	.26	1.83	.81
6/30/93	4.59	.78	.84	.76	3.40	1.16	.17	.15	1.93	.73
12/31/93	4.71	1.02	.87	.76	3.65	1.43	.16	.20	1.79	.91
6/30/94	4.53	.92	.81	.57	3.33	1.10	.16	.14	1.85	.84
12/31/94	4.55	1.86	.74	.62	3.06	1.74	.14	.27	2.07	.81
6/30/95	4.65	1.00	.76	.49	3.27	.95	.08	.13	2.08	.63
12/31/95	4.60	1.00	.80	.52	3.15	.99	.20	.23	2.07	.71
6/30/96	4.41	.84	.77	.49	2.99	.90	.10	.10	2.14	.56
Mean	4.60	1.00	.82	.65	3.43	1.22	.21	.27	1.81	.90

Source: Call reports.

In addition to higher levels of non-interest expense, the micro-lenders also had higher provisions for loan losses. Over the five-year period the ratio of provisions for loan losses to assets at the micro-lenders averaged 54 basis points, compared to 21 basis points at the diversified peers. One would expect somewhat higher provisions at the micro-lenders given their higher proportions of loans to assets. However, the provisions at the micro-lenders far exceed those justified by the difference in loan-to-asset ratios. Instead, most of the higher provisions at the micro-lenders appear due to differences in loan quality. Provisions for credit losses per dollar of loans at

the micro-lenders averaged 80 basis points over the five-year period, compared to only 37 basis points at the diversified peers.

Overall, the higher levels of non-interest expense and provisions for loan losses at the micro-lenders offset most but not all of their higher revenues. Over the five-year period, the pre-tax return on assets (the ratio of pre-tax net income to assets) averaged 1.92 percent at the micro-lenders, compared to 1.81 percent at the diversified peers. Both groups of banks showed a strong upward trend in pre-tax ROA over the period, resulting from improved net interest margins and decreases in non-interest expense and provisions for loan losses.

Table 7
Average Returns at Specialized Micro-Lenders and Diversified Peers

Annualized Data for Six-Month Periods (Percent)

Panel A: Averages for Specialized Micro-Lenders				
Period	Return on Assets	σ_{ROA}	Return on Equity	σ_{ROE}
12/31/91	.63	.68	14.20	22.69
6/30/92	.90	.32	18.98	29.20
12/31/92	.94	1.16	17.34	27.82
6/30/93	1.21	1.31	16.30	18.24
12/31/93	1.55	.95	19.39	12.44
6/30/94	1.07	.41	13.04	4.85
12/31/94	1.53	.62	17.96	7.89
6/30/95	1.38	.59	15.99	6.53
12/31/95	1.31	.62	15.01	7.34
6/30/96	1.15	.57	14.07	6.83
Mean	1.17	.72	16.23	14.38

Panel B: Averages for Diversified Peers				
Period	Return on Assets	σ_{ROA}	Return on Equity	σ_{ROE}
12/31/91	.60	1.59	9.03	7.91
6/30/92	.91	.94	10.66	6.78
12/31/92	1.21	.48	12.97	5.00
6/30/93	1.40	.57	14.45	6.43
12/31/93	1.23	.54	12.32	6.24
6/30/94	1.30	.53	13.20	6.32
12/31/94	1.40	.49	14.26	6.90
6/30/95	1.42	.38	13.55	5.04
12/31/95	1.40	.44	13.02	5.49
6/30/96	1.45	.39	13.43	4.43
Mean	1.23	.63	12.69	6.05

Source: Author's calculations.

Risk and Return

The greater aggressiveness in all types of lending, the lower capital ratios, the lower credit quality, and the higher earnings at the micro-lenders are all indications that they have chosen a high-risk/high-return strategy relative to the diversified peers. This conclusion is supported by the data shown in Table 7, two measures of return for both groups of banks over the period studied. As shown in Tables 6 and 7, although the micro-lenders averaged higher ratios of operating income to assets, their after-tax return on assets was slightly below that of the diversified peers.¹⁶ Nevertheless, because of their lower ratios of equity to assets, the micro-lenders had higher average returns

on equity. Over the period studied, the micro-lenders had an average return on equity of 16.23 percent, compared to 12.69 percent for the diversified peers.

In addition to higher returns, the micro-lenders clearly outperformed the diversified peers in terms of growth. Over the five-year period from June 30, 1991 to June 30, 1996, the average micro-lender's assets grew at an average geometric rate of 11.86 percent per year, compared to 8.43 percent for the diversified peers. Although after-tax profit margins at the micro-lenders were not greater than at the diversified peers, the former achieved more rapid growth.

In addition to average levels of various revenue and expense ratios, Table 6 also shows the standard deviation of these ratios, an indicator of operating risk. The specialized micro-lenders experienced substantially higher volatility in net interest margin, non-interest income, non-interest expense, and provision for loan losses. This greater volatility in line items suggests a greater volatility in returns, shown in Table 7. The standard deviations of return on assets and return on equity at the specialized micro-lenders considerably exceed those of the diversified peers.

Greater volatility in the various categories of income and expense at the micro-lenders does not necessarily indicate a higher risk of insolvency, however. Greater volatility in particular revenue or expense items conceivably could be dampened by imperfectly correlated volatility in other items or offset by higher levels of capital or wider profit margins. The overall risk of failure will depend upon the interactions between the earning power of the bank as measured by its expected or "normal" profit margin, the potential magnitude of shocks to this profit margin, and the extent of the equity cushion available to absorb the unforeseen shocks. This interaction is captured in a risk index, Z ,¹⁷ defined as:

