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An analysis of commercial bank participation in the Farmer Mac II loan sale program

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An analysis of commercial bank participation

in the Farmer Mac II loan sale program

by

Charles Edgar Murray

A dissertation submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Economics

Major Professor: Robert William Jolly

Iowa State University

Ames, Iowa

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Graduate College
Iowa State University

This is to certify that the Doctoral dissertation of

Charles Edgar Murray

has met the dissertation requirements of Iowa State University

Signature was redacted for privacy.

Major Professor

Signature was redacted for privacy.

For the Major Program

Signature was redacted for privacy.

For the Graduate College

To

My wife, Aiko

My children, Sophia and Thorstein

Zachary

My parents, Philip and Marian

and my teachers

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ABSTRACT

This dissertation's objective was to provide a descrip-
tive and empirical analysis of commercial bank participation
in the Farmer Mac II loan sale program for guaranteed portions
of U.S. Department of Agriculture (USDA) Guaranteed Farm Loan
Program loans sponsored by the Federal Agricultural Mortgage
Corporation (Farmer Mac). The descriptive analysis summarizes
reasons for participation cited by bankers responding to a
series of survey questions. Participants indicate the follow-
ing factors as important in their decision to sell loans:
enhanced liquidity, improved profitability, reduced interest
rate risk, added capacity to meet heavy USDA guaranteed loan
demand, and ability to pass on better loan rates and terms to
their borrowers. Nonparticipants say loan sales are unneces-
sary because of weak USDA guaranteed and overall loan demand,
sufficient deposit and capital levels to fund USDA guaranteed
loans, and a preference to hold the loans they originate. In
general, they do not sell guarantees to buyers other than
Farmer Mac. The empirical analysis uses a logit regression
analysis to predict the probability of a commercial bank
participating and to identify the factors useful in making
that prediction. Five models are estimated. The first deter-

mines the probability of a bank selling any type of USDA guarantee to Farmer Mac, be it a newly originated Farm Owner- ship (FO) or Operating Loan (OL) loan or a "seasoned" FO or OL loan. The other estimations look at participation by each loan type. Experience selling loans into other secondary markets always has a large positive effect on the probability of participating. Banks that hold a larger volume of USDA guaranteed loans in their portfolio also have a greater chance of participating in each estimation. Greater USDA guaranteed FO and OL loan demand and reduced competition among USDA FO and OL guarantee lenders increase the probability of selling new originations. These two variables are less effective in distinguishing between banks that sell "seasoned" loans and those that do not. No rule of thumb applies for the other independent variables' effects on the probability of selling newly originated or "seasoned" FO or OL loans. The reasons for selling FO and OL loans appear quite different aside from the variables discussed above.

INTRODUCTION

Congress created the Federal Agricultural Mortgage Corporation (Farmer Mac) with passage of the Agricultural Credit Act of 1987 (Pub. L. 100-233; 101 Stat. 1686). The stated purpose of this legislation was to improve the availability of mortgage credit to America's farmers, ranchers and rural homeowners, businesses and communities by establishing and maintaining a secondary market for agricultural real estate and rural housing loans. The legislation was somewhat controversial. Some policy makers and bankers argued that Farmer Mac was needed because small rural agricultural banks that relied heavily on deposits to make loans did not have the capital or liability structure necessary to fund long-term fixed-rate farm mortgages--exactly the type of farm ownership financing that farmers would have found beneficial during the farm financial crisis. Critics claimed that Farmer Mac was not needed; rather, they believed it was a misguided gift to bankers in exchange for the federal bailout of their major agricultural lending competitor, the Farm Credit System (FCS) (Hiemstra et al. 1988).

As initially structured, Farmer Mac faced insurmountable difficulties in fulfilling its purpose. The structure severe-

ly limited Farmer Mac's activities in order to shield taxpay-
ers from potential losses. As originally conceived, Farmer
Mac was supposed to create an additional source of long-term
fixed-rate funds by just guaranteeing the timely payment of
principal and interest of securities backed by pools of quali-
fied farm land and rural home loans. Farmer Mac was not
authorized to issue its own debt and use the funds to purchase
loans to hold in its own portfolio (i.e., pool loans), or
issue its own asset-backed securities (i.e., securitize
loans); these functions would have to be performed by a third
party. Furthermore, as initially structured, the Farmer Mac
guarantee on the loan-backed security became valid only after
losses equal to 10 percent of a pool's principal were absorbed
by the pooler, originators or investors. Finally, the loans
pooled to back the security had to meet certain diversifica-
tion requirements; in particular, a pool could not include a
high concentration of loans with respect to any particular
commodity or geographic area (Feldman 1996).

Farmer Mac was quick to ready itself for business.
However, once its doors opened, the authorization limitations
outlined above severely retarded business development. Farmer
Mac needed to generate some sorely needed business, and soon.

The legislation that created Farmer Mac (Agricultural
Credit Act of 1987) also gave the Secretary of Agriculture the
authority to create a secondary market for the guaranteed
portions of Farmers Home Administration (FmHA) guaranteed

loans (Pub. L. 100-233; 101 Stat. 1707). This part of the 1987 Act was in large part a response to a directional change in agricultural policy initiated by the Reagan administration (Sullivan and Herr 1990).

Specifically, future efforts to provide federal financial assistance to farmers would emphasize guaranteeing FmHA loans originated and serviced by commercial sources. Funding authorities for credit extended directly by the FmHA would be drastically reduced. A secondary market in FmHA guaranteed loans would allegedly give small rural banks with limited resources and access to capital markets the liquidity required to meet their guaranteed borrowers' needs without necessitating a reshuffling of lenders' existing portfolios. The new policy direction was aimed at increasing efficiency while maintaining adequate credit supplies--the government would leave banking to the bankers and farmers would retain access to financial assistance.

Farmer Mac seemed to be the logical home for such a program, based on its "readiness to do business" (Olson and Clark 1991). In 1990, Farmer Mac's authority was expanded by the Food and Agricultural Act of 1990 (Pub. L. 101-624; 104 Stat. 3834) to include the purchase and securitization of guaranteed portions of FmHA guaranteed loans. The original secondary market (the market for conventional loans) was coined "Farmer Mac I" and the latter secondary market for FmHA guaranteed loans was dubbed "Farmer Mac II."

The program structure of Farmer Mac II was not as problematic as that of Farmer Mac I. Under the new program, Farmer Mac could buy guaranteed portions of FmHA loans directly from originators as well as issue its own guaranteed asset-backed securities. The nature of the loans to be pooled and securitized--guaranteed portions of FmHA guaranteed loans--made it unnecessary for the security to have a subordinated interest or for loan pools to have complex diversification requirements. This program, more so than Farmer Mac I, was designed in such a way that it could serve its intended purpose.

The question that came to mind was: Would it work? The answer seemed to depend on the size of the FmHA guarantee market and whether lenders would have an incentive to use Farmer Mac II. These two issues are paramount for the following reasons: (1) banks must originate FmHA guaranteed loans if there are any to be sold and (2) banks must sell a sufficient number of their FmHA guaranteed loans for a viable secondary market in these loans to exist.

Currently, somewhat over $6.5 billion in USDA guaranteed loans[1] remain outstanding. The volume of USDA guaranteed lending obligations has increased modestly over the past

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[1]The Federal Crop Insurance Reform and Department of Agricultural Reorganization Act of 1994 (P.L. 103-354) established the Farm Service Agency (FSA) under the United States Department of Agriculture (USDA) and dissolved the Farmers Home Administration (FmHA). What used to be called FmHA guaranteed loans are now referred to simply as USDA guaranteed loans.

decade. However, after reaching a peak of nearly $2 billion in 1995, USDA guaranteed obligations in fiscal 1997 were the lowest since fiscal 1991 (the same year Farmer Mac II opened its doors for business). In fact, the USDA guaranteed Operating Loan program obligation (actual lending) of $1 billion for 1997 was about half of what was authorized (USDA 1998). One explanation for the recent decline is an improving farm economy; a second rests on stricter lending rules imposed as a result of the passage of the Federal Agricultural Improvement and Reform Act of 1996 or FAIR Act (Pub. L. 104-127; 110 Stat. 888). Regardless, there does appear to be a sufficient volume of guaranteed loans available to sustain an adequate level of business activity for Farmer Mac II to succeed.

Of course, Farmer Mac's ability to penetrate this market depends on whether guaranteed lenders utilize the program. Bankers travel a myriad of paths in their pursuit of profit and employ numerous tools in their management of risk. For instance, why would a lender sell a USDA guaranteed loan with a healthy net interest margin to retain only a servicing fee? He might if he could repeat the process or if it was a loan he would not ordinarily originate to hold in his portfolio. On the other hand, he might not if his bank had sufficient liquidity and capital to fund his desired portfolio holdings.

Farmer Mac II has been open for business since 1991. Its cumulative loan sale volume as of April 30, 1998, was $413 million, of which over $300 million is outstanding. The loan

sale program includes 348 lenders spanning 42 states, with participants concentrated in the midwest (Farmer Mac 1997).

The numbers provided above, although growing yearly, require a context. A total of 348 lenders have participated in Farmer Mac II; yet nationwide, there are over 6,000 banks that make USDA guaranteed loans. Farmer Mac II has over $300 million in outstanding volume; however, the total outstanding volume of USDA guaranteed debt is greater than $6.5 billion. To its credit, Farmer Mac II has had some success; clearly, its share of this market is modest.

In contrast, the SLM Holding Corporation, better known as Sallie Mae, purchased and securitized over $9 billion in guaranteed student loans in 1997. This represents nearly half of the over $20 billion in guaranteed student loans originated that year (SLM Holding Corporation 1997). For further comparison, the Small Business Administration (SBA) secondary market loan sale program for SBA guarantees buys roughly $3 billion of the $10 billion in new SBA guaranteed originations each year. An additional $1 billion per year of seasoned loans is purchased from the pool of almost $30 billion in SBA guaranteed loans outstanding (SBA 1998). Plainly, Farmer Mac has not achieved the level of success its close relatives have.

Farmer Mac is aware of the reasons for its slow development. It claims that its limited market penetration into the USDA guaranteed loan market (and the market for conventional agricultural real estate credit) is attributable to the his-

torical preference of lenders to retain loans in their portfolios, the real or perceived excess liquidity of many agricultural lenders, the reluctance of many lenders to offer intermediate-term adjustable rate and long-term fixed-rate real estate loans as a result of the higher profitability associated with shorter-term lending, and the lack of borrower demand for longer-term credit due to the lower interest rates offered on shorter-term debt (Farmer Mac 1996). Farmer Mac also realizes that it must compete with other third parties to purchase USDA guaranteed loans.

The question that this dissertation will address is this: What are the compelling internal and external economic forces that underlie a risk-averse profit maximizing commercial bank's decision to participate in the Farmer Mac II loan sale program for guaranteed portions of USDA Guaranteed Farm Loan Program loans? Do banks sell USDA guaranteed loans to enhance portfolio liquidity? To service heavy USDA guaranteed loan demand? To offer their USDA guaranteed loan customers better rates and terms? An understanding of what factors prompt banks to sell loans will provide insight into whether Farmer Mac might ever garner a larger share of the outstanding USDA guaranteed loan volume. Furthermore, it can be ascertained whether banks using the program have the characteristics that policy makers believed necessitated the creation of the secondary market in the first place.

Dissertation Organization

The first three chapters discuss agricultural credit markets, Farmer Mac II, and securitization. Chapter 1 provides an overview of the structure of the U.S. agricultural credit market, the characteristics and performance of its of commercial lending institutions, and a brief history of the Farm Service Agency (FSA) followed by a characterization of USDA lending.

Chapter 2 describes the genesis of the Farmer Mac II loan sale program, explains how it works, and discusses its development and future prospects. Chapter 3 reviews the theoretical reasons for securitization and previous empirical findings. The focus is on securitization's advantages from a bank's perspective.

Chapter 4 develops a simple model of banking behavior that suggests a number of testable hypotheses regarding secondary market participation. The model analyzes the portfolio allocation decision of a risk-averse profit maximizing bank that enjoys some degree of market power in lending.

Chapter 5 outlines a preliminary specification of the research design. It begins by summarizing and formalizing the hypotheses originating from the model and literature. Next, it describes how and where the data to be used in the analyses were collected. Finally, it details the methods of inquiry that will be employed to perform the analyses.

Chapter 6 contains a descriptive analysis of commercial

bank participation in the Farmer Mac II secondary market. The descriptive analysis is based on bankers' responses to a series of survey questions which ask the degree to which various factors are relevant in their decision to participate or not participate in Farmer Mac II.

Chapter 7 estimates a number of logit models to test the hypotheses outlined in Chapter 5. Each logit model predicts the probability of a bank participating in Farmer Mac II based on a given set of characteristics. More than one model is fitted so that participation with respect to different types of USDA guaranteed loans can be studied using different ex-planatory variables.

Chapter 8 includes concluding remarks.

CHAPTER 1

THE U.S. AGRICULTURAL CREDIT MARKET

The primary concern of this paper is whether banks have the incentive to participate in the relatively new Farmer Mac II secondary market. Since, the incentive to participate is not independent of the institutional framework and economic environment a bank operates in, to understand Farmer Mac II, it is necessary in this chapter to: (1) review the structure and characteristics of the U.S. agricultural credit market, (2) discuss the characteristics and performance of the market's private lenders, and (3) trace the history and review the characteristics of USDA lending. Discussion of Farmer Mac and the Farmer Mac II loan sale program will be postponed until Chapter 2.

U.S. Agricultural Credit Market Structure and Characteristics

Total farm business debt at year-end 1997 was estimated at $162.2 billion. This figure represents roughly 84 percent of the amount outstanding in 1984--the year total farm debt peaked (USDA 1998).

The agricultural debt market is primarily regulated by the laws of supply and demand. Farmers require credit to fi-

nance the purchase of land; construct and improve buildings; purchase livestock and feed; acquire and maintain equipment; buy seed, fertilizer, pesticide, and herbicide; and obtain other supplies or services needed to maintain a viable agricultural production operation. The supply of credit is provided by an array of institutions and methods.

Historically, the external provision of farm credit (aside from farmers' own sources) has not been supplied by what is termed direct finance--that is, the direct purchase of debt or equity securities by the saver. Rather, farm credit, like small business credit, is largely provided by financial institutions involved in what is called indirect finance. These institutions--such as commercial banks, the Farm Credit System (FCS), and insurance companies--intermediate the flow of funds between borrowers and savers and account for the lion's share of all funding to agriculture.

Sometimes farmers, whether they be beginning farmers who have insufficient net worth or established farmers who have suffered a financial setback from a natural disaster or some other misfortune, are unable to obtain private credit. Such farmers can turn to the Farm Service Agency (FSA) for assistance. The FSA, a federal agency housed under the United States Department of Agriculture (USDA), administers direct and guaranteed farm loan programs. The FSA's farm loan programs essentially replace the farm credit programs administered by the now defunct Farmers Home Administration (FmHA).

The following pages discuss the agricultural credit market volume and its distribution among the various lending institutions, highlighting any relevant trends. Then, in turn, each institution's characteristics and condition will be examined.

Total farm business debt and distribution

Table 1.1 shows total farm business debt and the percentage of the total debt held by each lender. From 1979 through the early 1980s, total farm debt continued to increase--reaching a peak in 1984 of $194 billion. The earlier trend of greater debt loads was reversed in the latter part of the 1980s by the onset of the farm financial crisis. Farm borrowing behavior in the early 1990s more or less mimicked that of the latter 1980s. However, by 1997, total farm business debt had come full-circle and returned to its 1980 level of roughly $160 billion. Indications are that total farm debt is expected to expand at a moderate pace in the near future (USDA 1998).

Although total debt by 1997 had returned to its 1980 level, the percentage distribution of total debt among lenders experienced permanent changes. During the period under consideration, commercial banks expanded their market share at the expense of the Farm Credit System (FCS), Farm Service Agency (FSA), and individuals. The FCS, life insurance companies, and "individuals and others" share of debt has largely

Table 1.1. Total farm business debt

Year	Total debt[1]	Comm. banks[2]	Farm Credit System	Farm Service Agency	Life ins. co.	Indiv. and others[3]
1979	$151.6	24.5%	29.9%	9.5%	7.4%	28.6%
1980	166.8	22.6	31.8	10.5	7.2	28.0
1981	182.4	21.3	33.8	11.4	6.7	26.9
1982	188.8	22.2	34.0	11.3	6.3	26.3
1983	191.1	23.8	33.3	11.2	6.1	25.6
1984	193.8	24.4	33.4	12.0	6.1	24.1
1985	177.6	25.0	31.6	13.8	6.3	23.2
1986	157.0	26.5	29.2	15.4	6.6	22.3
1987	144.4	28.5	27.7	16.3	6.5	21.0
1988	139.6	30.6	26.7	15.7	6.5	20.5
1989	138.0	32.6	26.4	13.8	6.6	20.5
1990	139.2	34.5	25.9	12.3	7.0	20.2
1991	139.1	36.1	25.5	11.0	6.9	20.6
1992	142.0	37.2	25.7	9.7	6.3	21.1
1993	146.8	38.4	25.0	8.5	6.3	21.8
1994	150.8	39.4	24.4	7.8	6.2	22.3
1995	150.8	39.8	24.8	6.7	6.1	22.7
1996	156.5	39.5	25.4	6.1	6.1	23.1
1997	162.2	39.7	25.5	5.4	6.1	23.3

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-68, February 1998), p.40.