$$Z = (ROA + K)/s$$

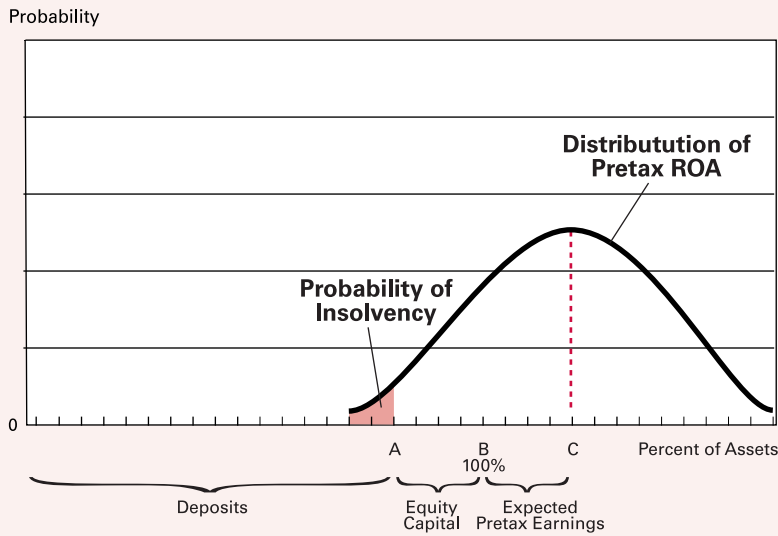
where ROA = the pretax return on assets, K = the ratio of equity capital to assets, and s = the standard deviation of pre-tax ROA . This Z statistic is a measure, expressed in units of standard deviation of ROA , of how much a bank's accounting earnings can decline before the bank exhausts its equity capital and becomes insolvent. Intuitively, the greater is Z , the

¹⁶ This difference is due to differences in securities gains and losses, extraordinary income, and effective tax rates.

¹⁷ This measure was developed by Hannan and Hanweck (1988). Although Hannan and Hanweck called the risk index "g", in subsequent work it has generally been called "Z".

Figure 2

The Determinants of the Probability of Insolvency



greater is the thickness of the equity cushion relative to the potential shock, and the lower is the likelihood of failure. While Z itself is an index of risk, it can also be used to calculate the probability of book value insolvency.¹⁸

The relationship between Z and the probability of book-value insolvency is shown graphically in Figure 2. The horizontal axis is denominated in terms of percent of total assets. The distance OA represents the ratio of deposits to assets, while the distance AB represents the ratio of equity to assets. Their sum, represented by OB, represents 100 percent of assets. The distance BC represents the expected pretax return

¹⁸ The one-period probability of insolvency is given by the equation $p = 1/(2[Z^2])$ (see Hannan and Hanweck 1988, pp. 204–5). This probability of insolvency will be accurate only to the extent that the distribution of potential ROAs is normal and to the extent that current ROA is a meaningful predictor of future ROA. Whether the assumption of normality is justified is yet unsettled, but it has been incorporated in prominent risk management tools such as Value at Risk and Morgan Guaranty’s Risk Metrics. Combining the assumption of normality with the Z-statistic to compute probabilities of insolvency has been widespread in academic studies. See Hannan and Hanweck (1988), Living and Savage (1990), McAllister and McManus (1992), Eisenbeis and Kwast (1991), Sinkey and Nash (1993), and Nash and Sinkey (1996). This one-period probability may understate the true probability of insolvency because it measures the risk of a single-period loss being so large it wipes out equity. In reality, insolvency often occurs after a sequence of smaller losses occurring over several periods. Thus serial correlation between negative shocks may exist.

on assets, approximated by the historical mean of pretax return on assets (ROA). The normal distribution with mean BC represents the potential variation in pretax ROA around the expected value. Book insolvency occurs when operating losses exceed the bank’s equity capital and is represented by the shaded area under the normal curve to the left of A on the horizontal axis. In graphic terms the Z-score is simply the distance AC divided by the standard deviation of the distribution of ROA, and represents the decline in pretax ROA, measured in units of the standard deviation of ROA, that can occur before insolvency follows. The greater the amount of equity capital and the higher pretax profit margins are relative to the variation in ROA, the smaller the probability of insolvency.

For each Z-score, there is a corresponding probability of book insolvency. As shown in Figure 3, the relationship between a bank’s Z-score and its probability of book-value insolvency is inverse, with higher

Figure 3

Probability of Insolvency and the Z-Score

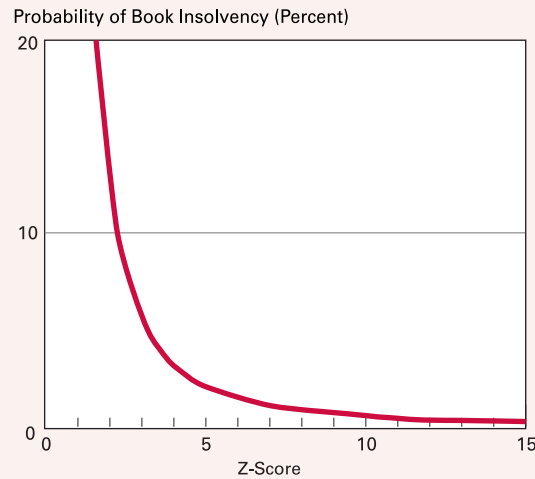


Table 8
“Typical” Z-Scores and Probabilities of Default for Specialized Micro-Lenders and Diversified Peers, December 31, 1991 to June 30, 1996
 Annualized Data for Six-Month Periods

Panel A: Averages for Specialized Micro-Lenders					
Date	Pretax ROA (%)	σ_{ROA}	Ratio of Equity to Assets (%)	Typical Z-Score	Probability of Insolvency (%)
12/31/91	1.34	1.03	7.52	8.60	.676
6/30/92	1.19	.64	7.61	13.75	.264
12/31/92	1.75	.94	7.77	10.13	.487
6/30/93	1.53	1.11	8.34	8.89	.632
12/31/93	2.34	.98	8.37	10.93	.419
6/30/94	1.72	.63	8.66	16.48	.184
12/31/94	2.54	.79	8.78	14.33	.243
6/30/95	2.35	1.08	8.97	10.48	.455
12/30/95	2.37	1.04	8.67	10.61	.444
6/30/96	2.04	.90	8.88	12.13	.340
Mean	1.92	.92	8.36	11.63	.414

Panel B: Averages for Diversified Peers					
Date	Pretax ROA (%)	σ_{ROA}	Ratio of Equity to Assets (%)	Typical Z-Score	Probability of Insolvency (%)
12/31/91	1.03	1.81	10.93	6.61	1.145
6/30/92	1.33	1.14	10.30	10.20	.480
12/31/92	1.83	.81	10.18	14.83	.227
6/30/93	1.93	.73	10.32	16.78	.177
12/31/93	1.79	.91	10.23	13.21	.286
6/30/94	1.85	.84	10.23	14.38	.242
12/31/94	2.08	.81	10.83	15.94	.197
6/30/95	2.08	.63	11.26	21.17	.111
12/30/95	2.07	.71	11.24	18.75	.142
6/30/96	2.14	.56	11.13	23.70	.089
Mean	1.81	.89	10.66	15.56	.310

Source: Author's calculations.

Z-scores corresponding to lower probabilities of insolvency. Moreover, the relationship is nonlinear, so that equal incremental improvements in Z result in smaller marginal declines in the probability of insolvency. For example, an improvement in the Z-score from 5.0 to 10.0 results in a decline in the probability of insolvency from 2.0 percent to 0.5 percent, a decline of 1.5 percentage points, while an equal improvement in the Z-score from 10.0 to 15.0 results in a decline in the probability of insolvency from 0.50 percent to 0.22 percent, or only 0.28 percentage points.

Table 8 presents average Z-scores and the corresponding average probability of insolvency for both the specialized micro-lenders and the diversified peers on a semi-annual basis for the period studied. The

data used to calculate the Z-scores are the averaged group data presented in Tables 4 and 5, and thus the Z-scores in Table 8 should be interpreted as depicting the average or typical bank in each group rather than an average of individual bank Z-scores.¹⁹

The typical Z-score for the diversified peers exceeded that of the specialized micro-lenders in 7 of the 10 periods, and over the five-year period the typical Z for the diversified peers averaged 15.56, compared to

¹⁹ The standard deviation of net income to assets is calculated from the cross-section distribution of returns. Because the banks within each group are fairly homogeneous, this distribution may be viewed as the distribution of random draws from the time series of distributions of the individual banks.

11.63 for the specialized micro-lenders. The generally higher Z-scores for the diversified peers translates directly into a lower typical probability of insolvency. Over the 10 periods, the typical diversified peer had an average probability of insolvency of 0.31 percent, compared to 0.41 percent for the typical specialized micro-lender. The slightly wider pre-tax profit margins at the specialized micro-lenders were not sufficient to offset their lower equity ratios and greater volatility of ROA, with the result that they had a somewhat higher probability of insolvency over the period.

Summary

While the number of specialized micro-lenders is small, their experience is consistent with and reinforces the findings of previous studies of specialized banks. Like the specialized banks analyzed in previous studies, the specialized micro-lenders have higher pre-tax returns than the diversified peers, and higher volatility in these returns. Higher pre-tax revenues are offset by higher levels of non-interest expense and provisions for loan losses. In addition the micro-lenders show higher growth rates, another way of realizing returns.

But where previous studies of specialized lenders showed them to hold higher ratios of capital to assets, the specialized micro-lenders actually hold less capital to assets than the diversified peers. One possible explanation for this difference lies in different funding structures. The nonbank subsidiaries analyzed by Liang and Savage (1990) and the credit card banks analyzed by Sinkey and Nash (1993, 1996) both rely upon external capital markets rather than insured deposits for the bulk of their funding. As a result they are required to hold capital sufficient to permit them to borrow in the capital markets. In contrast, the specialized micro-lenders are almost totally reliant upon local deposit markets. Their access to such markets is assured through their status as insured institutions, and thus their capital ratios are determined by regulatory requirements rather than market discipline.

The higher loan loss provision per dollar of loans at the micro-lenders is evidence that lending expertise is not the basis for their specialization. Similarly, the higher level of non-interest expense to assets indicates that scale economies are not a significant factor. Instead, the decision to specialize in commercial micro-lending appears to be a marketing-related strategy. By focusing on unmet needs for commercial micro-loans, the micro-lenders have been able to grow faster than

their diversified peers and thus to transcend the limitations imposed by their limited distribution systems and slow-growing local markets.

III. Specialization and Risk-Based Capital Requirements

Equity in a bank balance sheet acts as a cushion to absorb potential operating losses and thus protects both depositors and the Federal Deposit Insurance Corporation. As shown in the analysis of the micro-lenders, the amount of equity needed will depend on the potential size and probability of losses, so that banks with a high degree of risk in their asset portfolios will require greater proportions of equity than will banks with low risk portfolios. When regulators require the proportion of equity in a bank balance sheet to vary with the riskiness of the asset portfolio, the approach is referred to as risk-based capital.

Risk-Based Capital and the Basle Accord

Prior to 1988, bank capital requirements varied by country with respect to the ratios required and the assets included, and were often defined without regard to the riskiness of the assets concerned. In that year the Group of 10 countries established the "Basle Accord" on risk-based capital. The Basle agreement had two objectives: to establish international parity in bank capital requirements, and to make such requirements risk-based with respect to both on- and off-balance-sheet items. In the United States the Basle Accord was implemented in the FDIC Improvement Act of 1991 (FDICIA). Under FDICIA, a bank or bank holding company failing to meet specified levels of risk capital is subject to "prompt corrective action" by bank regulators.

The current calculation of risk-based capital for commercial banks first divides both on- and off-balance-sheet assets into four categories with different percentage weightings for risk. For example, Treasury bills receive a zero risk weighting, while commercial loans receive a 100 percent risk weighting. The required capital to back each asset is determined by multiplying the book value of the asset by the appropriate risk-weighting and then multiplying the resulting risk-weighted assets by 8 percent.²⁰ The re-

²⁰ The 8 percent capital requirement represents both Tier 1 and Tier 2 capital. Tier 1 capital is primarily common equity, while Tier 2 capital consists of loan loss reserves, preferred stock, and convert-

quired capital for the bank is simply the sum of the required capital for each asset class and the required capital ratio for the bank is a linear weighted average of individual product capital ratios.