[1] In billions of dollars.
[2] Percentage share of total for institution.
[3] "Individuals and others" includes trade credit and seller financing of real estate.

remained constant in the wake of the farm financial crisis.

The same however, is not true for commercial banks and the FSA. Throughout the 1990s, commercial banks steadily increased their market share; they currently hold two-fifths of each dollar lent to agriculture. At the same time, the FSA's share of the market has steadily eroded since 1987.

In fact, commercial banks and the FCS have accounted for 60 percent or more of all agricultural loans since 1990. The FSA during this period has seen its importance as a major direct lender erode--mainly due to changes in federal agricultural policy. (Policy changes concerning the FSA will be discussed at greater length below.)

Tables 1.2 and 1.3 break total farm business debt into its major components, farm real estate debt and nonreal estate farm debt. Each component accounts for roughly half the yearly total debt figure. Both real estate and nonreal estate credit trends resembled that of the total debt market as described above, and primarily for the same reasons. It is anticipated that nonreal estate and real estate debt will maintain their share of the total agricultural debt market, which is expected grow modestly as previously mentioned (USDA 1998).

The percentage of debt held by lender is also provided in the tables. Notice that the distribution of debt among lenders differs substantially between the real estate and nonreal estate debt markets. An brief explanation of each market follows.

Table 1.2. Real estate farm business debt

Year	Total debt[1]	Comm. banks[2]	Farm Credit System	Farm Sevice Agency	Life ins. co.	Indiv. and others[3]
1979	$79.7	9.8%	34.3%	7.8%	14.2%	32.2%
1980	89.7	8.7	37.0	8.3	13.4	31.0
1981	98.8	7.7	40.8	8.2	12.3	29.7
1982	101.8	7.4	42.9	8.2	11.6	28.8
1983	103.2	8.1	43.0	8.3	11.3	28.5
1984	106.7	9.0	43.7	8.9	11.1	26.7
1985	100.0	10.7	42.1	9.8	11.3	25.8
1986	90.4	13.2	39.4	10.7	11.5	25.1
1987	82.4	16.4	37.2	11.4	11.4	23.5
1988	77.8	18.5	36.5	11.5	11.6	21.7
1989	76.0	20.6	35.4	10.8	12.0	21.1
1990	74.7	21.8	34.7	10.2	13.0	20.3
1991	74.9	23.2	33.8	9.4	12.7	20.9
1992	75.4	24.9	33.7	8.5	11.6	21.3
1993	76.0	25.8	32.8	7.7	11.8	22.0
1994	77.7	27.1	31.7	7.0	11.6	22.5
1995	79.3	28.1	31.3	6.4	11.5	22.7
1996	81.7	28.6	31.5	5.7	11.6	22.6
1997	84.1	29.5	31.2	5.0	11.8	22.5

Source: *Agricultural Income and Finance: Situation and Outlook Report.* (USDA/ERS, Pub. No. AIS-64, February 1998), P.41.

[1] In billions of dollars.
[2] Percentage share of total for institution.
[3] "Individuals and others" includes trade credit and seller financing of real estate.

Table 1.3. Nonreal estate farm debt

Year	Total debt[1]	Comm. banks[2]	Farm Credit System	Farm Service Agency	Indiv. and others[3]
1979	$71.8	40.8%	25.1%	11.4%	22.7%
1980	77.1	38.9	25.6	13.0	22.5
1981	83.6	37.3	25.4	15.2	22.0
1982	87.0	39.5	23.6	14.9	22.0
1983	87.9	42.2	22.1	14.6	21.1
1984	87.1	43.2	20.8	15.8	20.3
1985	77.5	43.5	18.1	19.0	19.4
1986	66.6	44.6	15.5	21.7	18.2
1987	62.0	44.5	15.1	22.8	17.6
1988	61.7	45.9	14.2	20.9	19.0
1989	61.9	47.3	15.4	17.5	19.8
1990	63.2	49.5	15.6	14.8	20.1
1991	64.3	51.1	15.9	12.8	20.2
1992	63.6	51.7	16.3	11.2	20.8
1993	65.9	53.0	16.0	9.5	21.6
1994	69.1	53.1	16.2	8.7	22.0
1995	71.5	52.8	17.5	7.1	22.6
1996	74.8	51.4	18.7	6.5	23.3
1997	78.1	50.7	19.3	5.9	24.1

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-64, February 1998), p.42.

[1] In billions of dollars.
[2] Percentage share of total for institution.
[3] "Individuals and others" includes trade credit and seller financing of real estate.

Agricultural real estate debt and distribution

The Farm Credit System's (FCS) share of farm real estate debt during the period increased from one-third of the market in 1979 to a peak of 44 percent by 1984 (see Table 1.2). The increase in FCS market share was mainly attributable to the average-cost pricing method they used in determining loan rates at that time. Average-cost pricing involves averaging past funding costs to determine current lending rates. This pricing policy offered the FCS a competitive advantage over other lenders in the rising interest rate environment of the late 1970s and early-eighties. However, the FCS experienced a reversal of fortune when rates subsequently fell. Additionally, many farm borrowers fled the FCS as its financial woes mounted lest they could lose their stock in failed FCS units. The ills suffered by the FCS due to its institutional structure and business practices prompted passage of the Agricultural Credit Act of 1987. The 1987 Act reorganized the FCS as well as changed its business practices. Since then, the FCS has maintained a consistent one-third of the real estate farm debt.

Commercial banking's share of total farm real estate debt remained under 10 percent through the mid-1980s. During this period, banks found it difficult to compete effectively due to the FCS's pricing behavior. In addition, banks were limited by the way they fund fixed-rate mortgages. Since banks typically issue short-term claims (deposits) that are repriced

more frequently than the long-term fixed-rate assets they are funding, any increase in interest rates can lead to liquidity, profitability, and solvency problems. To avoid this risk, many banks relied on adjustable rate mortgages (ARMs) or simply refused to originate such loans. Since that time, banks have steadily continued to garner a larger market share and currently hold slightly less than one-third of every dollar of farm real estate debt. Commercial banking seems well positioned to retain its market share of this debt.

The Farm Service Agency's (FSA) share of total real estate lending during the period under consideration generally remained under 10 percent. Changes in policy at the federal level (again, to be discussed shortly) have altered the role the FSA plays in financing agriculture. Barring any major policy reversal, the FSA is unlikely to regain any significant share of direct lending to the farm sector. FSA's future role will involve guaranteeing loans, not originating or funding them.

Agricultural nonreal estate debt and distribution

Commercial banking's share of the nonreal estate farm debt (shown in Table 1.3) increased steadily during the period from a share of two-fifths of the total in 1979 to over one-half by 1990, where it has remained since. Meanwhile, the Farm Credit System (FCS) saw its market share of nonreal estate debt erode quickly until the late 1980s, after which it

recovered somewhat. Currently, commercial banks and the FCS account for nearly 70 percent of all funds lent for nonreal estate purposes.

The combined share of these lenders in the farm nonreal estate credit market is probably understated somewhat because of how merchant/dealer supplied point-of-sale (POS) credit is treated by the USDA. The USDA includes all merchant/dealer credit under the category "Individuals and others." However, POS credit is often funded through line-of-credit arrangements with FCS lenders or commercial banks (Farm Credit Administration 1997).

The Farm Service Agency's (FSA) share of nonreal estate lending during the interval can be largely explained by the farm financial crisis and changes in agricultural policy. Starting from a market share of slightly over 10 percent in 1979, the FSA saw its share increase rapidly during the 1980s as financially troubled farmers turned to the "lender of last resort" for help. Since that time, the FSA market share of nonreal estate debt, like its share of real estate lending, has continued to whither, and will likely continue to do so given the new direction of federal agricultural policy.

Before turning our attention the characteristics and financial condition of the lending institutions serving agriculture, it is worth noting that the Farm Credit System and commercial banking system have emerged from the wake of the farm financial crisis as the major institutions serving farm-

ers' credit needs. Together, these institutions account for nearly two-thirds of the $160 billion or so of outstanding farm debt. Moreover, their importance is not likely to wane in the foreseeable future. As previously discussed, the Farm Service Agency's share of direct farm credit is a small and decreasing fraction of that of commercial banking's and the Farm Credit System's. However, it would be incorrect to conclude that the FSA's role in the provision of farm credit is inconsequential, given its "lender of last resort" function. This function alone makes the FSA a key source of direct funds for those farmers who do not qualify for commercial credit.

Major Private Lenders Serving Agriculture

Having established the commercial banking industry and the Farm Credit System as the major sources of credit to farmers, we will now look at each in more detail.

Commercial banking characteristics and performance

Table 1.4 reports bank lending, by size, as of June 30, 1997, for agricultural and nonagricultural banks, respectively. The Federal Reserve System (FRS) classifies a bank as agricultural if its ratio of farm loans to total loans exceeds the unweighted average of the ratio at all banks on a given date--17 percent as of June 30, 1997. The Federal Deposit Insurance Corporation (FDIC) uses a more arbitrary criterion;

Table 1.4. Bank lending, by size, June 30, 1997

Total assets[1]	Banks[2]	Total farm loans[3]	Avg. farm loans[4]	Farm loans/ Total loans	Farm lending share[5]
a. Agricultural bank lending					
<25	959	4,203	4.4	47.4	6.0
25-50	1,063	9,166	8.6	41.7	13.2
50-100	798	11,764	14.7	36.6	16.9
100-300	349	9,628	27.6	30.7	13.8
300-500	20	1,342	67.1	30.1	1.9
>500	14	1,549	110.7	22.9	2.2
Total	3,203	37,654	11.8	35.7	54.1
b. Nonagricultural bank lending					
<25	526	247	0.5	5.4	0.4
25-50	1,082	1,096	1.0	4.6	1.6
50-100	1,535	2,660	1.7	3.9	3.8
100-300	1,854	5,554	3.0	2.9	8.0
300-500	350	1,835	5.2	2.2	2.6
>500	633	20,495	32.4	0.9	32.4
Total	5,980	31,886	5.3	1.2	45.9

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-68, February 1998), p.13.

[1] In millions of dollars.
[2] Number of banks.
[3] In millions of dollars.
[4] In millions of dollars.
[5] The percentage of total commercial bank agricultural loans held by this size group.

it defines an agricultural bank as any bank that holds 25% or more of its loan portfolio in agricultural loans (USDA 1998). The FRS definition applies to Table 1.4 as well as the following discussion.

Both the total number of banks and the number of agricultural banks decreased during the past decade, with the ratio of agricultural banks to all banks over the period remaining more or less constant at one-third. The declining number of banks and resultant increased concentration in the banking industry is a well established trend.

Two-thirds of all agricultural banks have assets of $50 million or less, while fully 90 percent of all such banks have assets of $100 million or less. Slightly under half of all nonagricultural banks have assets greater than $100 million. Clearly, a typical agricultural bank tends to have fewer assets than its nonagricultural counterpart.

Agricultural banks supply slightly over half of all bank lending to agriculture despite being fewer in number and smaller in size than nonagricultural banks. The reason is that farm banks hold a much larger percentage of their loan portfolio in agricultural loans. Looking at Table 1.4, farm loans averaged roughly one-third of the total loans at all farm banks except for the very largest, and totaled nearly half of all loans at farm banks with assets of less than $25 million.

Very large banks (assets over $500 million) account for

the majority of farm lending among nonagricultural banking institutions and over one-quarter of all commercial farm debt. With an average of $32 million in farm loans per bank and a total of $20 billion, these large depositories are important sources of credit to agriculture. However, farm lending remains a small fraction (less than 1%) of their overall loan portfolios.

Selected agricultural bank performance measures during the period 1988-1997 are provided in Table 1.5. The rate of return on equity capital (ROE), a profitability ratio which measures net income per dollar of equity, improved over the period. ROE can rise if either net income per dollar of assets (return on assets or ROA) rises or if financial leverage (as measured by the asset/equity ratio) increases. The greater the leverage multiplier, the greater a bank's outstanding debt relative to equity. Further examination of Table 1.5 reveals that over time agricultural banks' return on assets increased as well as their capital/asset ratio, indicating that banks became more solvent in addition to becoming more profitable.

Farm loan quality also improved during the period. Nonperforming loans (loans past due 90 days but still accruing interest, and nonaccruing loans) as a percentage of total loans and the provision for loan losses as a percentage of loans both decreased and remain low. The loss rates that plagued loan portfolios during of the 1980s have subsided.

Table 1.5.   Agricultural bank performance measures, 1988-1997

Year	Return on equity	Return on assets	Equity/ Asset ratio	Loan loss/ Loans	Nonper. loans/ Loans	Loan/ Deposit ratio
1988	10.0%	0.9%	10.0%	0.8%	2.7%	54.5%
1989	10.7	1.0	10.1	0.7	2.3	56.0
1990	10.7	1.0	9.9	0.5	2.0	55.5
1991	11.4	1.0	10.1	0.5	1.9	56.0
1992	13.1	1.2	10.4	0.4	1.8	57.0
1993	12.8	1.2	10.9	0.3	1.4	59.7
1994	12.1	1.2	10.8	0.2	1.1	62.5
1995	11.9	1.2	11.3	0.3	1.1	65.5
1996	11.8	1.2	11.1	0.3	1.3	66.5
1997	12.4	1.3	11.6	0.3	1.3	69.0

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-68, February 1998), p.11.

The loan/deposit ratio, a conventional measure of liquidity, increased steadily as farmers continued to assume more debt. Without increasing their deposit base, additional borrowing, or selling loans in the secondary market, bank managers may be forced to slow lending to agriculture.

One final note: It is debatable whether the current trend in bank consolidation and interstate banking will affect the funding available to agriculture in the distant future. For now, most small rural banks that serve agriculture are unlikely to be targets of the large urban banks that are crossing state lines and driving the consolidation trend. In the immediate future, the banking landscape will likely include mega-banks with urban branches nationwide and smaller regionally anchored banks. The distant future's banking structure could significantly affect farm and rural lending.

Farm Credit Service characteristics and condition

As indicated earlier, the Farm Credit System (FCS) is a major competitor in the agricultural credit market. The Farm Credit System is a nationwide cooperative system of banks and associations providing credit to farmers, agricultural concerns and related businesses. The system also includes a number of entities that support the efforts of the lending institutions (Farm Credit Administration 1997).

As of January 1, 1998, the FCS was comprised of six Farm Credit Banks (FCBs), one Bank for Cooperatives (BC) and one Agricultural Credit Bank (ACB). Farm Credit Banks make direct long-term real estate loans through 48 Federal Land Bank Associations (FLBAs) and provide loan funds to 64 Production Credit Associations (PCAs), 56 Agricultural Credit Associations (ACAs), and 31 Federal Land Credit Associations (FLCAs).

A Production Credit Association delivers short- and intermediate-term credit to farmers and ranchers using money borrowed from its Farm Credit Bank. PCAs own their loan assets. Federal Land Bank Associations serve as a lending agent for a Farm Credit Bank. FLBAs make and service long-term mortgage loans to farmers, ranchers, and rural residents for housing. Unlike PCAs, FLBAs do not own the loan assets they originate and service. Agricultural Credit Associations have the combined authorities of a PCA and FLBA. ACAs can fund loans by borrowing from a Farm Credit Bank or the Agricultural Credit Bank.

The Bank for Cooperatives makes loans to farmer-owned marketing, supply, and service cooperatives; rural utilities (electric and telephone); and rural sewer and water systems. Furthermore, it can finance agricultural exports and provide international banking services for farmer-owned cooperatives. The Agricultural Credit Bank has the combined authorities of an FCB and a BC.

The Federal Farm Credit Banks Funding Corporation is owned by the System's banks. It markets the securities the System banks sell to raise loanable funds. The Farm Credit System Insurance Corporation is an independent U.S. Government-controlled corporation that ensures the timely payment of principal and interest on insured notes, bonds, and other obligations issued on behalf of FCS banks.

By statute, the Federal Agricultural Mortgage Corporation (Farmer Mac) is an FCS entity. It has two ties to the FCS. Farmer Mac is examined and regulated by the Farm Credit Administration (FCA), the same independent agency in the executive branch of the U.S. Government responsible for regulating the banks, associations, and entities that make up the FCS. The other tie is the five FCS representatives that sit on Farmer Mac's Board of Directors. Strangely enough, Farmer Mac, which was supposed to help bankers compete with the FCS, ended up being an entity of the FCS.

Table 1.6 reports FCS loan quality, operating efficiency, and solvency ratios. As noted earlier, FCS loan volume con-

tinued to rise after the farm financial crisis period, although its market share remained constant. Delinquent farm loan volume and net charge-offs have shown a marked improvement, indicating that FCS portfolio quality is solidifying.

Table 1.6. Farm Credit System financial indicators

Year	Delinq. loans/ Loans	Net charge offs/ Loans	Net int./ Earning assets	Nonint. exp./ Loans	At-risk cap./ Loans
1990	6.1%	0.0%	2.4%	1.5%	12.0%
1991	5.4	0.1	3.0	1.5	14.1
1992	4.6	0.0	3.4	1.5	15.9
1993	3.6	0.0	3.6	1.6	17.9
1994	2.7	-0.1	3.6	1.6	19.1
1995	1.8	0.0	3.4	1.4	19.4
1996	1.3	0.1	3.5	1.4	20.2
1997	1.2	0.0	3.4	1.4	21.0

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-68, February 1998), p.15.

Net interest income (total interest income less interest expense) as a proportion of earning assets rebounded sharply from earlier levels and remains strong, while noninterest expenses (less merger implementation and restructuring costs) to total loans dropped slightly. Both ratios suggest that FCS operating efficiency improved during the 1990s, more so as the decade progressed.

At-risk capital continues to accumulate faster than loans outstanding. Since at-risk capital measures all FCS resources (allowances for losses on acquired property and loans, surplus, unprotected borrower stock, and the FCS Insurance Fund)

that can be liquidated before exposing bondholders to losses,
the at-risk capital/assets ratio is useful for evaluating the
relevant cushion between stockholders and bankruptcy.

Overall, the financial condition of the FCS remains
strong. However, it should be noted that systemwide statis-
tics may hide the differences in condition among FCS districts
and the various entities.

USDA Guaranteed Lending History and Characteristics

Background

Throughout American history, farmers have repeatedly
called for low-cost direct loans from the government. Govern-
ment help first came in the form of the Federal Credit System
established in 1916; however, the demand for direct credit re-
mained. When an emergency situation arose, financial assis-
tance was generally supplied by temporary agencies created by
the government on an ad hoc basis. The onset and the severity
of the Great Depression heightened the need for a more perma-
nent and continuous flow of credit to farmers. As a result,
the Farm Security Administration was established in 1937.
Assistance to agriculture consisted of two programs: (1) farm
production and subsistence loans, and (2) farm establishment
loans. In 1946, a new agency, the Farmers Home Administration
(FmHA) was created to officially succeed the Farm Security
Administration. The FmHA was housed under the United States

Department of Agriculture (USDA) (USDA 1984).

For the next fifty years, the FmHA helped disadvantaged farmers and rural residents improve their lot in life through various and varied programs. But, further changes were on the horizon. As part of the Federal Crop Insurance Reform and Department of Agriculture Reform Act of 1994 (Pub. L. 103-354), the FmHA was reorganized into what is now called the Farm Service Agency (FSA). The FSA retains the same guiding principle its predecessors were charged with during the depression--that is, providing a safety net to beginning and financially distressed established farmers.

The Farm Service Agency (FSA) currently administers direct and guaranteed lending programs targeted at agricultural and rural development which include the following: (1) operating loans, (2) farm ownership loans, (3) emergency loans, (4) water conservation loans, and (5) residential mortgages to farmers and residents of rural areas.

FSA direct and indirect loans are subsidized in a number of ways. First, direct loans are priced somewhat below market rates since FSA rates are based on the federal government's cost of funds. Interest rates on guaranteed loans are negotiated between the borrower and lender, but the agreed interest rate cannot exceed the average market interest rate the lender charges other customers for similar loans. The interest rate is subsidized in the sense that, without the USDA's guarantee, the borrower would either pay a higher interest rate or be

denied credit altogether. Second, FSA provides direct borrowers with supervision and credit counseling which would be cost prohibitive for a private lender. Moreover, direct borrowers that graduate to guaranteed loans or conventional commercial credit take this accumulated knowledge with them. This creates a sort of credit enhancement to the lender (Barry 1995).

USDA guaranteed loan program history

Traditionally, FmHA credit assistance to farmers had been in the form of direct lending. However, in 1972, a second type of FmHA credit assistance was introduced--the guarantee of credit supplied by commercial sources. The Rural Development Act of 1972 authorized FmHA to guarantee loans made by commercial lenders for farming, housing, and rural business and industry, including enterprises in cities with populations of up to 50,000. Under the program, the FmHA guaranteed no more than 90 percent of any loss of principal and accrued interest. The guarantee on accrued interest expired 90 days after borrower default. Eligibility requirements and underwriting standards for an FmHA guaranteed loan were similar to those then used in the FmHA's direct loan program (USDA 1988).

Through 1984, the guaranteed loan program was relatively dormant--guaranteed loan obligations averaged about 8 percent of total FmHA farm loan activity (Jurenas 1985). This trend was abruptly reversed in 1985 with passage of the Food Security Act. The 1985 Act changed the relative importance of the

guarantee program by replacing, dollar for dollar, reductions in FmHA's direct lending authorities with guaranteed loan authorities.

The increased emphasis placed on the guarantee program rested on the belief that a guaranteed loan provided the same benefit to a farmer as a direct loan of the same size, but at a lower cost (OMB 1984). In other words, policy makers viewed the two programs as substitutes. Herr (1991) questioned that view. He contended that direct loans are funded by sources outside the local area and guaranteed loans are typically funded by local sources. Thus, he argued, direct loans add to the area's credit supply while guaranteed loans must be funded from existing local credit supplies.

Sullivan and Herr (1989), examined the degree of substitutability of the direct and guarantee loan programs. They claimed that the substitutability would rise if banks adjusted their credit delivery systems by increasing their loan/deposit ratios, carried more guaranteed loans and fewer government securities in their asset portfolio, and sold the guaranteed portion of an FmHA loan to a third party and repeated the process. Sullivan and Herr found that banks participating in FmHA's loan guarantee program had not significantly altered their credit delivery system in such fashion. In addition, studies conducted by the Office of the Inspector General (OIG 1988) and the Government Accounting Office (GAO 1989) found that the growth of the USDA guaranteed loan program was pri-

marily attributable to commercial lenders converting conven-
tional borrowers to FmHA guaranteed loans rather than helping
graduate FmHA direct borrowers to FmHA guaranteed loans. By
the late-eighties, the substitutibility issue was largely
academic--the shift in policy had taken root. Guaranteed
lending quickly gained the majority share of USDA's total
yearly program obligations as direct lending was permanently
scaled back (USDA 1998).

Current USDA guaranteed loan programs

Farm Ownership (FO) direct and guaranteed loans are
available for the purchase or improvement of farm real estate.
Guaranteed loans can also be used to help owner-operators
restructure their debts using real estate equity. Farm Owner-
ship loans are capped at $200,000 for a direct loan; guaran-
teed FO loans are capped at $300,000. FO terms are not to
exceed 40 years.

Operating Loans (OL) are used to finance livestock,
equipment and other expenses incurred during operations and
are normally repaid within 7 years. Operating Loans may also
be extended for the purposes of refinancing existing indebted-
ness or to cover essential family living expenses. The limits
for direct and guaranteed OL loans are $200,000 and $400,000,
respectively (Farm Service Agency 1998).

Guaranteed loan interest rates and terms are negotiated
between the lender and the borrower. Since the government

assumes much of the credit risk, the agreed loan rate between lender and borrower is not to exceed the average interest rate the lender receives from its other farm customers on similar loans. Direct loans are priced based on the government's cost of funding.

Recent developments

The Federal Agricultural Improvement and Reform Act of 1996 (Pub. L. 104-127; 110 Stat. 888) reduced appropriations for direct loans as well as tightened restrictions on borrowers. This was a further attempt to encourage the graduation of borrowers from direct credit programs to commercial credit sources. The legislative changes affected both the direct and guaranteed Farm Ownership and Operating Loan programs (USDA 1997).

New direct Farm Ownership loans will only be extended to qualified beginning farmers or those with less than 10 years of FSA borrowing history. Apportionment for the FO program, the budgetary limit on the volume of new loans that can be issued during a fiscal year, was reduced accordingly.

Participation in the direct Operating Loan program will be limited to those farmers who have been farming 5 years or less or have 6 or less years of FSA borrowing experience. Rules for refinancing existing indebtedness using direct Operating Loans have been changed to coincide with the new policy direction. Refinancing existing debt using the OL

program is no longer permitted unless the borrower has suf-
fered a qualifying loss due to natural disaster, is refinanc-
ing debt obtained from sources other than the FSA, or has
refinanced direct or guaranteed FSA debt fewer than 5 times.
The 1996 Act also authorized the FSA to increase its guarantee
to 95 percent for commercial loans extended to borrowers
refinancing existing OL indebtedness.

FSA borrowers will now be allowed one and only one in-
stance of debt forgiveness, and any instance of debt forgive-
ness will disqualify the borrower from any additional FO or OL
credit. Furthermore, delinquent FSA account holders will not
qualify for direct operating loans.

The new FSA loan rules are designed to help a new genera-
tion of farmers become established as well as send a clear
signal to established farmers that FSA programs are a helping
hand, not a crutch. Clearly, the FSA program changes legis-
lated in the 1996 Act have affirmed the federal agricultural
credit policy direction of graduating farmers from public
financing to commercially supplied credit. This policy affir-
mation further accentuates the important question of whether
direct and guaranteed lending are genuine substitutes. More-
over, the recent changes in policy may augment the need for
the secondary market in FSA guaranteed loans sponsored by
Farmer Mac.

USDA program obligations

Additional insight into the FSA's importance as a provid-
er of farm credit requires a breakdown of its direct and
guaranteed lending activities. The demand for direct OL and
FO and guaranteed FO loans usually meets or eclipses FSA's
annual lending authority for such loans. Guaranteed OL bor-
rowing has, in general, fallen well short of FSA authoriza-
tion. In 1997, guaranteed OL borrowing was one-half its
annual lending authority. Currently, outstanding direct loan
volume is roughly $10 billion and guaranteed volume is over
$6.5 billion. The number of active direct and guaranteed loan
program borrowers is approximately 110,000 and 40,000, respec-
tively (USDA 1998).

Examination of Table 1.7 reveals the decline in outstand-
ing principal of FSA farmer programs, decline in total annual
program obligations and declining importance of direct program
obligations vis-a-vis the guaranteed program. Note the two
trends. Within one decade, FSA's total and yearly program
obligations have been nearly halved. Also during this time,
the share of direct lending to total yearly FSA obligations
fell by one-half. Thus, direct lending volume is one-quarter
of what it was, while guaranteed lending obligations remain at
about the same level.

Table 1.7. FSA program obligations

Year	Total outstdg. program oblig.[1]	Total yearly program oblig.[2]	Direct program/ Yearly oblig.	Guaran. program/ Yearly Oblig.
1986	$29.2	$4.4	64.1%	35.9%
1987	28.1	3.1	48.5	51.5
1988	28.2	2.3	45.2	54.8
1989	26.5	2.2	46.2	53.8
1990	23.7	2.2	42.0	58.0
1991	22.0	2.1	30.8	69.2
1992	20.5	2.3	31.0	69.0
1993	18.8	2.1	32.9	67.1
1994	18.0	2.7	32.4	67.6
1995	17.5	2.5	22.5	77.5
1996	16.9	2.7	31.0	69.0
1997	16.3	2.3	32.1	67.9

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-68, February 1998), p.23.

[1] In billions of dollars.
[2] In billions of dollars.

FSA loan quality

The quality of FSA direct and guaranteed loans is reported in Tables 1.8 and 1.9, respectively. Over the last decade, delinquencies as a share of total principal outstanding for FSA direct lending programs have far exceeded that of the guaranteed loan programs. The new direction in policy may not eliminate the persistently high delinquency rates of the direct lending program; however, by reducing the total principal outstanding, direct program losses should subside, even if delinquency rates remain at their current levels.

Delinquency rates on FSA guaranteed loans are of interest to commercial lenders because (1) loans are not fully guaran-

Table 1.8. FSA Direct Loan Program delinquencies

Year	Active cases (number)			Principal outstanding		
	Total[1]	Delinq. cases[2]	Delinq. cases/ Total	Total[3]	Delinq. loans[4]	Delinq. loans/ Total
1986	422	135	31.9%	$27.6	$6.3	22.8%
1987	389	128	32.8	25.8	6.6	25.6
1988	376	138	36.7	25.1	8.3	33.2
1989	346	115	33.1	23.3	8.0	34.4
1990	299	80	26.9	19.5	6.1	31.4
1991	281	79	28.2	17.5	5.5	31.5
1992	252	74	29.2	15.5	4.8	30.9
1993	225	56	25.0	13.8	4.1	29.9
1994	208	48	22.9	12.6	3.6	28.3
1995	194	53	27.1	11.5	3.2	27.8
1996	182	42	23.1	10.6	2.4	22.9
1997	170	32	18.8	9.8	2.0	20.7

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-68, February 1998), p.24.

[1] In thousands.
[2] In thousands.
[3] In billions of dollars.
[4] In billions of dollars.

Table 1.9. FSA Guaranteed Loan Program delinquencies

	Active cases (number)			Principal outstanding		
Year	Total[1]	Delinq. cases[2]	Delinq. cases/ Total	Total[3]	Delinq. loans[4]	Delinq. loans/ Total
1986	NA[5]	NA	NA	$1.7	$31.4	1.9%
1987	18.9	1.1	5.6%	2.4	42.6	1.8
1988	27.5	1.3	4.4	3.2	54.1	1.7
1989	30.0	1.6	5.3	3.2	60.6	1.9
1990	37.0	1.7	4.6	4.1	58.5	1.4
1991	40.2	1.9	4.7	4.5	59.3	1.3
1992	42.2	2.4	5.6	4.9	102.8	2.1
1993	42.5	2.1	4.9	5.0	98.5	2.0
1994	44.1	1.7	3.8	5.4	82.3	1.5
1995	46.8	1.8	3.9	5.9	91.3	1.5
1996	48.5	2.3	4.8	6.4	112.5	1.8
1997	49.5	2.5	5.1	6.5	124.5	1.9

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-68, February 1998), p.24.

[1] In thousands.
[2] In thousands.
[3] In billions of dollars.
[4] In millions of dollars.
[5] Active cases for 1986 were not available.

teed, (2) a bank would incur loan liquidation costs in the event of default, and (3) a bank still needs to collect on the guarantee. The delinquency rates are broken down by program in Tables 1.10 and 1.11.

Table 1.10 shows that the number of active delinquent FO cases has risen, but the proportion of delinquent FO cases to total active FO cases has not. Table 1.10 also shows a steady increase in the dollar amount of delinquent FO loans, but again, the proportion of the dollar amount of FO delinquencies to total FO principal outstanding has not risen.

Table 1.11 presents the recent history of OL delinquencies. Over time, the number of delinquent OL cases has increased marginally as a fraction of the number of total OL cases. Furthermore, the dollar amount of OL delinquencies has inched up slightly, too.

For the period 1991-97, the dollar amount of delinquent OL loans as a fraction of total OL principal outstanding is higher than the similar ratio for FO loans (2.0 percent vs. 1.2 percent). Moreover, the volatility of the delinquency rate for OL loans appears to be higher than that of FO loans. The coefficient of variation (standard deviation/mean) for OL loans is .22 percent and .10 percent for FO loans. Clearly, in terms of delinquency rates, OL loans are riskier than FO loans.

It would be revealing to put USDA guaranteed loan program delinquencies into context by comparing them to the delinquen-

Table 1.10. FSA guaranteed FO program delinquencies

	Active cases (number)			Principal outstanding[1]		
		Delinquent			Delinquent[2]	
Year	Total	Total	Pct.	Total	Amount	Pct.
1991	11,277	496	4.4	1,520.3	18.2	1.2
1992	13,433	611	4.6	1,818.7	25.5	1.4
1993	14,591	580	4.0	2,095.0	26.0	1.2
1994	16,237	486	3.0	2,331.3	25.1	1.1
1995	17,941	555	3.1	2,592.6	26.3	1.0
1996	19,139	703	3.7	2,803.6	32.3	1.2
1997	20,252	786	3.9	2,984.9	35.1	1.2

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-44, February 1992; AIS-48, February 1993; AIS-52, February 1994; AIS-56, February 1995; AIS-60, February 1996; AIS-64, February 1997; AIS-68, February 1998).

[1] Measured in millions of dollars.
[2] Amount delinquent includes past due payments of principal and accrued interest.

Table 1.11. FSA guaranteed OL program delinquencies

| | Active cases (number) | | | Principal outstanding[1] | | |
| | | Delinquent | | | Delinquent[2] | |
Year	Total	Total	Pct.	Total	Amount	Pct.
1991	40,463	1,556	3.9	2,941.2	34.7	1.2
1992	41,536	2,049	4.9	3,059.4	69.8	2.3
1993	27,561	1,434	5.2	2,913.7	67.0	2.3
1994	27,647	1,130	4.1	3,060.9	53.6	1.8
1995	28,696	1,128	3.9	3,320.9	62.5	1.9
1996	29,172	1,586	5.4	3,541.1	78.2	2.2
1997	29,131	1,725	5.9	3,507.9	86.9	2.5

Source: *Agricultural Income and Finance: Situation and Outlook Report* (USDA/ERS, Pub. No. AIS-44, February 1992; AIS-48, February 1993; AIS-52, February 1994; AIS 56, February 1995; AIS-60, February 1996; AIS-64, February 1997; AIS-68, February 1998).