The Basle Accord's concept of consistent risk-based capital requirements was a major step forward in international bank regulation, and implementation in the United States coincided with a substantial increase in average capital ratios in banking (Wall and Peterson 1995, 1996). But the Basle scheme of risk-based requirements has been criticized on several grounds. The risk categories are broad and somewhat arbitrary and no differentiation is made among high- and low-quality assets within the same risk category. Thus, a loan to a AAA-rated corporation requires the same capital as does a loan to a CCC-rated one. Nor is any consideration given to concentration within an asset class, so that a bank with a concentrated exposure to a highly cyclical industry faces the same requirements as one with a loan portfolio diversified across a broad range of industries.

Diversification and Risk-Based Capital

In addition to these issues of granularity in the requirements, another problem concerns the interactions between the different risk categories. By creating a structure in which the required capital for the bank is a weighted average of the required capital for each asset category, the Basle Accord makes an implicit assumption that the risk of the bank is a weighted average of the risks of the asset categories. But modern portfolio theory has established that this implicit assumption holds true only in the special case where the returns on each asset category are perfectly positively correlated with each other. That is, the risk of a portfolio can be expressed as:

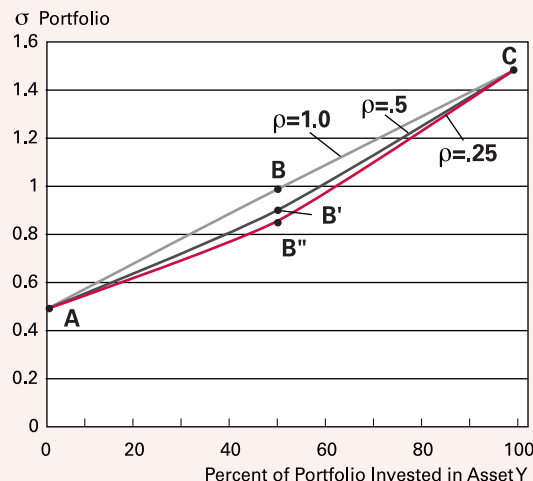
$$\sigma_{\text{port}}^2 = \sum w_i^2 \sigma_i^2 + \sum \sum w_i w_j \sigma_i \sigma_j \rho_{i,j}$$

where σ_{port}^2 = the variance of returns on the asset portfolio, w_i = the proportion of the portfolio invested in the i -th security, and $\rho_{i,j}$ = the coefficient of correlation of returns between the i -th and j -th security. In the simplest two-asset case, this can be written as:

ible and subordinate debt. Of the 8 percent requirement, at least half must be Tier 1 capital. See Davis and Lee (1997). In addition, banks must satisfy a leverage ratio of Tier I capital to average assets of 5 percent to be considered well capitalized. Because Tier I capital of the small banks discussed in Section II consists almost entirely of equity, the equity-to-assets ratios shown in Table 5 are tantamount to leverage ratios.

Figure 4

The Effect of Asset Return Correlation on Portfolio Risk



$$\sigma_{\text{port}}^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2w_1 w_2 \sigma_1 \sigma_2 \rho_{1,2}$$

Only in the case where the two asset categories are perfectly positively correlated will the risk of the portfolio reduce to:²¹

$$\sigma_{\text{port}} = w_1 \sigma_1 + w_2 \sigma_2$$

In reality, the returns on most assets are positively but imperfectly correlated. As a result, the assumption of perfect positive correlation implicit in the current risk-based capital requirements does not hold. The existence of imperfect correlation of asset returns implies that the risk of the bank's portfolio is less than the weighted average risks of the individual asset categories. Moreover, the risk of the portfolio declines as the degree of correlation between the asset categories lessens. This is shown in Figure 4 for a simple two-asset case. In Figure 4, asset X is low-risk/low-return, with a pretax return on assets of 1 percent and a standard deviation of returns of 0.5 percent. Asset Y is high-risk/high-return asset with an expected pretax return of 3.0 percent and a standard deviation of returns of 1.5 percent. The horizontal axis in Figure 4 shows the percentage of the portfolio invested in Y (and by implication, since the portfolio must be in-

²¹ For a proof, see Bodie, Kane, and Marcus (1993), p. 201.

Figure 5

The Effect of Asset Return Correlation on Required Capital

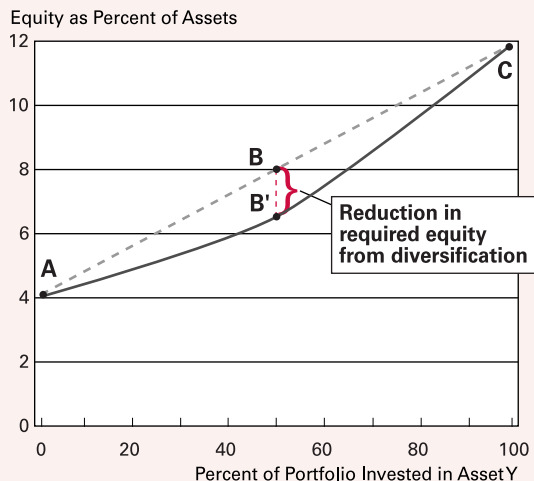
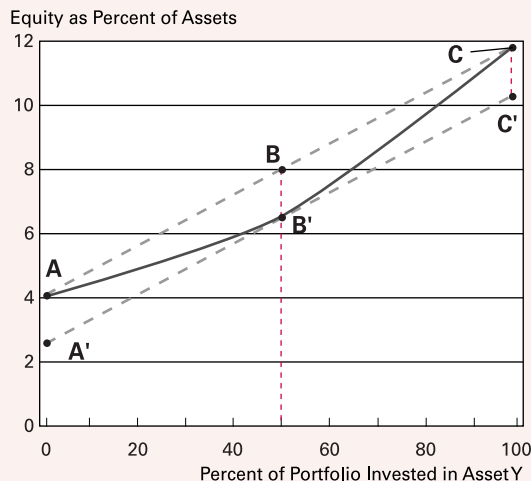


Figure 6

Alternative Regulatory Requirements



vested in one or the other, the percentage invested in X). Thus at point C, 100 percent of the portfolio is invested in Y and zero percent in X. At point A, zero percent of the portfolio is invested in Y and 100 percent in X, while at point B, the portfolio consists of 50 percent Y and 50 percent X.