[1] Measured in millions of dollars.

[2] Amount delinquent includes past due payments of principal and accrued interest.

cies banks experience with respect to their loan portfolio in general. However, this is not possible due to differences in the way the two are measured. USDA delinquencies include only past due payments of principal and accrued interest. The FDIC reports on various types of noncurrent assets. However, if a loan is deemed noncurrent, the total dollar value of the asset is counted, not just past due payments of principal and accrued interest. Given the caution above, the average yearly noncurrent loan to loan ratio for all insured institutions during the period 1992-97 was 1.6 percent (FDIC 1998).

Summary

The focus of this dissertation is to explain why a commercial bank might participate in Farmer Mac II. We examined the structure and characteristics of the U.S. agricultural credit market to determine what trends exist and how the banking industry fits in. We also looked in more detail at the lending institutions serving agriculture.

Over the past decade, commercial banks have increased their share of both the growing real estate and nonreal estate farm debt markets. In addition, the public policy shift away from USDA direct lending toward guaranteed lending affects commercial banks serving agriculture. Growing overall demand for farm credit combined with increased demand for USDA guaranteed loans may lead bankers to consider participating in Farmer Mac II.

CHAPTER 2

FARMER MAC

This chapter discusses the genesis of the Farmer Mac II loan sale program, how it works, and its development to date.

Legislative History

In response to the farm financial crisis experienced during the 1980s, the Agricultural Credit Act of 1987 (Pub. L. 100-233; 101 Stat. 1686) was enacted on January 6, 1988. The main thrust of the 1987 Act was to "bail out" the financially beleaguered Farm Credit System. Two years of applying temporary band-aids had only postponed the inevitable. Congress and the Reagan administration felt that the increasing political and economic risks of allowing the FCS to collapse were far too great; thus, the major rescue. As part of the bail out, in a bow to commercial banks and insurance companies, a new secondary market for pooling agricultural loans into tradable securities was created (Congressional Quarterly 1987).

In particular, Title VII, Subtitle A, Section 701, of the 1987 Act established the Federal Agricultural Mortgage Corpo- ration (Farmer Mac) to create a secondary market in farm

mortgage loans to enhance the ability of the Farm Credit System, commercial banks, and life insurance companies to supply credit to agriculture at fixed rates, on more favorable terms, and at competitive rates. The 1987 Act also authorized the Secretary of Agriculture under Title VII, Subtitle B, Section 711, to create a secondary market for FmHA guaranteed loans.

Farmer Mac is a government sponsored enterprise (GSE) which operates as an independent entity within the Farm Credit Service (FCS). Like other GSEs, it is characterized by its federal charter, private ownership, targeted mission, and access to financial markets through sales of asset-backed debt securities having agency status. Farmer Mac is supervised and regulated by the Office of Secondary Market Oversight of the Farm Credit Administration.

An elementary understanding of Farmer Mac is required to see how Sections 701 and 711 of the 1987 Act are ultimately related. The genesis of Farmer Mac is the result of an institutional bailout, borrower distress, deregulation and financial innovation, and partisan political wrangling (Hiemstra et al. 1988). The stated legislative purpose of Farmer Mac as outlined in Section 701 is:

    (A)   to increase the availability of long-term credit to farmers and ranchers at stable interest rates;

    (B)   to provide greater liquidity and lending capacity in extending credit to farmers and ranchers;

    (C)   to provide an arrangement for new lending to facilitate capital market investments in providing long-

term agricultural funding, including funds at fixed rates of interest; and

(D)   to enhance the ability of individuals in small rural communities to obtain financing for moderate-priced homes. (sec. 701)

The 1987 Act authorized Farmer Mac to guarantee the timely payment of principal and interest on securities backed by pools of commercial quality agricultural real estate and rural housing loans. Farmer Mac securities issued in the secondary market would be similar to the Government National Mortgage Association (Ginnie Mae) issues except that the loans underlying a Farmer Mac security would not be publicly insured or guaranteed (Hiemstra et al. 1988). This initial government sponsored enterprise and its associated secondary market is currently referred to as Farmer Mac I.

Section 711 of the Agricultural Credit Act of 1987 enabled the FmHA to permit the sale of the guaranteed portion of FmHA loans by means of a secondary market. The Secretary of Agriculture was authorized to:

develop such procedures as are necessary for the facilitation, administration, and promotion of secondary market operation, and for determining the increase of farmers' access to capital at reasonable rates and terms as a result of secondary market operations. (sec. 711)

Furthermore, the Secretary may:

directly or through a market maker approved by the Secretary, issue pool certificates representing ownership of part or all of the guaranteed portion of any loan guaranteed by the Secretary under his title. Such certificates shall be based on and backed by a pool established or approved by the Secretary and composed solely of the entire guaranteed portion of such loans. (sec. 711)

The 1987 Act improved the FmHA's secondary market which existed on an ad hoc basis. The belief was that the program would provide additional funds for rural banks to lend farmers and rural communities by allowing local participating banks to use the money from sales of FmHA guaranteed loans for additional agricultural lending. This new secondary market for FmHA loans, originally dubbed Aggie Mae by the financial press, was modeled after a secondary market created for Small Business Administration (SBA) loans. Aggie Mae was originally kept separate from Farmer Mac because it was believed that FmHA borrowers were not likely to meet Farmer Mac underwriting standards, and unlike Farmer Mac, guaranteed FmHA nonreal estate loans would also be eligible for pooling (Hiemstra et al. 1988).

The USDA subsequently contacted Farmer Mac officials in the fall of 1989 to discuss the possibility of joining efforts to establish a secondary market for FmHA guaranteed loans. This discussion ultimately resulted in the submission of proposed legislation before Congress to expand Farmer Mac's authority beyond the powers outlined in the 1987 Act (Olson and Clark 1991).

The secondary market for FmHA guaranteed loans was given a boost when the Food and Agricultural Act of 1990 (Pub. L. 101-624; 104 Stat. 3834) authorized Farmer Mac to purchase, pool, and issue guaranteed securities backed by guaranteed portions of USDA guaranteed loans. The intent of the legisla-

tion was to expand vitally needed credit availability for farmers and ranchers by providing a significant measure of liquidity to rural lending institutions. Reductions made in FmHA's direct lending programs for budgetary reasons left many farmers and ranchers with no alternative financing sources other than the guaranteed loan program. It was believed that increased demand for the guarantee program would exceed the ability of rural institutions to accommodate farmers' credit needs unless these institutions had access to funds outside their locality (USCCAN 1990).

Farmer Mac II was given the nod for the new secondary market in FmHA guaranteed loans because of the "readiness to do business" displayed on the part of the Farmer Mac I management team after passage of the 1987 Act (Olson and Clark 1991). Farmer Mac II does not replace Farmer Mac I. Rather, it complements the original secondary market instrumentality created by the 1987 Act by extending its authority to purchase guaranteed portions of FmHA guaranteed loans and then to issue and guarantee securities backed by such loans. The Farmer Mac II program is:

> intended to provide the liquidity and economic incentives
> of an efficient secondary market, together with a simpli-
> fied loan application completion procedure, that will
> give lenders new and better reasons for making these
> [FmHA guaranteed] loans (FAMC 1990, A-1).

Development and Outlook

Lenders participating in the Farmer Mac II loan sale
program sell guaranteed portions of eligible USDA loans di-
rectly to Farmer Mac; however, in accordance with current FSA
guidelines, the lender maintains all responsibility for ser-
vicing the loan. The list of eligible USDA guaranteed loans
includes Farm Ownership (FO), Operating Loans (OL), Business
and Industry (B&I) and Community Facility (CF) loans. Lenders
need not be a shareholder of Farmer Mac; any lender that makes
FSA farm program or Rural Economic and Community Development
(RECD) loans is an eligible originator. Seasoned (previously
booked) guaranteed portions may also be sold to Farmer Mac as
long as the loans are current and the seller has no actual
knowledge of any impending delinquency or default and does not
anticipate pay-off, liquidation, or delinquency within the
next 12 months (FAMC 1990).

Farmer Mac maintains a continuous "buy side" in the USDA
guaranteed loan market, thus creating a steady source of
liquidity for lenders. Initially, Farmer Mac issued guaran-
teed securities based on individual or small pools of guaran-
teed loans. In early 1995, Farmer Mac was authorized to
purchase the guaranteed portion of eligible loans and hold
them in their portfolio for investment purposes (USDA 1997).

Farmer Mac uses discount and medium-term notes to carry
the guaranteed loans to be securitized as well as to buy back
the loan-backed securities it issues. Farmer Mac has evolved

into loan pooler, loan-backed security issuer, and final
investor; it now performs the entire array of functions in-
volved with securitization except for originating and servic-
ing the loans (FAMC 1997).

Farmer Mac II faces many challenges in its attempt to
build business volume. Table 2.1 reports the total number of
sellers that have participated, the number of states repre-
sented, the number of loans purchased each year, and the
cumulative number of loans purchased since Farmer Mac II's
inception. Although its business activity increased each
year, Farmer Mac's market penetration remains very modest.
From Table 2.1, if the latest and most generous figures to
Farmer Mac are considered, the cumulative total of 2,423 USDA
guaranteed loans purchased by Farmer Mac account for only 4.9
percent of the 49,383 USDA guaranteed Farm Ownership and
Operating Loan active cases existing at year-end 1997. The
total number of participants is also expanding, but partici-
pation numbers seem paltry when compared to the 6,000 plus
lenders originating USDA guaranteed loans. This contrast
would be even more striking if the participation numbers were
adjusted downward to reflect only lenders that regularly
participate.

Table 2.2 provides the dollar volume of Farmer Mac II
program activity. It shows the yearly volume of loans pur-
chased, cumulative loan volume, outstanding volume, and Farmer
Mac's outstanding guaranteed volume relative to FSA's out-

Table 2.1.   Farmer Mac II lender participation

Year	Total sellers to date	Total states to date	Loans purch. yearly	Total loans to date
1991	23	15	80	80
1992	61	25	166	246
1993	110	30	341	587
1994	143	30	372	959
1995	184	34	398	1,357
1996	257	38	543	1,900
1997	314	41	523	2,423

Source: Compiled using 1991-97 FAMC Annual Reports.

Table 2.2.   Farmer Mac II loan volume

Year	Total yearly volume[1]	Total volume purch.	FM II total outstdg.	FM II market share[2]
1991	$10.2	$10.2	$10.0	0.2%
1992	23.4	33.6	30.3	0.6%
1993	39.9	73.5	64.6	1.3%
1994	47.4	120.9	91.1	1.7%
1995	56.2	177.1	143.3	2.4%
1996	92.6	269.7	211.0	3.3%
1997	95.0	364.7	272.8	4.2%

Source: Compiled using 1991-97 FAMC Annual Reports.

[1] All dollar volumes measured in millions of dollars.
[2] FM II market share is the ratio of FM II volume outstanding to FSA guaranteed farmer loan program volume outstanding for the same year.

standing guaranteed volume for the same year. Again, Farmer
Mac has made positive strides in accumulating business volume
over time; however, outstanding Farmer Mac volume remains
under 5 percent of total FSA outstanding volume. If FSA
guaranteed lending remains slack, the farm economy remains
strong, and lenders are disinclined to utilize the program,
Farmer Mac may continue to struggle in its attempts to gener-
ate business activity.

Despite its limited market penetration, the growth in
Farmer Mac II program activity is encouraging--at least for
the present. However, a number of issues exist that may make
continued progress difficult. The issues include the follow-
ing: (1) foremost is the success of the Farmer Mac I loan sale
program for conventional agricultural loans; (2) the histori-
cal preference of lenders to retain loans in their own portfo-
lios; (3) the actual or perceived excess liquidity of many
agricultural lenders; (4) the reluctance of lenders to offer
intermediate- and long-term fixed-rate real estate loans as a
result of the higher profitability associated with short-term
lending; (5) the lack of borrower demand for intermediate- and
long-term loans due to the lower interest rates generally
associated with shorter-term loans; and (6) the competition
among third party purchasers of USDA guaranteed loans. The
issues listed above are largely self-explanatory, with the
exception of the success of Farmer Mac I.

Essentially, the success and continuation of the Farmer

Mac II program depends foremost on the success of the Farmer Mac I program, regardless of whether the Farmer Mac II program is viable in its own right. The reason is that the Federal Agricultural Mortgage Corporation (FAMC) cannot continue to exist as an ongoing entity if Farmer Mac I does not become viable. Farmer Mac II's potential business activity is limited to the $6.5 billion in outstanding USDA guaranteed loans. Farmer Mac II's relevant market is dwarfed by the nearly $40 billion of real estate debt that Farmer Mac officials believe qualifies for securitization through Farmer Mac I (FAMC 1996). In other words, the level of business activity necessary to sustain Farmer Mac as an ongoing entity will have to be generated by the Farmer Mac I program. Any further consideration of the prospects of Farmer Mac II must first look at the prospects of the Farmer Mac I loan sale program.

The legislation that created what is now called the Farmer Mac I loan sale program severely limited Farmer Mac's activities to shield taxpayers from potential losses. It could be argued that Farmer Mac I was "provided an opportunity to fail." Farmer Mac was not authorized to issue its own asset-backed securities or engage in portfolio lending--that is, issuing claims and using the funds to purchase loans to hold in its portfolio. As initially designed, the program relied on third parties to pool loans and issue securities backed by the pools, with Farmer Mac then guaranteeing the security. In addition, Farmer Mac's guarantee of the security

became effective only after the first 10 percent of losses of the pool's principal were absorbed by the poolers, originators, or investors. Furthermore, the loans comprising the pool had to be diversified across different commodities as well as different geographic areas.

This program structure was problematic. By structuring Farmer Mac I to minimize taxpayer exposure, the program could not serve its intended purpose. As designed, the business activity trickling into Farmer Mac was inadequate for sustained operations; with due time, continued losses would erode its capital base and Farmer Mac would wither and "die on the vine."

In 1995, Farmer Mac approached Congress and asked for expanded powers. Congress responded with passage of the Farm Credit System Reform Act of 1996 (Pub. L. 104-105; 110 Stat. 162), breathing new life into the future prospects of Farmer Mac. In essence, the 1995 Act raised Farmer Mac's capital standards in exchange for giving Farmer Mac added authorities. Farmer Mac is now allowed to purchase qualified loans directly from originators and hold the loans in its portfolio or package them as securities, thus eliminating the prior agency problems with poolers. The 1995 Act also eliminated the complex loan pool diversification requirements, and did away with the 10 percent cash reserve or subordinated interest requirement that had to be affixed to the guaranteed security.

These legislative changes have removed the statutory

barriers that barred Farmer Mac I's chances for success, but the lending barriers facing Farmer Mac II described above must also be overcome if Farmer Mac is to build the volume of business necessary to sustain itself over the long run. For now, Farmer Mac is continuing to lobby for expanded powers, is increasing business activity, and has recently turned profitable. The future requires more of the same.

Summary

Farmer Mac II is a relatively new, federally sponsored loan purchase plan authorized by the Food and Agricultural Act of 1990 (Pub. L. 101-624; 104 Stat. 3834). It allows for the sale of the guaranteed portions of United States Department of Agriculture (USDA) guaranteed loans by commercial lenders and the subsequent securitization of the said guaranteed portions by the Federal Agricultural Mortgage Corporation (Farmer Mac). Farmer Mac is a government sponsored enterprise (GSE) created by the Agricultural Credit Act of 1987 (an amendment to the 1971 Farm Credit Act) which operates as an independent entity within the Farm Credit System (FCS). Like other GSEs, it is characterized by its federal charter, private ownership, targeted mission, and access to financial markets through sales of asset-backed debt securities having agency status. Farmer Mac is supervised and regulated by the Office of Secondary Market Oversight of the Farm Credit Administration. Farmer Mac also oversees a secondary market for farm real

estate and rural housing loans called Farmer Mac I.[1]

Farmer Mac II is experiencing modest growth. The aggregate principal amount purchased from its inception through 1997 is $364 million, of which $273 million remains outstanding. This represents roughly 5 percent of the total USDA FO and OL loan program principal outstanding. Surely, there is room for additional growth.

In the next chapter, the securitization process will be discussed in detail. Chapter 3 explains what securitization is and how it works, and why banks sell loans into a secondary market. The chapter provides the final bit of background needed before moving on to the task at hand--that is, explaining what prompts a bank to participate in the Farmer Mac II loan sale program.

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[1]This paper will focus on issues related to the Farmer Mac II loan sale program.