The vertical axis shows the risk of the bank's portfolio, expressed as the standard deviation of pre-tax ROA for the portfolio. At C, since the portfolio consists of 100 percent Y, the bank's portfolio risk will simply be that of the underlying asset Y. At A, since the portfolio consists of 100 percent of X, the bank's portfolio risk will be that of the underlying asset X. However, at intermediate points where the bank holds both X and Y, the overall portfolio risk will depend upon the degree of correlation in the returns on X and Y. Figure 4 shows three such possibilities, for $\rho = 1.0$, for $\rho = 0.5$, and for $\rho = 0.25$. As can be seen, the bank's portfolio risk will be a weighted average of the risks on the individual assets only in the case where the returns are perfectly positively correlated, or where $\rho = 1$. As the degree of correlation between the assets declines, the risk of the portfolio declines. When $\rho = 1$, and the bank invests equal amounts in X and Y, the standard deviation of the portfolio will be 1.0 percent. But if $\rho = 0.5$, this declines to 0.90 percent, and if $\rho =$

0.25, portfolio risk is only 0.85 percent. Thus, if asset returns are less than perfectly correlated, diversification will result in a reduction in risk.

The effect of diversification on bank portfolio risk translates directly into the capital required, as shown in Figure 5. Figure 5 shows the equity capital necessary to achieve a Z score of 10, corresponding to a probability of insolvency of 0.5 percent, for two of the three bank portfolios shown in Figure 4, assuming correlation of returns between X and Y of $\rho = 1$ and $\rho = 0.25$. At A, where the bank specializes in X, it requires 4 percent equity capital to achieve a Z score of 10. At C, where it specializes in Y, the bank requires 12 percent equity capital to achieve the same Z score. For a diversified bank holding equal proportions of X and Y, the amount of capital required will once again depend on the degree of correlation between X and Y. If X and Y are perfectly positively correlated, then the bank will require 8 percent equity to assets to achieve a Z-score of 10, depicted by the point B. If, however, the coefficient of correlation between the asset returns is only 0.25, the bank will require only 6.5 percent equity to assets to achieve a Z score of 10, shown by the point B'. The difference between the two, or 1.5 percent, represents the reduction in required equity resulting from diversification.

Are Specialized Banks Undercapitalized?

Because asset returns are imperfectly correlated, more diversified banks need less capital than specialized ones. This creates a conundrum for regulators. If they implement risk-based capital requirements as envisioned in the Basle Accord, they cannot achieve an equal probability of insolvency across both diversified and specialized banks. This is shown in Figure 6, where the curve AC is identical to that shown in Figure 5 and represents the equity-to-asset ratio needed at various degrees of diversification to attain a constant probability of insolvency of 0.5 percent. Thus AC represents an iso-insolvency line. If the regulators set the capital requirements so as to ensure a probability of insolvency of 0.5 percent on the part of the specialized banks, then the required capital ratios for different portfolio mixes of X and Y will vary along the straight chord ABC. The problem, of course, is that if required capital is set to protect the specialized banks at A and C, then the diversified banks at B will be overcapitalized by the amount BB', the vertical difference between the chord ABC and the iso-insolvency curve AC.²²

Alternatively, by lowering the required capital ratio for each asset category, the regulators could set capital requirements so as to just adequately capitalize the average diversified bank. This would shift the chord ABC downwards to A'B'C' until it is just tangent to the iso-insolvency curve at B'. However, while the diversified banks at B' are now just adequately capitalized, the specialized banks at A and C are now undercapitalized, as shown by the vertical distances AA' and CC'.²³ Thus, implementing risk-based capital requirements according to the Basle Accord forces regulators to choose between adequately capitalizing specialized banks but overcapitalizing diversified ones, or adequately capitalizing diversified banks but undercapitalizing specialized ones. (The question of extending risk-based capital requirements to specialized nonbanks is discussed in Appendix 1.)

Although the empirical evidence indicates that specialized banks and nonbank subsidiaries tend to have higher probabilities of insolvency than diversified banks, this does not necessarily indicate that the

specialized institutions are undercapitalized, since higher probabilities of insolvency are also consistent with the diversified banks being overcapitalized. To identify which group of banks is either under- or overcapitalized, it is first necessary to determine regulatory objectives with respect to the probability of insolvency. That is, if bank regulators have adopted a policy target for the probability of insolvency of 0.5 percent and the specialized and diversified banks have on average a probability of insolvency of 0.8 and 0.5 percent respectively, then it is possible to conclude that regulators have decided to set risk-based capital requirements with respect to the diversified banks. If, on the other hand, specialized banks have on average a probability of insolvency of 0.5 percent while diversified banks have a probability of insolvency of 0.25 percent, then this suggests that regulators have chosen to set capital requirements with respect to the specialized banks.

Banking regulators have not articulated explicit policy targets for the probability of bank insolvencies, but recent actual rates of insolvencies may be indicative. Table 9 shows the annual number of commercial bank insolvencies over the 10-year period from 1987 through 1996 both in terms of absolute numbers and relative to the number of commercial banks operating at the beginning of each year. The failure rate has varied widely over the period, from 1.57 percent in 1989 to 0.05 percent in 1996. Over the 10-year period, the failure rate averaged 0.82 percent per year, but it was considerably lower in the last half of the period than in the first half. Indeed, between 1992 and 1996 the failure rate averaged only 0.32 percent, similar to the 0.31 percent average probability of insolvency for the typical bank in the diversified peer group over the same period.