CHAPTER 3

SECURITIZATION

This chapter reviews the theoretical and empirical literature on securitization. Starting with a definition of traditional financial intermediation, the discussion then introduces securitization and explains the difference between the two. Moving on, secondary markets and the role they play in the securitization process is examined. A breakdown of the various types of loan-backed securities rounds out the preliminary background regarding securitization. The chapter then reviews the reasons for securitization from a bank's vantage. The reasons are broadly grouped into regulatory and non-regulatory incentives.

Financial Intermediation

Financial intermediation or indirect finance is the primary route for moving funds from savers to borrowers in an economy with information and transaction costs. Intermediaries issue indirect claims to savers with cash flows that vary with those received from borrowers. Carlstrom and Samolyk (1993) refer to this process as "asset transformation." They identify three types of asset transformation: denomination

transformation, credit risk transformation, and maturity transformation.

Denomination transformation involves issuing smaller-denomination claims to many savers in order to fund larger-denomination credits to borrowers. For example, it would be costly for a borrower to identify and organize a sufficient number of small savers to fund a home mortgage. Substantial costs would also arise if each and every saver had to directly monitor a number of borrowers. Information and transaction costs could be reduced by a financial intermediary performing the denomination transformation service to finance the mortgage. Denomination transformation also enhances a lender's ability to diversify their investments by allowing them to hold a wider variety of assets.

Credit risk transformation involves pooling risks. By spreading their resources across many borrowers, the financial intermediary can issue indirect claims to savers that have a more predictable cash flow than any individual asset in its portfolio. In the event of an isolated default, the loss is spread across all savers so that no individual saver is exposed to a high degree of risk.

Maturity transformation occurs when financial intermediaries issue shorter-term claims to savers that are used to fund longer-term loans to borrowers. Thus, financial intermediaries create liquidity.

Securitization vs. Traditional Financial Intermediation

Securitization is a relatively new innovation in the banking industry that differs markedly from so-called traditional financial intermediation (Cumming 1987). Traditional financial intermediation occurs when a bank funds its asset portfolio by issuing liabilities in its own name. Although traditional financial intermediation has become more complex over time, the basic nature of its credit delivery system remains unchanged.

Securitization breaks with traditional financial intermediation. Cumming (1987) defines securitization as the "matching up of borrower and saver wholly or partly by way of the financial markets" (p.11). For example, bonds and commercial paper wholly match borrowers and savers, completely replacing traditional financial intermediation. This type of financing is referred to as direct finance because the asset transformation process is absent. Asset-backed securities, in contrast, only partially match borrowers and savers, using a financial intermediary to originate a loan and the financial market to identify the final investor. In this latter case, the conversion of bank loans into marketable securities changes a lender's perception of loan quality by combining the basics of credit origination with the marketability of the loan in the capital market.

Securitization is not disintermediation. Disintermediation, as used here, refers to the displacement of traditional

financial intermediation. Disintermediation emulates tradi-
tional financial intermediation by shifting the matching
process from banks to nonbank financial institutions--such as
insurance companies. Like banks, these institutions generally
do not alter the form of the financial claim. For example, a
bank retail customer may withdraw his deposit and purchase a
whole life insurance plan from an insurance company that then
invests the funds in a home mortgage. Although the whole life
plan and the saving deposit are not perfect substitutes, they
do share some common attributes. Since the insurance company
could conceivably fund the same home mortgage that the bank
would have, disintermediation simply involves the shifting of
claims around among different holders.

Securitization changes the matching process and therefore
the form of the financial claim. Traditional financial inter-
mediation packages or bundles the key elements of a loan: loan
origination, servicing, and funding. It also involves manag-
ing the credit, market, and funding risk that arise in match-
ing borrowers and lenders. The form of the financial claim is
not changed.

The matching process is altered under securitization
because a bank separates (or unbundles) the key elements of a
loan. The bank may originate and service the loan but not
fund it, or originate the loan but not service or fund it.
This unbundling eventually leads to changes in the form of the
financial claim.

Suppose a bank originates a loan and decides to service, but not fund it. Further suppose the bank sells the loan to a conduit (such as the Federal Home Loan Mortgage Corp. or "Freddie Mac") who assembles similar loans into a pool and then issues a loan-backed security for sale in the capital market. This process alters the form of the original financial claim. Securitization involves asset transformation from the financial institution's perspective. Note that disintermediation and securitization are similar in that both displace traditional financial intermediation; disintermediation emulating it, securitization replacing it.

Secondary Markets

Although many different types of transactions fall under securitization broadly defined, the purpose of this dissertation is to study how securitization is involved in the secondary market. Thomas Fitch (1990) defines a secondary market as a market where existing loans (or other assets) are sold to investors, either directly or indirectly, through an intermediary. The focus of this dissertation is thus the indirect sale of loans by commercial banks to investors via a government sponsored enterprise called Farmer Mac. A government sponsored enterprise (GSE) is a federally chartered credit institution that sponsors a secondary market by issuing bonds to purchase loans.

The practice of purchasing or selling loans by the bank-

ing industry is not a new phenomenon. Loans have been partic-
ipated or sold on a stand-alone basis for many years. Histor-
ically, loan participations or sales were specifically tai-
lored to the needs of the buyers and sellers whether or not
the loans were initially originated for such purposes. This
type of "traditional" loan sale does not alter the form of the
financial claim since the loan does not undergo any type of
asset transformation.

In addition to participations and traditional loan sales,
banks can sell loans into secondary markets. However, loans
involved in this type of sale must be standardized so that the
buyer (or conduit) can assemble similar loans into pools and
issue a security that can be sold to investors in the capital
market. Financial claims undergo substantial changes in
secondary market transactions that do not occur in a tradi-
tional sale or participation.

The practice of securitizing loans in lieu of purchasing
and selling loans on a stand-alone basis is attributable to
technological advances, the characteristics of certain loans,
and government encouragement. Advances in computer technolo-
gy, specifically electronic record keeping and information ex-
change, have enabled the development and enhanced the sophis-
tication of secondary markets.

Pavel (1986) identifies various loan characteristics that
facilitate or hinder securitization. Since loan terms and
structures vary significantly, not all loans are easily secur-

itized. For example, only 22 percent of conventional mortgages have been securitized, while 85 percent of FHA/VA insured mortgages have been. Commercial and industrial loans are rarely, if ever securitized.

Like most financial assets, the riskiness of an asset-backed security is the primary determinant of its price. As the riskiness of a security rises, its price must fall, thus increasing its associated yield. As the yield on the security rises for a given average yield on the underlying pool of loans, the benefits of securitization are reduced. Pavel claims that the key to the process is the ease and accuracy in which the portfolio of loans underlying a security can be evaluated. Claims with well-defined payment patterns, sufficient term to maturity, and understandable and predictable credit characteristics--such as mortgage loans--are prime candidates for securitization. Added credit enhancements further facilitate the securitization process. Guaranteeing the loans to be pooled, guaranteeing the security, and over-collateralization are popular methods for overcoming the difficulty in evaluating the underlying loan portfolio and asset-backed security.

Another factor that affects the yield on the asset-backed security, aside from the factors mentioned above, is the liquidity of the security. If an asset-backed security is not easily marketable, its price would have to be adjusted to include a substantial liquidity premium to attract investors.

Here again, the benefits from securitization would be reduced.

The liquidity aspect of Farmer Mac's asset-backed securities is especially relevant. Up to this point in time, there has not been a market for their loan-backed securities, and no assurance that such a market for their securities will ever develop.

Ginnie Mae, Fannie Mae, Freddie Mac, Sallie Mae, Farmer Mac, and the rest of the GSE family represent the government's effort to create and maintain secondary markets for loans. The government has, explicitly or implicitly, encouraged securitization by directly guaranteeing certain types of loan payments, by directly or indirectly guaranteeing certain types of loan-backed security payments, and by its more favorable tax and regulatory treatment of certain financial transactions and instruments.

The government's effort to create and maintain secondary markets for loans is evident by examining the numbers. The first mortgage-backed security was issued in 1970 by the Government National Mortgage Association (Ginnie Mae). Since then, Ginnie Mae, Fannie Mae, and Freddie Mac have pooled and securitized roughly half--over $1.7 trillion--of all outstanding single-family mortgage debt (United States Treasury 1996).

Types of Loan-Backed Securities

The form the original financial claim eventually takes depends on the type of security the conduit eventually issues.

Once a group of loans is assembled, many different types of
loan-backed securities can be issued and sold. Pavel (1986)
notes three major types of securities: pass-throughs, mort-
gage-backed bonds, and pay-throughs. Though all three types
are collateralized by an underlying pool of loans or mort-
gages, each type of security differs with regard to ownership,
repayment, and bookkeeping. The various types of asset-backed
securities and common examples of each are discussed below.

Pass-through securities

Pass-throughs were the first, and remain the least com-
plex and most popular loan-backed security. Pass-through
securities are issued using pooled loans that are similar in
term to maturity, interest rate, and quality. Certificates of
ownership, representing the underlying loans held in trust,
are sold to investors. Loan payments are collected by the
originator and passed through to the investor. More often
than not, the originator passes payments on to a third-party
trustee, who then passes them on to the investor. This is
especially true for GSE securities. In return, the originator
is allowed to keep any origination fee as well as a service
fee. A key attribute of a pass-through security is that the
debt obligation does not appear on the balance sheet of the
originating financial institution. Origination and service
fee income earned by a bank without an associated balance
sheet commitment is referred to as off-balance sheet banking.

An example of a popular pass-through is the Ginnie Mae. Ginnie Maes are collateralized with loans that are guaranteed by the Department of Veterans Affairs (VA) or insured by the Federal Housing Administration (FHA). The securities' payment of interest and principal is guaranteed by the Government National Mortgage Association (GNMA). The term to maturity of a Ginnie Mae pass-through is uncertain. If interest rates fall, the principal will be repaid faster, since homeowners will exercise the option to refinance their mortgage; if rates rise, principal will be repaid more slowly, since homeowners will not choose to refinance. The originating bank or savings and loan typically retains 50 to 150 basis points before passing-through the payments to investors.

Mortgage-backed bonds

A mortgage-backed bond is a security that is collateralized by a portfolio of mortgages. The underlying loans remain on the issuer's balance sheet as assets and the new security is carried as a liability. Payments to investors are made from the issuer's general funds.

Mortgage-backed bonds are usually over-collateralized for reasons that arise from the handling of ownership and payment. A mortgage-backed issuer is subject to prepayment risk because repayment is not directly routed to the bond holder. Recall, the loans remain on the issuer's balance sheet as assets. Since borrowers are generally allowed to repay early, there is

a possibility that the outstanding balance of the loans comprising the security could decline faster over time than the principal of the security itself--thus, creating a potential maturity gap.

For example, suppose an institution has pooled together a group of 12 percent fixed-rate mortgages and uses them to back an 8 percent mortgage bond. A drop in interest rates--say to 10 percent--will trigger mortgage borrowers to refinance. However, since payments of these types of bonds are not routed directly to the security holder, the institution will find itself with prepaid mortgage receipts it cannot use to pay off its bond obligation. The institution's only recourse is to lend that money at the new lower market rate and accept the lower net interest margin. Had the security been a pass-through, the institution would have simply passed-on the prepayments to the security holders. In general, financial institutions prefer to reprice their assets and liabilities at the same time, thus avoiding so-called interest rate risk.

Over-collateralization also protects investors from any default risk associated with the mortgages underlying the pooled security. Lastly, over-collateralization compensates for the risk arising from the possibility of the physical collateral depreciating.

Mortgage-backed bonds are less attractive to financial institutions and more attractive to investors than pass-through securities because mortgage-backed issuers incur the

burden of prepayment risk. (The opposite is true of the pass-through.) Moreover, the mortgages underlying a mortgage-backed security remain on the books as collateralized assets. Since regulators treat the bonds as debt rather than a sale of assets, the attractiveness of this type of security from a financial institution's perspective is further reduced.

Pay-through securities

Pay-through securities are hybrid financial instruments that combine characteristics of both pass-throughs and mort-gage-backed bonds. Like pass-throughs, payment is routed directly to the investor. Like mortgage-backed bonds, owner-ship remains with the issuer of the security. The security is carried as a liability on the issuer's balance sheet.

Pay-throughs and pass-throughs give the issuer the advan-tage of avoiding prepayment risk. To accommodate pay-through investors, a special type of security called a collateralized mortgage obligation (CMO) was introduced. The CMO issue is divided into several maturity classes, or tranches, with each tranche receiving semi-annual interest payments. The princi-pal and any prepayments initially accrue to the class with the shortest maturity. After the shortest maturity class is retired, payments accrue to the next class, and so on. Inves-tors concerned with the uncertainty of the term of a security would prefer a CMO over a pass-through. The two major issuers of CMOs are Freddie Mac and Fannie Mae.

Farmer Mac's securities are referred to as "Guaranteed Agricultural Mortgage-Backed Securities" (AMBS). The securities evidence beneficial ownership interests in a trust fund consisting of one or more segregated pools of "Qualified Assets." Qualified assets include the following: (1) various types of agricultural real estate mortgage loans ("Qualified Loans"); (2) portions of loans guaranteed by the USDA ("Guaranteed Portions"); (3) Trust Fund AMBS; (4) mortgage pass-through certificates; (5) other mortgage-backed securities evidencing interests in or secured by Qualified Loans or Guaranteed Portions, or (6) any combination thereof (FAMC 1998). In other words, the securities ultimately represent ownership of the loans that the Farmer Mac I and II programs have the authority to purchase and securitize. Farmer Mac guarantees the timely payment of interest and principal of the securities. The pass-through structure of the security was mandated by the legislation that created Farmer Mac (FAMC 1990).

Reasons for Securitization

The motives behind securitization fall into two general theoretical categories: regulatory incentives and non-regulatory incentives. Legal and regulatory structures such as capital requirements, reserve requirements, limits on types of depository lending, and fixed-price deposit insurance distort the incentive to employ traditional financial intermediation.

Banks may then respond by securitizing loans. Non-regulatory motives, such as the ability to reduce interest rate risk, may also prompt loan sales.

Regulatory incentives

The regulatory incentives behind loan sales are explained by the "regulatory tax hypothesis" and the "moral hazard hypothesis." The regulatory tax hypothesis is discussed in Pennacchi (1988) and Pavel and Phillis (1987). Flannery (1989) and Pyle (1985) explain loan sales by applying the concept of moral hazard.

The regulatory tax hypothesis is based on the idea that various institutional regulations such as capital constraints and the holding of non-interest bearing reserves impose implicit and explicit costs (or "taxes") on banks. Banks respond by adopting credit delivery systems that reduce the burden of these taxes. Regulation and deposit insurance affect the volume of securitization and the types of loans securitized.

Pennacchi (1988) develops a model that shows why banks sell loans in the presence of regulatory taxes by demonstrating that the cost of holding non-interest earning reserves, the need to satisfy capital requirements, and the level of deposit insurance premiums raise the cost of deposit funds for a bank above what nonbank institutions must pay for funds. Essentially, any comparative advantage the bank has in origi-

nating and servicing a loan is offset by the comparative disadvantage of funding it with deposits, after accounting for the regulatory tax burden.

To lower the cost of funds, the bank sells loans rather than buying additional deposits to fund them. Keeping deposits off the balance sheet lowers the cost of funds by eliminating deposit insurance premiums, avoiding the need to issue costly additional equity, and removing the obligation of holding non-interest earning reserves against deposits. The resultant lower marginal cost of funds increases the bank's loan volume and increases profitability.

Pavel and Phillis (1987) perform an empirical analysis that supports Pennacchi's theoretical results. They find that required reserves and capital requirements are significant determinants of loan sales. They also suggest that regulatory limits on depository lending such as the "Qualified Thrift Lender Test," which requires thrifts to hold a minimum fraction of their portfolio in the form of home mortgages, may constrain portfolio diversification and encourage securitization.

James (1987, 1988) questions the regulatory tax hypothesis by noting that nonbank financial institutions, which are not subject to such restrictions, also sell loans. Moreover, James maintains that securitization remains popular in spite of reductions in the reserve requirements set by the Board of Governors of the Federal Reserve System.

The moral hazard hypothesis is predicated on the idea that fixed-rate deposit insurance encourages banks to change their behavior regarding their choice of assets.

Flannery (1989) contends that loan sales are the result of the combination of loan examination procedures and capital adequacy regulations. According to Flannery, insured banks prefer low risk individual loans, but seek high portfolio risk in order to maximize the value of their deposit insurance put options. Flannery contends that bankers have a comparative advantage in originating loans of various default risk categories, but regulatory standards play a role in which loans a bank will have a comparative advantage in financing. If regulators apply different capital standards across banks, each bank may have a different optimal risky loan category. Many types of loans will be originated; loans with the optimal risk will be held, the rest will be sold.

In particular, regulatory authorities compel banks to write down bad loans, but carry appreciating assets at book value. Under such treatment, the ability to absorb future losses out of bank capital is underestimated. To avoid this understatement, a bank sells any asset that has appreciated. Banks with high market-to-book capital ratios or low capital ratios combined with high net charge-offs should sell more loans than banks with the opposite attributes.

Pyle (1985) suggests that off-balance sheet banking, of which loan sales are an example, is the result of the moral

hazard problem that arises in the presence of fixed-rate deposit insurance. To enhance the subsidies associated with fixed-rate deposit insurance, a bank can increase asset risk and financial leverage by selling relatively low risk loans while carrying riskier loans on the balance sheet.

The moral hazard hypothesis ignores two realities, however. The first is that the all-in-cost of insured deposits may be less than other forms of funding. The second is that non-depositories (institutions that do not make use of insured deposits) participate in the loan sale market.

The regulatory tax and moral hazard hypotheses may in part explain why certain banks--especially large ones--sell loans. The main deficiency in these theories is the inability to explain why uninsured financial institutions that are not subject to similar regulations sell loans. In addition, many banks that operate in the same regulatory framework do not sell loans. Thus, there may be incentives that lie in the non-regulatory functioning of a bank.

Non-regulatory incentives

Pavel and Phillis (1987) find empirical evidence showing that banks sell loans to avoid interest rate risk and to facilitate loan portfolio diversification. By selling a fixed-rate loan, a bank can pass the interest rate risk on to the purchaser while continuing to underwrite the credit risk (risk that a borrower will default). Depository institutions

wishing to diversify across a different set of loans than they originate and service might also use loan sales as a management tool.

James (1987, 1988) claims that banks separate the funding of a loan from other services associated with lending to avoid the underinvestment problem that arises when a bank has outstanding risky debt, such as large uninsured certificates of deposit.

Underinvestment refers to the situation where firms pass up new, positive net present value investments. Meyers (1977) has pointed out that a firm will pass up profitable projects if the new investment opportunity reduces the risk of outstanding debt claims, thereby redistributing wealth from stockholders to debt holders. James applies the same concept to the banking firm. Here, if the bank has outstanding uninsured CDs, it will pass over new, positive net present value loans in order to reduce the wealth transfer between equity owners and debt holders. James demonstrates that a bank using debt funding can sell all or part of the cash flows generated from a new loan--effectively issuing collateralized debt--and avoid the underinvestment problem.

To demonstrate the concept, suppose a bank has risky debt outstanding that pays a contractually fixed rate of interest. Suppose further that a new loan opportunity arises which is to be financed using new unsecured debt. The promised payment on the new funding must reflect the uncertainty of the cash flow

of all existing assets as well as the new loan. If the bank has the opportunity to finance the new loan using secured debt, the promised payment need only reflect the uncertainty of the cash flow of the new loan. If the new loan is not relatively risky, the cost of secured debt financing will be lower than the cost associated with unsecured debt financing. Hence, by using loan sales as a substitute for secured debt, a bank may take on low risk loans that it would pass up if forced to fund using large uninsured CDs.

James also shows that the presence of fixed-price deposit insurance and capital requirements exacerbate the underinvestment problem and provide a further incentive to securitize. Fixed-price deposit insurance exacerbates the underinvestment problem because the rate on existing deposits will not adjust fully to reflect the marginal contribution of the new loan to the overall risk of the bank. Here, the wealth transfer occurs between shareholders and the deposit insurance authority. Again, the result is underinvestment in relatively riskless loans and overinvestment in relatively risky loans.

Capital requirements exacerbate the underinvestment problem if new low risk loans must be supported by additional equity. Both existing uninsured depositors and the deposit insurance authority benefit from the banks inability to substitute a reduction in asset risk with an increase in financial risk. The bank will either underinvest by refusing the loan or sell the loan to avoid a redistribution of wealth.

Carlstrom and Samolyk (1993) develop a model in which loan sales occur as a response to capital constraints that arise when banks operate in distinct, informationally segmented markets. Without access to asset-backed lending, bankers in markets with profitable opportunities but insufficient deposits to meet their funding needs will find themselves capital constrained.

With asset-backed lending, banks in constrained markets will originate and sell unfunded profitable loans to institutions in unconstrained markets. The purchasing institutions prefer buying individual projects as opposed to extending deposit claims to the capital constrained bank. Lending via deposit liabilities would create claims on the entire constrained bank's portfolio, creating monitoring difficulty and expenses because the two markets each institution operates in are segmented.

Greenbaum and Thakor (1987) incorporate asymmetrical information into their model of bank funding modes. In the absence of a central bank that regulates, provides deposit insurance and other services, and the presence of asymmetrical information regarding borrower's pay off distributions, banks will sell their higher quality assets and fund their lower quality assets. However, introducing a central banking authority that regulates and subsidizes certain services diminishes the incentive to sell loans. Greenbaum and Thakor also note that the current erosion of such subsidies and the devel-

opment of new information processing technology will allow banks to better exploit their competitive advantage in originating and servicing loans and lead them to sell loans regardless.

Other

In a non-theoretical discussion, Walker (1990) outlines several reasons some banks have decided not to sell assets. Some banks (1) have room in their portfolios for additional loans; (2) may not be able to replace the loan with a similar loan (or any loan) if sold; (3) are compelled to accept more deposits than they can profitably employ to foster relationships with their customers; (4) may be able to raise funds across the spectrum of all maturities more cheaply than an asset-backed security can; and (5) do not have the competence required to participate in small or large scale asset sales because of insufficient personnel, technology, tax or legal support.

Summary

The success of any secondary market hinges in part on the institutional nature of the loans securitized, the securities issued, the participants in the process, and the process itself. More often than not, regulation or legislation influences the loans, securities, participants, and processes that are involved in securitization. In addition to the given

institutional framework, the viability of a secondary market
depends on the incentive to participate. The incentive to
participate may be enhanced or diminished by the institutional
factors mentioned above. In this sense, the incentive to
participate is not mutually exclusive of, for example, the
design of the program. Additionally, incentives will be
contingent on the economic environment presently facing the
potential secondary market participant.

Thus, the viability of the Farmer Mac II loan sale pro-
gram depends on its institutional framework, the compatibility
of that framework with the inherent economic incentives, and
on the economic environment.

The question addressed in this dissertation is this:
Given the existing structure and conditions of agricultural
credit markets, recent policy changes aimed at graduating FSA
borrowers from direct lending programs to commercial sources
of credit, and the structure of the Farmer Mac II loan sale
program, what are the compelling economic incentives that
underlie a risk-averse profit-maximizing commercial bank's
decision to participate in the Farmer Mac II loan sale pro-
gram? Is it possible to accurately predict the probability of
a bank participating? And, if so, what are the factors useful
in making that prediction?

In the next chapter, a simple economic model will be
developed that attempts to capture the essence of a risk-
averse profit-maximizing bank's portfolio allocation process.

The model is limited to the particular task at hand--that is, identifying the economic incentives to sell USDA/FSA guaranteed loans the into Farmer Mac II secondary market.

CHAPTER 4

A MODEL OF BANK BEHAVIOR

The purpose of the model developed in this chapter is to examine the conditions under which a bank would be willing to sell USDA guaranteed loans into the Farmer Mac II secondary market. The model is based on the short-run asset management theory of banking. Liability management is suppressed for reasons to be discussed shortly.

Bank asset managers are concerned with liquidity, solvency, and profitability. Banks need liquidity to satisfy deposit withdrawals and fund legitimate loan requests. Liquidity is incorporated into the model by allowing changes in deposit levels and loan demand to alter the bank's ability and willingness to sell loans, as is consistent with the design and intent of the loan sale program.

Solvency refers to the difference between the realizable value of bank assets and bank liabilities should the bank experience economic distress. The concept of solvency is not addressed by imposing an external institutional soundness constraint. Adding such a constraint would not alter the incentive to participate, but could limit the extent of participation. Rather, the bank will consider the riskiness of

any portfolio decision as discussed below.

Profitability is the return shareholders earn for employing their capital. Investing capital in a portfolio of loans with a positive probability of default makes the return on the portfolio uncertain. The model will force bank asset managers to balance the trade-off between the risk and return associated with any portfolio choice. Because risk and return are positively related, bank managers will have to accept additional risk for pursuing portfolios that are more profitable. It should be noted that the selection of a portfolio also implies the off-balance sheet activity of collecting service fees if the bank is selling loans to Farmer Mac.

The development of the model begins with specifying the constraints faced by the bank. Along with the usual resource constraint, the loan sale program feature that allows the bank to sell only the guaranteed portions of USDA guaranteed loans will be imposed. Next, a function that defines the bank's preferences with respect to the trade-off between risk and return will be introduced. Given preferences, the bank can pick an optimal portfolio from the various portfolios available.

Constraints

The bank faces three constraints. The first is a resource constraint. The second is a constraint arising from the structure of the Farmer Mac II loan sale program. The final

constraint requires that USDA loan volume be non-negative.

Resources

Assume a bank with the following simplified resource constraint:

$$D+K = L+S, \tag{1}$$

where D is deposits, K is bank capital, L is the total volume of USDA guaranteed loans originated, and S is the volume of Farmer Mac securities. All variables are measured in dollars. The resource constraint is represented as an equality. The bank will always purchase assets equivalent in value to its resources, since it is assumed that additional investment in the Farmer Mac security increases interest income without increasing risk.

A note concerning the Farmer Mac security is in order. Farmer Mac securities are somewhat risky as can be ascertained from the legend on the certificate representing each security. It reads:

> The Federal Agricultural Mortgage Corporation hereby guarantees timely payment of interest and principal on the Farmer Mac II Guaranteed Securities in accordance with the terms of the security issued. The Farmer Mac II Guaranteed Securities are not obligations of, and are not guaranteed as to interest or principal by the Farm Credit Administration, the United States, or by any other agency or instrumentality of the United States (other than the Federal Agricultural Mortgage Corporation). (FAMC 1990, 302)

However, it is assumed in constructing the bank's objective function that Farmer Mac securities are risk-free. The

assumption does not conflict with the discussion and language above if a line of reasoning is established that shows Farmer Mac securities to be risk-free de facto albeit not de jure.

Assume Farmer Mac cannot meet its obligations. This default would in all likelihood reverberate into other financial markets. Although Farmer Mac bonds are not explicitly backed by the U.S. Treasury, investors purchase them on the assumption that they are implicitly guaranteed. This so-called "agency status" attribute of Farmer Mac securities creates a dilemma. If Farmer Mac collapses, the federal government does not have any legal obligations to investors. However, if the federal government does not step in and back the claims, investor's confidence in other agency status debt, such as the Federal National Mortgage Association (Fannie Mae), Farm Credit Administration, Federal Home Loan Mortgage Corporation (Freddie Mac), etc. could diminish. Even confidence in U.S. Treasury bonds could be at risk. Casual proof of this reasonoming is evidenced by the bailout and overhaul of the Farm Credit System in the late 1980s. From the bank's viewpoint then, Farmer Mac securities are treated as risk-free.

Note that equation (1) does not represent the bank's balance sheet, despite its seeming similarity. The reason is that participation in the loan sale program allows the bank to generate income or fees from off-balance sheet activities in addition to income derived from assets held on the balance

sheet. Hence, the relevant constraint is the bank's resources, not its balance sheet.

Deposits and bank capital, the internal resources of the bank, are assumed given. This assumption is consistent with the notion that small, geographically isolated, rural banks have limited access to funding sources. However, the bank can leverage its portfolio by participating in the loan sale program. Leverage, as used here, occurs when the optimal dollar value of loans originated, determined by the portfolio decision, is larger than the bank's internal resources. In other words, the bank is participating in the loan sale program if the total dollar volume of loans originated (L) exceeds the internal resources (D+K) of the bank.

Farmer Mac II program constraint

The structure of the loan sale program limits the bank's behavior through the resource constraint. Farmer Mac II allows for the entire sale of only the guaranteed portion of a loan (Pub. L. 101-624; 104 Stat. 3834). The USDA's guaranteed loan program permits the guarantee to vary up to a maximum of 90 percent. (Presumably, the unguaranteed portion encourages diligence on the part of the bank in servicing the loan.)

This Farmer Mac loan sale program feature, combined with the resource constraint and the assumption that the bank's internal resources are fixed, yields a restriction on how large loan volume can be and hence, the degree of participa-

tion in the program. The restrictions on loan volume and participation are, respectively:

$$0 \le L \le \frac{1}{1-g} (D+K),$$
(2)

$$\frac{-g}{1-g} (D+K) \le S \le D+K,$$
(3)

where g is the guarantee rate on USDA guaranteed loans.

Equation (2) requires that the total dollar volume of USDA loans originated be non-negative and no larger than the amount that corresponds to selling the full guaranteed portion of all loans originated. The upper dollar limit on loans rises as the bank's internal resources rise or the guarantee rate increases.

Equation (3) allows no more than the total internal resources of the bank to be held in Farmer Mac securities in the event that loan volume is zero. The bank cannot sell Farmer Mac securities but can leverage its portfolio via participation in the loan sale program. Since the total dollar volume of loans is limited to the amount that corresponds to selling the full guaranteed portion of all loans originated, participation is accordingly limited also.

The guarantee rate will eventually be allowed to vary to see how the incentive to participate in the loan sale program changes. However, it is not modelled as a choice variable from the bank's perspective. Bankers logically attempt to guarantee loans at the maximum rate of 90 percent.

At this point a simple numerical is provided for illus-
tration. Assume the guarantee rate is 90 percent and the
internal resources of the bank total $100,000. Also assume
the bank chooses to originate and hold $100,000 worth of
loans. The bank could then sell the 90 percent guaranteed
portions of those loans to Farmer Mac for cash, take the
proceeds and originate an additional $90,000 in loans. The
total loan volume originated at this point is $190,000. The
bank's net investment is still $100,000--the $10,000 residual
from the sale plus $90,000 in new originations. Furthermore,
by selling the 90 percent guaranteed portion of the additional
$90,000 in loans, the bank could originate $81,000 more in
loans. The bank could continue to sell the 90 percent guaran-
teed portion and originate new loans with the proceeds. There
is a limit however. Given the 90 percent guarantee rate and
$100,000 in initial resources, the bank is limited by the
program to originating a maximum of $1 million worth of loans.
Again, its net investment totals $100,000. The other $900,000
in loans has been sold to Farmer Mac through the loan sale
program.

Preferences

Given the resource and program constraints facing the
bank, the next step is to introduce a function that defines
the bank's preferences with respect to profit and risk. The
bank's objective is to maximize a utility function (U) of the

form:

$$U = -e^{-b\pi} ,$$ (4)

where π is profits and b is a measure of risk aversion.

The term b can be shown to be the negative of the ratio of the second to the first derivative of the utility function. This ratio is a commonly used measure of risk aversion. As b decreases, risk aversion decreases. The specified utility function also has the desirable property of decreasing absolute and constant relative risk aversion. Decreasing absolute risk aversion implies that risk aversion decreases as profit increases, while constant relative risk aversion means that the bank will have constant risk aversion to a proportional loss of wealth even though the absolute loss increases as profit does.

If profit is normally distributed, maximizing expected utility in equation (4) is equivalent to maximizing:

$$V = E(\pi) - (\frac{b}{2}) \sigma^2_{\pi} ,$$ (5)

where V is the new objective function to be maximized, $E(\pi)$ is expected profit, and σ^2_{π} is the variance of profit. The variance of profit is used as a proxy for risk.

Expected Profit and Variance

The objective function in equation (5) asserts that the lender seeks a balance between a portfolio's expected profit and the variance of profit. The bank is willing to accept

more risk only if the additional risk is accompanied with higher expected profit. The arguments, expected profit and variance, must be expressed in terms of the bank's ability to manipulate them via changes in its portfolio holdings.

Expected profit

The bank's profit function is:

$$\pi = FS + (1-d)PL + d[\lambda + g(P-\lambda)]L - C(L), \qquad (6)$$

where d is the default rate, P is the gross return on USDA guaranteed loans, λ is the gross liquidation rate of a USDA guaranteed loan should default occur, F is the gross risk-free rate earned on the Farmer Mac security, C(L) is the total cost associated with originating and servicing USDA guaranteed loans.

The revenue from Farmer Mac securities is the product, FS. The gross rate of return earned on these securities, F, is also the rate the bank would receive in the event of a loan sale. Any Farmer Mac and trustee fees associated with selling a loan must be ignored if the bank is to enjoy equal risk-free buying and selling rates.

The second product in the profit function represents the revenue from USDA loans held in the portfolio that are repaid. If d, a random variable from the bank's respective, is the proportion of loans that will default, 1-d is the proportion of loans that will be repaid. Let d be distributed normally with mean, μ, and variance σ^2. Since d is normally distribut-

ed and π is a linear function of d, π will be normally distributed as required by the objective function in equation (5). Note that d is the source of uncertainty in equation (6), all other variables therein are non-random.

The rate of return on USDA loans, P, is a function of USDA loans originated, L:

$$P = P_c + \theta ,\qquad (7)$$

where P_c is the competitive loan rate and θ is a nonstochastic mark-up factor. The amount that a lender can charge a borrower in excess of the competitive rate depends on local demand as well as the degree of local market power. Assume:

$$\theta \geq 0 ,\qquad (8)$$

$$\frac{\partial \theta}{\partial L} < 0 ,\qquad (9)$$

and

$$\frac{\partial \theta}{\partial L}\frac{L}{\theta} = -\delta .\qquad (10)$$

The assumption in (9) reflects the notion that the mark-up factor decreases as the bank's loan volume increases. The relationship in (10) proxies the degree of local market power the bank enjoys. Specifically, equation (10) states that a given percentage increase in loan volume will lead to a constant percentage decrease in mark-up equal to δ. A larger δ implies a greater degree of local market power. A further stipulation is that $\delta < 1$, or that a given percentage change in

loan volume results in a less than proportionate change in mark-up.