It would not be surprising if regulators focused on diversified banks in formulating capital requirements. The number of diversified banks far exceeds the number of specialized ones. If regulators were to set risk-based capital requirements with respect to the relatively small number of specialized institutions, they would necessarily overcapitalize the diversified ones. To the extent banking markets were competitive, the overcapitalized banks would then find it difficult to generate sufficient earnings to achieve a competitive return on equity. Banks would then withdraw, until a lessening in competitive conditions resulted in widening margins and a more competitive return on equity.

Alternatively, if regulators set capital requirements so as to just adequately capitalize the diversified banks, then the specialized banks will be under-

²² The diversified banks will be overcapitalized in the sense that their probability of insolvency will be less than 0.5 percent.

²³ The specialized banks will be undercapitalized in the sense that their probability of insolvency will be greater than that of the diversified banks.

capitalized. But here it is important to distinguish between probability of insolvency and exposure. While the probability of insolvency may be higher for the specialized banks, mitigating factors may cause the social costs from the insolvency of one of these institutions to be small. Some types of specialized banks, such as the credit card banks, fund themselves primarily through borrowed funds obtained in the capital markets. The reliance upon external capital markets may lessen the exposure in two ways. First, such institutions will have relatively small amounts of insured deposits that represent a contingent claim upon the deposit insurance fund. Second, to the extent they rely on the capital markets for their funding, their capital ratios and probabilities of insolvency will be set by market forces rather than by regulators, so that economic capital will usually exceed required regulatory capital. Thus, the excess exposure is not the difference between the target probability of insolvency of the regulators and that associated with the regulatory risk-based capital requirements, but that between the regulatory target and the probability of insolvency associated with economic risk-based capital.

The specialized micro-lenders analyzed above are a different case. These institutions are funded predominantly from insured deposits, and thus represent a greater exposure to the deposit insurance fund. Moreover, unlike other specialized institutions, they are not subject to market discipline which would impose higher capital ratios than those required by the regulators. Indeed, as noted above, the specialized micro-lenders have capital ratios below their diversified peers. However, the small number of these institutions and their small average size mean that this exposure is also small. As of June 30, 1996, the 14 specialized micro-lenders studied here had aggregate total assets of \$767 million. Because the liability structure of the micro-lenders other than equity consists almost entirely of insured deposits, the marginal exposure of the deposit insurance fund resulting from the higher probability of insolvency for these banks is the "excess" probability of insolvency times the aggregate assets of the banks times the expected loss rate on assets if insolvency should occur.²⁴ For the specialized micro-lenders as a group this excess exposure is

²⁴ The excess probability of insolvency is defined as the probability of insolvency less the regulatory target rate of insolvency. For the specialized micro-lenders it is assumed to be 0.41 percent minus 0.31 percent, or 0.10 percent.

Table 9
Failure Rates at Insured Commercial Banks, 1987 to 1996

Year	Number of Failed Banks	Number of Commercial Banks	Failure Rate (%)
1996	5	9,941	.050
1995	6	10,450	.057
1994	13	10,957	.119
1993	41	11,449	.358
1992	120	11,926	1.006
1991	124	12,345	1.004
1990	168	12,712	1.321
1989	206	13,137	1.568
1988	200	13,722	1.457
1987	184	14,209	1.295
		Mean 1987–1996	.824
		Mean 1992–1996	.318
		Mean 1987–1991	1.329

Source: Federal Deposit Insurance Corporation.

only \$138,000.²⁵ Given the important role these specialized micro-lenders play in the economic development of their local market areas, one could conceivably argue that they generate positive externalities that offset the excess potential loss to the deposit insurance fund.

IV. Conclusion

As a result of the relaxation of regulatory restraints on geographic and product competition, the availability of new technologies at falling prices, and changing customer preferences, banking is undergoing a far-reaching restructuring, culminating in wide-spread consolidation. As shown in Table 9, the number of commercial banks declined by 30 percent over the 10 years from 1987 to 1996. Banks of all sizes, but especially smaller ones, are under intense competitive pressure. One generic strategic response to increased competitive pressure is to differentiate oneself from the competition by specializing in a particular niche. As a result, there appears to be an increasing trend towards specialization by banks, discussed in Appen-

²⁵ The excess exposure would be $.001 \times \$767 \text{ million} \times .18 = \$138,000$, where .18 represents the average loss per dollar of assets of insolvent banks experienced by the FDIC over the 10-year period from 1986 to 1995. This represents a maximum exposure under the assumption that all the deposits of the banks are insured. To the extent some deposits are uninsured, the exposure will be lessened.

dix 2, "Is Specialization a Viable Strategy?" Although the number of specialized banks is still small, they are likely to become more prevalent.

The growing number of specialized banks creates an issue for regulators regarding the efficacy of current regulatory risk-based capital requirements. The current conceptual approach to regulatory capital requirements, embodied in the Basle Accord, does not adequately differentiate between specialized and diversified banks and forces regulators to choose between undercapitalizing specialized banks or overcapitalizing diversified ones. If, as seems likely, regulators have chosen to set regulatory capital requirements to adequately capitalize the far larger number of diversified banks, then specialized banks as a class will be undercapitalized, in the sense that they will have a higher probability of insolvency even after their higher levels of capital are taken into account.

An important distinction must be made between larger specialized banks dependent on the capital

markets for funding and smaller ones dependent on local deposit markets. In order to maintain access to funding, the larger banks must maintain sufficient equity to permit them to borrow in the capital markets. Although previous studies indicate that these large institutions still have a higher probability of insolvency, the influence of the market is to mitigate the undercapitalization associated with regulatory risk-based capital. In contrast, the smaller specialized banks are dependent on local deposit markets for funding and are guaranteed access to such markets because of their status as insured institutions. In such cases there is no mitigating influence from the private capital markets. While at present the number of specialized banks is small, it is increasing, and consideration should be given to modifying the current risk-based capital requirements to address the differences between specialized and diversified banks.

Appendix 1:

Should Risk-Based Capital Requirements Be Extended to Specialized Nonbanks?

In considering whether to extend regulatory risk-based capital requirements to specialized nonbanks, it is important to distinguish between economic and regulatory risk capital.²⁶ Economic risk capital is defined as the amount of equity capital required by private investors to persuade them to invest in the debt and equity of the financial intermediary. Economic risk capital reflects an evaluation by private investors of the risks of the individual components of the asset portfolio and the covariances among them, as well as other forms of risk such as market and business risk. Given a certain risk profile, the amount of economic risk capital will vary with the probability of insolvency that shareholders and other funds providers will accept. As conceived in the Basle Accord, regulatory risk capital considers primarily asset risk and does not take into account either the covariances among the assets or other forms of risk. Presumably regulators set capital requirements to achieve some target rate of insolvency.

Because they are calculated on the basis of different risks and only economic capital takes into account interrelationships among these risks, regulatory and economic risk capital may differ, even if management, capital markets, and the regulators all agree on the appropriate probability of

insolvency. But economic and regulatory capital can also differ if regulators and investors have different targets with respect to the probability of insolvency.

Historically, at least in banking and insurance, it can be argued that regulators have had a lower tolerance for insolvency than have private investors. The latter calculate required economic capital by balancing private risk and return, comparing the probability and private costs of insolvency against the decline in return at different levels of equity capital. Regulators, on the other hand, consider total costs associated with insolvency, which include externalities or social costs. To the extent insolvencies result in negative externalities, the social costs will exceed the private ones. In banking, these negative externalities include disruptions in local business markets, claims on the deposit insurance fund, and contagion effects culminating in banking runs and financial panics. Because bank regulators focus on these social externalities as well as the purely private costs associated with insolvency, they are likely to have a lower tolerance for insolvency than private investors (Gorton and Winton 1996). The existence of these negative externalities has resulted in banking being accorded a special status among financial intermediaries. As a result, commercial banks have been extensively regulated while nonbanks holding similar assets, such as mortgage banks and finance and leasing companies, have not.

Should regulatory risk-based capital requirements be extended to nonbanks?²⁷ One argument for doing so is to

²⁶ The distinction was first articulated by Merton and Perold (1995).

²⁷ Currently in the United States, in addition to commercial banks and thrift institutions, both insurance companies and broker/dealers are subject to risk-based capital requirements. Because they

achieve competitive equity. That is, if commercial banks are required to achieve a lower probability of insolvency than nonbanks, then the former will hold more equity capital and have a higher weighted average cost of funds than the unregulated intermediaries. The higher cost of funds imposed by the regulation will result in either the banks earning a lower and noncompetitive rate of return or, alternatively, a gradual loss of market share to the unregulated institutions. Extending regulatory risk-based capital requirements to nonbanks creates a "level playing-field."

But this argument for competitive equity is flawed. If, as

are regulated at the state level, uniform capital requirements for life insurance companies are set by the National Association of Insurance Commissioners. These requirements equal a prescribed proportion of a company's investment in various assets, a proportion which varies by type and rating of the asset. Thus they are conceptually similar to the Basle Accord (see Kopcke 1995). Net capital requirements for broker/dealers are set by the Securities and Exchange Commission. Broker/dealers are required to maintain a minimum ratio of net capital to dealer indebtedness, where the latter is essentially equivalent to all monetary liabilities of the broker/dealer. Net capital is computed as net worth less certain adjustments. One of these adjustments is to impose "haircuts" or a reduction in value on certain assets held in the broker/dealer's house accounts. The amount of this haircut varies with the type of asset. The effect of the "haircut" is to cause firms which trade for their own accounts to provide more equity to meet the capital requirement. Covariances in returns across asset categories are not taken into account in determining the adjustments to net worth.

In Europe, uniform risk-based capital requirements have been imposed on both banks and nonbanks as part of the "Single European Market" legislation promulgated by the European Union (see Hall 1996).

Appendix 2:

Is Specialization a Viable Strategy?

Specialization, like low-cost production, is a classic response to increasing competitive pressure. Given the rapidly changing structure of U.S. banking over the past 10 years, it is instructive to determine if specialization is becoming more or less prevalent. If it is becoming more prevalent, it would be *prima facie* evidence that specialization is a viable strategic response.

On the other hand, if specialization is becoming less prevalent, not only would it cast doubt on the viability of specialization as a strategic response, but it would also cast doubt on time series studies of specialized banks, since such studies would suffer from survivorship bias.

At first glance, specialized micro-lending does not appear to be a successful strategy. Table A-1 shows the numbers of banks with high proportions of micro-loans since June 30, 1993, the first date on which data on loans by size of loan were collected. As shown there, the number of micro-lenders with more than 40 percent of assets in micro-

argued in the previous section, regulatory risk-based capital requirements are set with respect to the diversified banks, then they will undercapitalize specialized institutions. Since most nonbanks hold specialized asset portfolios, the extension of the current regulatory risk-based capital requirements is unlikely to result in binding requirements. That is, economic risk-based capital for specialized institutions, even incorporating higher private probabilities of insolvency, is likely to exceed regulatory risk-based capital ratios. This explains, for example, why credit card banks simultaneously have both higher capital ratios and higher probabilities of default than diversified banks (Sinkey and Nash 1993; Nash and Sinkey 1996).