The third term in the profit function is the return the bank earns on defaulted loans. The bank would receive the nonstochastic liquidation rate, λ, plus the guarantee rate, g, times the difference between the loan rate and the liquidation rate. From the bank's perspective, the liquidation rate is less than the loan rate (or there would be no risk associated with lending).

The total cost associated of originating and servicing USDA guaranteed loans is represented by:

$$C(L) = cL, \tag{11}$$

where c is a constant. The total cost is a noninterest expense incurred in originating and servicing loans as opposed to an interest expense. The interest expense involved in carrying the loans is modelled implicitly as the bank's opportunity cost of not holding securities.

Taking the expectation of both sides of the profit function and rearranging yields:

$$E(\pi) = FS + [1 - \mu (1 - g)] PL + \mu \lambda (1 - g) L - C(L) . \tag{12}$$

Variance

The variance of profit, σ^2_π, is:

$$\sigma^2_\pi = (1 - g)^2 \sigma^2 (P - \lambda)^2 L^2 . \tag{13}$$

The Bank's Problem

Given its preferences for risk and return, the bank chooses the dollar volume of Farmer Mac securities and USDA guaranteed loans subject to its resource constraint, the loan sale program constraint, and an institutional nonnegativity constraint.

To solve the bank's problem, use equations (1), (5), (7), (11), (12), and (13) to form the following objective function:

$$\max_{=} V = (1-\mu(1-g))(P_c+\theta)L+\mu\lambda(1-g)L+F(D+K-L)-cL$$
$$-\frac{b}{2}(1-g)^2\sigma^2(P_c+\theta-\lambda)^2L^2, \tag{14}$$

subject to:

$$L \leq \overline{L}, \tag{15}$$

and

$$L \geq 0, \tag{16}$$

where $\overline{L}$ is the maximum loan volume allowed by the program constraint as given by (2) and L≥0 is an institutional non-negativity constraint.

Solution

Differentiating the objective function with respect to loan volume leads to the following first-order Kuhn-Tucker conditions:

$$\Omega_\psi = \overline{L} - L \geq 0, \ \psi \Omega_\psi = 0, \ \psi \geq 0, \tag{17}$$

$$\Omega_L = (1 - \mu(1-g))(B+\lambda) + \mu\lambda(1-g) - F - c - b(1-g)^2\sigma^2 ABL - \psi \leq 0, \tag{18}$$
$$L\Omega_L = 0, \ L \geq 0,$$

where Ω is the Lagrangian, ψ is the multiplier associated with the program constraint and

$$A = P_c + \theta - \lambda, \tag{19}$$

$$B = P_c + \theta(1-\delta) - \lambda. \tag{20}$$

Case 1

If the multiplier associated with the program constraint, ψ, is positive, the bank is originating as large a loan volume as the program rules will permit. The bank wishes to expand its loan volume to an even greater extent but is prohibited from doing so.

The scenario described above would lead to the greatest participation in the loan sale program for any given lender. The conditions favorable to this type of solution would be a low average and variance of the default rate, a high guarantee rate, a low servicing cost per loan, a small degree of risk aversion, and a high liquidation rate. High local demand and a small degree of local market power do not unambiguously push the lender toward the characterized solution.

Case 2

If the program constraint is not binding ($\psi=0$), then the optimum L is found by setting Ω_L equal to zero and solving for L. The second order condition for a maximum follows:

$$\Omega_{LL} = (1-\mu(1-g))(1-\delta)\frac{\partial\theta}{\partial L} - b(1-g)^2\sigma^2 [AB + ((1-\delta)A+B)\frac{\partial\theta}{\partial L}L] < 0. \quad (21)$$

A sufficient condition for Ω_{LL} to be negative is:

$$AB > \left|[(1-\delta)A+B]\frac{\partial\theta}{\partial L}L\right|. \quad (22)$$

The sufficient condition above requires that risk increase at an increasing rate as loan volume increases.

Demand functions

Setting $\Omega_L=0$ and solving for L leads to a solution of the following form:

$$L^* = L(\mu,\sigma^2,\lambda,g,F,c,b,P_c,\delta). \quad (23)$$

The optimum S can be determined from the resource constraint using L^*:

$$S^* = S(\mu,\sigma^2,\lambda,g,F,c,b,P_c,\delta,D,K). \quad (24)$$

Comparative statics

Qualitative comparative static results can be determined without explicitly solving for L^* or S^* using the implicit function rule. For L^*, this can be done by differentiating Ω_L

with respect to L and the particular independent variable of interest. The following results are straight forward:

$$\frac{dL^*}{d\mu} = \frac{-[(1-g)(-B)]}{\Omega_{LL}} < 0, \tag{25}$$

$$\frac{dL^*}{d\sigma^2} = \frac{-[-b(1-g)^2 ABL]}{\Omega_{LL}} < 0, \tag{26}$$

$$\frac{dL^*}{d\lambda} = \frac{-[\mu(1-g)+b(1-g)^2\sigma^2(A+B)L]}{\Omega_{LL}} > 0, \tag{27}$$

$$\frac{dL^*}{dg} = \frac{-[\mu B+2b(1-g)\sigma^2 ABL)]}{\Omega_{LL}} > 0, \tag{28}$$

$$\frac{dL^*}{dF} = \frac{-[-1]}{\Omega_{LL}} < 0, \tag{29}$$

$$\frac{dL^*}{dc} = \frac{-[-1]}{\Omega_{LL}} < 0, \tag{30}$$

$$\frac{dL^*}{db} = \frac{-[(1-g)^2\sigma^2 ABL]}{\Omega_{LL}} < 0, \tag{31}$$

$$\frac{dL^*}{dP_c} = \frac{-[(1-\mu(1-g))-b(1-g)^2\sigma^2(A+B)L]}{\Omega_{LL}} \gtrless 0 \tag{32}$$

$$\frac{dL^*}{d\delta} = \frac{-[-(1-\mu(1-g))\theta+b(1-g)^2\sigma^2 A\theta L]}{\Omega_{LL}} \gtrless 0. \tag{33}$$

The qualitative comparative static results for S* are identical to those for L* (equations 25-33 above), but have the opposite sign. Unlike L*, the optimum S is a function of deposits, D, and capital K. Increases in D or K will cause a proportionate increase in S*--that is,

$$\frac{dS^{\cdot}}{dD} = 1, \tag{34}$$

$$\frac{dS^{\cdot}}{dK} = 1. \tag{35}$$

The signs in (25), (26), (27), (28), (31), (32), and (33) require that

$$B = P_c + \theta(1-\delta) - \lambda > 0. \tag{36}$$

The restriction above is reasonable if a borrower's loan project is competitive and the lender adds a monopoly premium to the loan rate. Should a borrower default, the most the bank could realistically recoup during liquidation would be the competitive loan rate, P_c.

Discussion of comparative static results

The results of the model suggest that banks with certain characteristics will hold relatively more USDA loans in their portfolio and therefore be more likely to participate in the Farmer Mac II loan sale program. A discussion of each characteristic follows.

An increase in the average, μ, or the variance, σ^2, of the default rate causes the bank to reduce its USDA loan volume regardless of whether the bank's portfolio is leveraged. The default rate becomes particularly important if the lender leverages its portfolio by selling the guaranteed portion of a loan to make more loans than its initial resources would support.

To illustrate the point, let the bank have an initial endowment of \$100,000 in internal resources. And, for simplicity, ignore interest payments, assume a guarantee rate of 90 percent, a default rate of unity, and a liquidation rate of zero. If the bank chose to invest its \$100,000 in USDA loans under this scenario, it would end up with \$90,000. If the bank alternatively chose to leverage its resources and made \$1 million in USDA loans, it would end up with nothing because the bank would have to pay-through the \$900,000 it receives from the USDA loan guarantees to Farmer Mac. This example exaggerates an important facet of the loan sale program--the decision to participate must take into account the risk exposure to the bank's net investment. Greater participation in the loan sale program increases the risk exposure to the bank's net investment because the bank ends up holding a larger proportion of its portfolio in the unguaranteed residuals remaining after selling the guaranteed portion of a loan.

An increase in the liquidation rate, λ, increases the bank's incentive to originate USDA loans. Regardless of the default rate, if the liquidation rate was high enough to recoup all interest and principal due, making USDA loans would not be risky. To some extent, banks do reduce their exposure to risk by only loaning a fraction of the project's worth. However, many borrowers finance 90 percent of a project, the maximum allowed by the USDA under its guarantee program. A second relevant point with respect to the liquidation rate

should be noted. If the collateral underlying the loan project is appreciating, the bank's exposure to risk is minimal. The opposite is true if the collateral is depreciating rapidly, as agricultural lenders learned in the mid and late 1980s.

An increase in the guarantee rate, g, will lead to a greater volume of USDA loans. The maximum guarantee rate is set by the USDA. However, the bank can choose to guarantee a loan below the maximum allowed. Evidence shows that most banks guarantee loans at the maximum rate.

A higher return on the Farmer Mac security, F, reduces the volume of loans lenders would prefer to hold in their portfolio for two reasons. First, the risk-free security becomes more attractive because of its higher return. Secondly, since F is the relevant rate should the bank leverage its portfolio, the return from participating in the loan sale program is lower.

An increase in the servicing cost per loan, c, has a negative effect on the volume of loans desired. The servicing cost per loan will be higher for banks that have insufficient personnel, technology, tax or legal support. These banks are not likely to participate in the loan sale program.

The more risk averse a bank's management is (higher b), the fewer loans the bank will make. If asset managers at the bank are risk-neutral, they would simply maximize expected return. The loan sale program would appear very attractive to these managers. However, decision makers that are concerned

with risk would balance any profitable opportunity offered by
the program with any additional risk involved.

A positive local demand shock, P_c, does not lead to an
unambiguous change in loan volume. The intuitive result that
an increase in demand leads to higher loan volume is more
likely the lower the average and variance of the default rate,
the higher the guarantee rate, and the less risk averse the
bank's management is. The reason that a demand shock does not
unambiguously lead to higher loan volume again rests on the
idea that originating more loans increases risk. A satisfac-
tory increase in return, given the risk, will entice the bank
to make more loans. A risk-neutral bank would unambiguously
increase its loan volume as P_c rises.

The ambiguous sign on the demand shock parameter gives
insight into the reason that the growth of guaranteed lending
is mostly due to the guaranteeing of existing loans already at
commercial lenders rather than converting existing USDA direct
loan borrowers to loan guarantees (GAO 1989). Lenders appear
eager to shore up the existing loans in their portfolio, but
reluctant to add new ones. Policy makers hoping that the new
loan sale program will accommodate former USDA direct loan
borrowers now looking for guaranteed loans may be disappoint-
ed.

Greater local market power does not lead to an unambigu-
ous decrease in loan volume. Recall, greater local market
power is evidenced by a larger δ. A larger δ implies the

monopoly premium added to the competitive loan rate will decline faster for any given increase in loan volume. The intuitive result that greater local market power leads to a lower loan volume is more likely the lower the average and variance of the default rate, the higher the guarantee rate, and the less risk averse the bank is. A risk-neutral bank would unambiguously reduce its loan volume as δ rises.

An increase in deposits will result in less portfolio leverage. For any given loan volume, banks with larger deposit bases are less likely to participate in the loan sale program than are ones with smaller deposit bases.

Finally, a larger capital position does not alter the loan volume the bank chooses. It does, however, increase the amount of risk-free Farmer Mac securities the bank will hold. Banks that are well capitalized will not likely participate in the loan sale program.

The internal resources, deposits and capital, do not affect loan volume. This result is consistent with the Fisher separation principle. The separation principle holds that investment and funding decisions are divorced (Copeland and Weston 1988). If the bank wants to originate a loan but cannot fund it given its internal resources, it sells the loan to Farmer Mac.

The comparative static results support some of the claims made regarding the new loan sale program. Lenders with limited resources are more likely to participate in the program.

Lower Farmer Mac security rates also increase the incentive to participate. Lenders equipped to originate and service loans at relatively low costs per loan will also be attracted to the program.

Theoretically, banks will not unambiguously undertake profitable opportunities offered by the program. But, if the profitable opportunity outweighs the additional risk involved, the intuitive result holds. In addition, for any degree of risk aversion, factors that reduce risk do lead to an increased chance of participation.

Summary

In this chapter, a risk-averse profit maximizing bank chose its optimal portfolio using a mean-variance selection criterion. One of the assets to choose from was a risk-free security; the other, a risky asset characterized by a downward sloping demand curve. The bank could leverage its portfolio, not by borrowing at the risk-free rate, but rather by selling loans into a loan sale program. Any factor that increases the bank's loan volume makes it more likely that the bank will sell loans. Reductions in capital or deposits do not affect the optimal loan volume, but do increase the probability of participating. This is because a reduction in capital or deposits could reduce the internal resources of the bank below the optimal loan volume a bank has selected.

Chapter 5 summarizes and formalizes the hypotheses from

the model just developed and from the literature discussed in

Chapter 3. It also suggests the data that could be used to

test the hypotheses. Next, it discusses the procedure used to

collect the data. Finally, it discusses the methods of inqui-

ry to be used in Chapters 6 and 7.

CHAPTER 5

PRELIMINARY SPECIFICATION

The purpose of this chapter is three-fold. First, the testable hypotheses suggested by the preliminary chapters and the theoretical model developed in Chapter 4 will be reviewed and formalized. Next, the procedure used to collect the data used in Chapters 6 and 7 is described. Finally, this chapter explains how the data will be used in the descriptive analysis of secondary market participation in Chapter 6 and to predict the probability of a bank participating in Farmer Mac II in Chapter 7.

Testable Hypotheses

Chapters 1-3 and the model developed in Chapter 4 imply a number of testable hypotheses. Each sub-section below formalizes a hypothesis and suggests a measure that might be used to test it. The discussion is summarized in Table 5.1.

Loan quality

Both the literature and the model developed in Chapter 4 imply that loan quality affects the incentive to sell loans. Loan quality for the purposes of this study is fully described

Table 5.1. Summary of testable hypotheses

Determinant	Variable	Expected Sign
Loan quality		
Portfolio		
Default	noncurrent loans/loans	negative
Losses	net charge-offs/loans	positive
USDA guaranteed loans		
Default	mean default rate	negative
	default rate's variance	negative
Losses	recovery rate	positive
USDA guarantee		
rate	USDA guarantee rate	positive
Efficiency		
Bank level	assets per employee	positive
USDA guaranteed loans		
Origination	hours per loan	negative
Servicing	hours per year	negative
Risk-aversion	risk-based capital ratio	negative
Return		
USDA guaranteed loans		
Competitive rate	demand	none
Monopoly premium	degree of competition	none
Alternative assets	yield on assets	positive
Funding	cost of funding	positive
Liquidity		
Asset liquidity	loans/deposits	positive
Deposit drain	deposits/assets	negative
Customer accommodation		
Agricultural lending	farm loans/loans	positive
USDA guaranteed lending	USDA loan volume	positive
Other secondary market		
experience	yes	positive
Size	assets	none

by the following: loan default rate characteristics (average and variance of the probability of default), the recovery rate (percentage of principal plus interest due less foreclosure costs recovered in the event of default), and the USDA guarantee rate affixed to a loan. These factors are in fact what makes lending risky in the model developed in Chapter 4. The comparative static results presented in Chapter 4 show that, ceteris paribus, a decrease in the average or variance of the default rate, an increase in the recovery rate, or a decrease in the guarantee rate on USDA guaranteed loans reduce a bank's USDA guaranteed loan volume, and therefore its incentive to participate in Farmer Mac II.

Pavel and Phillis (1987) found that a higher net charge-offs to loan ratio was positively related to loan sales. Their argument was that an increase in net charge-offs forces banks to sell appreciating assets in order to bring regulatory measures of equity in line with the "true" value of the firm. Presumably, the appreciation of an asset would be caused by a drop in interest rates. (As interest rates fall, fixed future cash flows have a higher present value). Net charge-offs should be inversely related to what is defined above as the recovery rate. That is, as net charge-offs rise, recovery rates should fall. This should be so since net charge-offs measure the loss to a bank in the event of default and the recovery rate measures the percentage of principal and interest (net of all foreclosure costs) recovered in the event of

default. While the two are not exact opposites, they should move in opposite directions.

Two clarifications are in order. First, Pavel and Phillis test only one facet of loan quality. Second, their measure of net charge-offs is an overall loan portfolio measure. In other words, their finding is that loan portfolio losses cause banks to sell loans from their loan portfolio.