Of course, one could achieve the same probabilities of insolvency across both banks and specialized nonbanks by imposing separate and higher requirements on the specialized nonbanks. But the difference in appropriate probabilities of insolvency between diversified banks and specialized nonbanks is due to the negative social externalities resulting from bank insolvencies. Unless it can be shown that failures of specialized nonbanks will result in similar negative social externalities, the imposition of public rather than private insolvency rates is equivalent to imposing a tax on the nonbank institutions. And ultimately it is not clear that commercial banks are at a competitive disadvantage due to the lower probabilities of insolvency imposed upon them as regulated institutions. Because they offer federally insured deposits, banks can raise funds at more advantageous rates than can nonbanks. Thus, the higher cost of funding resulting from regulatory-imposed capital requirements is at least partially matched by the lower cost of insured deposits. While commercial banks may be losing market share to nonbanks, it is unclear that the cause is differential capital requirements that need to be addressed by extending risk-based capital requirements to nonbanks.

loans declined sharply over the period from 1993 to 1996. This same pattern appear also for banks with levels of micro-loans less than the 40 percent criterion used to define specialized banks for this study. Does this decline indicate that specialized micro-lending is not a viable strategy?

First, most of the decline in the number of micro-lenders occurs during the period from June 30, 1993 to June 30, 1994, and may be due to reporting errors rather than reflect an actual decline in the number of micro-lenders. June 30, 1993 was the first date on which banks were required to report the number and dollar volume of loans by size, and it appears that the incidence of reporting errors was significantly higher than normal. As a result, the decline from June 30, 1993 to June 30, 1994 may reflect correction of errors made on the June 30, 1993 call reports.

If we disregard the data for June 30, 1993 as unreliable, then the decline in the number of micro-lenders from June 30, 1994 to June 30, 1996 is much less. As shown in Table A-2, if the changes in the number of banks in each category are broken down by the source of the change, one-half of the decline is due to mergers or failures. If the banks that exited through mergers or failure are disregarded for the

Table A-1
Banks Making Micro-Loans, 1993 to 1996

Micro-Loans to Assets	Number of Banks			
	June 30, 1993	June 30, 1994	June 30, 1995	June 30, 1996
Over 40 percent	96	45	35	27
35 to 40 percent	101	31	35	36
30 to 35 percent	204	99	88	88
Over 30 percent	401	175	158	151
Under 30 percent	10,796	10,545	10,012	9,538

Source: Call reports.

moment, then the number of micro-lenders with micro-loans greater than 30 percent of assets declined by about 8 percent over the two-year period from June 30, 1994 to June 30, 1996. This decline, while significant, is probably not substantial enough or sustained over a long enough period to justify any conclusions concerning the viability

Table A-2
Changes among Specialized Micro-Lenders, 1994 to 1996

Micro-Loans to Assets	Number of Banks	
	1994 to 1995	1995 to 1996
<i>More than 40 percent</i>		
Beginning of period	45	35
Net migration ^a	(9)	(7)
Mergers	0	(1)
Failures	(1)	0
End of Period	35	27
<i>35 to 40 percent</i>		
Beginning of period	31	35
Net migration ^a	6	2
Mergers	(2)	(1)
Failures	0	0
End of period	35	36
<i>30 to 35 percent</i>		
Beginning of period	99	88
Net migration ^a	(7)	3
Mergers	(4)	(3)
Failures	0	0
End of period	88	88

^aMovement among categories of banks.

Source: Call reports.

Table A-3
Exit Rates of Commercial Banks, 1994 to 1996

Micro-Loans/Assets	Number of Banks, June 30, 1994	Number Merged/Failed, June 30, 1994-1996	Exit Rate
35 to 40 percent	31	3	9.7%
30 to 35 percent	99	7	7.1%
More than 30 percent	175	12	6.8%
Under 30 percent	10,720	1,007	9.5%

Source: Call reports.

of specialized micro-lending as a business strategy. Migration among categories of banks as the proportion of micro-loans to assets changes is substantial, and the 8 percent decline from 1994 to 1996 may simply reflect random events or cyclical trends.

In addition to the 12 banks that de-emphasized micro-lending, another 11 merged and one failed during the two-year period from June 30, 1994 to June 30, 1996. Is this exit rate normal? If a larger proportion of micro-lenders are acquired or fail, then this might be interpreted as evidence that specialized micro-lending is not a viable strategy.

Overall, it appears that the micro-lenders actually had comparable or lower exit rates than did non-micro-lenders. Table A-3 compares merger/failure rates over the 1994-96

Table A-4
Number of Specialized Banks, 1993 to 1997^a

Specialty	As of June 30				Percent Change, 1993-96
	1993	1994	1995	1996	
Construction and Land Development	2	3	2	1	(50)
Commercial Real Estate	45	52	56	60	33
Credit Cards	60	62	72	73	22
Lease Financing	2	1	3	1	(50)
Agriculture	273	380	371	314	15
Total, Specialized Banks	382	490	504	449	17
All Banks	11,197	10,720	10,170	9,689	(13)

^aA bank is considered specialized if a particular category of loans accounts for more than 40 percent of assets.

Source: Call reports.

period for banks with high proportions of micro-loans and all other banks. As can be seen there, only 4.4 percent of banks with more than 40 percent of assets in micro-loans and only 6.8 percent of banks with more than 30 percent of assets in micro-loans merged or failed, compared to 9.5 percent of all other banks. Thus the micro-lenders would appear to have a lower exit rate than other banks.

Overall, the evidence on the viability of specialized micro-lending is mixed. While the micro-lenders appear to have a lower exit rate associated with mergers/failures, the overall exit rate, from both mergers/failures and de-emphasis of micro-lending, is somewhat higher than the exit rate for other banks. Over the two-year period from 1994 to 1996, about 13.7 percent of the micro-lenders merged, failed, or de-emphasized micro-lending.

The trend becomes somewhat clearer if we look at other types of specialization. Table A-4 shows the number of specialized banks over the period from 1993 to 1996 by the type of specialized lending engaged in. Although there is considerable variation in individual categories as banks migrate back and forth over the 40 percent line, the general trend is upward, especially if only the three categories with the largest number of banks (agricultural lending, credit cards, and commercial real estate) are considered. The trend towards specialization is even clearer if we compare the specialized banks with all banks. Over the three-year period from 1993 to 1996, the total number of specialized banks (other than micro-lenders) increased by 17 percent, while the total number of banks declined by 13 percent. Thus, there appears to be a moderate trend toward increased specialization.

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