The model in Chapter 4 does distinguish among various types of loan quality. However, it is not sophisticated enough to make a distinction between a bank's loan portfolio and a particular type of loan in the loan portfolio because the loan portfolio consists of a single type of loans--USDA guaranteed loans. The model could "loosely" be interpreted to show any of the following: 1) loan portfolio quality causes loan sales in general; 2) loan portfolio quality causes sales of particular loans; 3) particular loan quality causes loan sales in general; or 4) particular loan quality causes sales of particular loans. Since the focus of the study is why banks participate in Farmer Mac II, numbers 1 and 3 above will be ignored.

Noncurrent loans to loans and net charge-offs to loans

Using Pavel and Phillis' work and the model as a guide, a number of testable hypotheses arise. The first hypothesis is that poor overall loan portfolio quality causes the sale of USDA guaranteed loans into Farmer Mac II. If banks sell loans

for the reasons that Pavel and Phillis claim, they must sell them into some secondary market. Would one of those secondary markets be Farmer Mac II? A bank's noncurrent loan to loan ratio could be used to measure the default rate on loans and its net charge-offs to loans ratio could be used to measure its losses.

USDA guarantee loan default and recovery rate

The second hypothesis is that poor USDA guaranteed loan quality should reduce a bank's incentive to originate USDA guaranteed loans and therefore reduce the probability of that bank participating in Farmer Mac II. The information needed to determine the mean and variance of the probability of USDA guaranteed loan default would have to come from the bank. Given the lowest, most likely (mode), and highest default rates for each bank, it is possible to calculate a mean and variance of the default rate for each bank using what is called the triangular probability distribution. This proce-dure translates expectations about uncertain variables into probabilities, expressed as a percentag chance (Jolly 1980). The recovery rate in the event of a USDA guaranteed loan liquidation would also have to be obtained from the bank.

USDA guarantee rate

The third hypothesis deals specifically with the guaran-tee rate. The guarantee rate affixed to a loan affects the

quality of a loan only after it has defaulted and been liqui-
dated. If the guarantee rate was 100 percent, a loan would
have no risk--any loss would be completely absorbed by the
guarantor (the USDA in our case). However, even a 100 percent
guarantee rate would not shield a bank from foreclosure costs.
Some bankers indicated to this researcher that the chances of
collecting on the guarantee were not even 100 percent.

As the guarantee rate is lowered, for any given default
rate and loss rate, a loan's risk increases. The usual hy-
pothesis then applies: increased loan risk reduces the likeli-
hood of participating in Farmer Mac II. Information about the
level of the guarantee rate banks affix to their USDA guaran-
teed loans could be obtained through a survey.

Operating efficiency

The model in Chapter 4 found that an increase in the cost
of originating USDA guaranteed loans reduced the bank's guar-
antee volume, and therefore its chances of participating in
Farmer Mac. This would be a "loan level" hypothesis. Pavel
and Phillis (1987) found evidence that a lower noninterest
expense to loan ratio increased the probability of loan sales
in general. Their finding relates to efficiency at the "bank
level."

The first hypothesis is that a bank that can originate
USDA guaranteed loans more efficiently will originate more of
those loans and therefore be more likely to participate in the

Farmer Mac II program. A reasonable measure of efficiency might be the total number of hours needed to originate a loan and the average number of hours spent each year servicing the loan. The second hypothesis to be tested is that banks with a higher assets per employee ratio are more likely to participate in Farmer Mac II. The former hypothesis captures the essence of the model's implication; the latter, Pavel and Phillis' finding.

Risk-aversion

Chapter 4 models the portfolio decision of a risk-averse profit maximizing bank. Ceteris paribus, an increase in the degree of management's risk-aversion reduces the amount of the risky asset (USDA guaranteed loans) the bank chooses. As the optimal proportion of loans in the portfolio fall, the incentive to participate in Farmer Mac II falls too. One measure that could be used to capture management's tolerance for risk is the risk-based capital ratio.

The risk-based capital ratio is total risk-based capital (primary capital plus secondary capital) as a percentage of risk-weighted assets. The risk-weighted assets measure is calculated by attaching risk-weights to each of a bank's assets as well as its off-balance sheet activities (such as selling loans with recourse). A lower risk-based capital ratio reflects a more aggressive management style.

Comparative advantage

We will say that a bank has a comparative advantage in originating loans if the bank enjoys a relatively higher rate of return on its loans and a comparative advantage in funding loans if it has a relatively lower cost of funds. Generally, a bank will engage in those activities (originating and funding) in which they have a comparative advantage. Return will be taken up first and funding second.

Return

There are really two overarching issues concerning return. The first concerns the return a bank earns on particular types of loans; the second, the return a bank earns on other assets in its portfolio. To clarify the point, banks can hold USDA guaranteed loans or invest their resources in other assets. Hence, both returns are relevant.

Return on USDA guaranteed loans. The model in Chapter 4 is constructed in such a fashion that there are two components to a bank's return on USDA guaranteed loans--a base rate (competitive rate) and a monopoly premium. An increase in the competitive USDA guaranteed loan rate has an ambiguous effect on USDA loan volume and consequently participation. Although a bank welcomes the additional profit from originating new loans, it faces additional risk from holding the new loans. The bank must weigh the additional profit against the addi-

tional risk. If a bank was risk neutral (i.e., b=0 in equation 32, Chapter 4), an increase in the competitive loan rate would lead the bank to unambiguously increase its loan volume and probability of participating[1]. Of course, the risk neutral case has the more appealing intuitive result.

A change in the competitive loan rate would presumably occur due to a change in the demand for USDA guaranteed loans. So, the hypothesis is that an increase in USDA guaranteed loan demand has an indeterminate effect on participation.

The second part of the return is the monopoly premium that arises because the bank in Chapter 4 had a downward sloping demand curve for USDA guaranteed loans. An increase in market power has an ambiguous effect on loan volume and thus participation. As competition weakens, a bank is able to add a larger monopoly premium to the competitive rate. However, since marginal revenue never falls below the competitive rate (due to the specification of the demand curve in the model), a bank may not want to reduce its loan volume to capture the higher monopoly premium--especially if its loan volume is very high or the competitive loan rate is high relative to the monopoly premium. A risk neutral bank (i.e., b=0 in equation 32, Chapter 4) will unambiguously want to reduce its USDA loan volume.[2]

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[1]This is a sufficient although not necessary condition for loan volume to rise as the competitive loan rate rises.

[2]This is a sufficient but not necessary condition for a bank to reduce its loan volume as its market power increases.

Although there are a number of possible ways to measure market power, one method would be to ask banks what the degree of competition is among lenders for USDA guaranteed loans in their market area. Given this measure, the hypothesis is that an increase in competition among lenders (i.e., a decline in a bank's market power) will have an undetermined effect on participation. We now turn to the return on other assets in the portfolio.

Return on alternative assets. The only asset besides UDSA guaranteed loans included in the model presented in Chapter 4 was the risk-free Farmer Mac security. Recall, a bank could hold this security ($S>0$) or originate more loans than it has deposits and capital to fund them so that $S<0$ -- that is, the bank was participating in the Farmer Mac II program. The comparative static results then showed that as the return on this security rose, the bank would reduce its USDA loan holdings and increase its Farmer Mac security holdings. The bank does this because its profit rises without an increase in risk.

While correct as constructed, the model precludes one important possibility. As the return on alternative assets rises, a bank could continue to originate USDA guaranteed loans, sell them, and reinvest the proceeds from the sale into those alternative assets. So, although the bank has reduced its USDA loan holdings, it has actually increased its USDA

loan originations.

The hypothesis then is that banks with higher returns on their portfolio as a whole will have a higher probability of participating in Farmer Mac II. To get that greater return, they might have to reduce their holdings of USDA guaranteed loans, but they do not have to reduce their originations.

To sum up this section on return, it is not unambiguously true that a bank with a comparative advantage (i.e., higher returns) in originating USDA guaranteed loans will have a higher likelihood of participating in Farmer Mac II. However, banks that have a comparative advantage in terms of the return on assets held elsewhere in their portfolio are more likely to participate.

Funding

If a bank keeps an asset in its portfolio, it then must fund it. Although not explicitly modelled, common sense dictates that an increase in funding costs would reduce the incentive to hold the asset and increase the incentive to sell it. Therefore, the hypothesis is that a bank with higher funding costs will be more likely to participate in Farmer Mac II than a bank with lower funding costs.

Liquidity

Sufficient liquidity facilitates a bank's ability to meet deposit withdrawals and make loans--i.e., conduct day to day

business. The measures of liquidity deemed important to participation are a bank's loan-to-deposit ratio and its deposit-to-asset ratio.

Loan-to-deposit ratio

The model presented in Chapter 4 is tailored to the argument regarding bank resources forwarded by the advocates of a secondary market for agricultural loans (USCCAN 1990) and the research of Herr (1991). The claim is that rural lending institutions are constrained in their ability to actively acquire new sources of funding, thus creating potential liquidity problems. The inference is that liquidity problems would arise because of heavy USDA guaranteed loan demand. To model this scenario, we treated the resources of the bank--deposits and capital--as fixed, and did not allow the bank to borrow funds. The bank's only way of creating liquidity was to either reduce its loan volume and hold more of the risk-free security or sell loans into the Farmer Mac II secondary market.

The hypothesis to be tested then is that a higher loan-to-deposit ratio enhances the incentive to participate in the Farmer Mac II loan sale program. Banks with a lower loan deposit ratio have greater liquidity, and therefore would be less likely to participate.

Deposit-to-asset ratio

A so-called deposit drain would also affect a bank's liquidity position. That is, even if a bank is not experiencing heavy loan demand, its loan-to-deposit ratio could be rising because its deposit base is eroding. To isolate this effect, we could use the deposit-to-asset ratio. Banks with a lower deposit-to-asset ratio would then be expected to have a higher probability of participating in Farmer Mac II.

Customer accommodation

Although customer accommodation was not modelled explicitly in Chapter 4, it is certainly an important aspect of banking. After all, banking is a service industry. The hypotheses respecting customer accommodation will focus on a bank's agricultural and USDA guaranteed lending volume and how participating in a secondary market benefits a bank's customers.

Dixon, et al. (1997) found that banks holding a larger percentage of their loan portfolio in agricultural loans were more likely to originate USDA guaranteed loans, and in the case of OL loans, have a larger USDA guarantee volume. They claim that agricultural banks use guarantees as a risk-reducing tactic. Regardless, we might expect a bank's probability of participating in Farmer Mac II to increase as its agricultural loan to loan ratio rises.

A relatively higher USDA guaranteed lending volume may

reflect a greater willingness to serve the guarantee segment
of the farm credit market. A larger USDA guaranteed loan
volume would also create a greater pool of loans for a bank to
sell. Thus, it will be hypothesized that greater USDA guaran-
teed lending and participation are positively related.

Experience selling loans into other secondary markets

Management experience selling loans into other secondary
markets may increase the probability of selling loans into
Farmer Mac II. First, managers with experience participating
in other secondary markets may be in a better position to
evaluate the potential advantages and disadvantages of selling
loans than managers with no experience. Second, they would
also likely be able to adapt more quickly to the bureaucratic
structure of the Farmer Mac II program, given that Farmer Mac
II is designed similar to other secondary market programs.
Third, other secondary market experience may be indicative of
a bank's superior personnel, technology, tax or legal support.
Finally, other experience may be a manifestation of the bank
characteristics and market forces that spur a bank to partic-
ipate in secondary markets.

Size

Pavel and Phillis (1987) found that increased bank size
was a significant factor underlying loan sales. They maintain
that loan sales require the level of management sophistication

that comes with increased bank size. Although Walker (1990) provides no evidence, he contends that a bank needs sufficient personnel, technology, tax, and legal support to engage in small or large scale asset sales. And, according to Walker, these characteristics are associated with larger size.

Pavel and Phillis (1987) do mention the possibility that smaller banks might sell loans due to overlines; i.e., small banks selling portions of loans that exceed their legal lending limits. Recall, Farmer Mac II was created to provide a significant measure of liquidity to rural lending institutions.

The hypothesis is that size affects participation, but the net effect is ambiguous. The reason is two-fold. Small banks are more likely to be constrained by overlines, and therefore participate. Larger banks are more likely to have the attributes necessary to engage in secondary market activity.

Data

This section deals with issues concerning the data used in the descriptive and empirical analyses of Chapters 6 and 7, respectively. It details the procedure used to collect survey information and the issue of nonresponse. It also addresses the problems that arose in matching financial information from the Federal Deposit Insurance Corporation (FDIC) with the survey responses.

Background

The preliminary specification of the hypotheses discussed above suggests various characteristics that should distinguish participants in the Farmer Mac II loan sale program from nonparticipants. Some of the data concerning these characteristics can be found on a bank's balance sheet and income statement; some--such as the degree of competition for USDA guaranteed loans among lenders in the bank's market area--cannot be found in a financial statement and must be collected by survey. A decision was made to survey a sample of banks and then match each bank's survey results with its financial statement information. The survey instrument appears in the Appendix. The financial statement information was collected from the bank's "Summary Financial Report," which is available to the public from the Federal Deposit Insurance Corporation (FDIC). A Summary Financial Report, which is similar to the Federal Reserve's "Call Report," contains a bank's consolidated balance sheet and consolidated income statement, as well as demographic information about the bank.

Survey

A survey instrument was constructed and tested on seven community banks in northeastern Missouri to ensure that the instrument's questions were clear and concise. Since none of the seven banks sold USDA guaranteed loans to Farmer Mac, two banks in South Dakota that did participate were also sent

surveys. The seven former banks were chosen because they originated USDA guaranteed loans and because of the researcher's familiarity with the banks' management and ability to visit the banks in person; the latter two banks were chosen because of their substantial volume of USDA loan sales to Farmer Mac and the willingness on behalf of the management to fill out the questionnaire and discuss the clarity and content of the questions. The names of the two South Dakota banks were supplied by Farmer Mac. The survey instrument was then modified based on input provided by the banks in the pre-test.

Each survey was to be accompanied by a cover letter addressed to the Chief Executive Officer (CEO) of the bank. The cover letter appears in the Appendix with the survey instrument. Six weeks after the initial wave of surveys was sent, nonrespondents would be sent a follow-up letter (also found in the Appendix) with another copy of the survey.

The next task was to identify the institutions that engage in USDA guaranteed lending. A list of all institutions that had USDA guaranteed loans in their asset portfolio as of the end of 1996 was obtained from the USDA in 1997. The total dollar volume of USDA guaranteed loans held by the 7,696 institutions on this list represents the available pool from which Farmer Mac could purchase and securitize loans through its Farmer Mac II loan sale program. Since the dissertation's main focus concerns commercial bank participation in Farmer Mac II, all nonbank financial institutions--such as Farm

Credit System lenders--were deleted from the list. At this point, the list included both banks that sold USDA guaranteed loans to Farmer Mac and those that did not.

A list of banks known to participate in the Farmer Mac II loan sale program as of the end of 1996 was obtained from Farmer Mac in 1997. This list contained 329 institutions. Once again, nonbank institutions were deleted from the list, leaving a total of 312 commercial bank participants.

Next, banks on the Farmer Mac list were deleted from the USDA list. As a result, the remaining 5,823 commercial banks on the USDA list represents the population of banks that hold USDA loans in their portfolios but do not participate in the Farmer Mac II loan sale program.

The banks to be surveyed from the USDA list were selected using a systematic sampling method. The goal in determining the sample size was to sample enough banks so that the number of banks that participate in secondary markets included in the sample (with some bound on the error of estimation) reflected the proportion of banks that participate in secondary markets in the population, accounting for the reality that not all banks surveyed would respond.

The following equation was used to determine the number of banks, n, to be surveyed to estimate the proportion of banks that participate in secondary markets:

$$n = Npq/[(N-1)D + pq],$$

where N is the population of banks on the USDA list, p is the proportion of banks in the population that participate in secondary markets, q=(1-p) is the proportion of banks that do not participate in secondary markets, and $D=B^2/4$. B is the bound on the error of estimation (Scheaffer et al. 1986).

To solve for the number of banks to be sampled from the USDA list, n, we must have values for N, p, and B. Since N is known (N=5,823), all that is really needed is p and B. The bound on the error of estimation, B, was set at 5 percent. The proportion of secondary market participants in the population, p, was obtained from an empirical analysis done by Pavel and Phillis (1987). Their study used survey data for 13,763 banks from the "Reports of Condition and Reports of Income" filed with the appropriate regulatory agency. In their study of 13,763 banks, 8,190 (60 percent) sold loans into a secondary market. So, given N, p, and B, the total number of banks to be surveyed required to estimate the proportion of secondary market participants is 360.

Of course, not every bank sampled could be expected to respond. Assuming a response rate of 20 percent, 1,800 banks have to be surveyed to obtain the needed 360. Since the banks were to be chosen systematically, every third bank was chosen from the USDA list. Thus, a total of 1,941 banks were surveyed.

The first bank was selected from the sampling frame by picking one of three numbered balls out of a hat; every third

bank was selected thereafter. There was no reason to believe that any hidden periodicities existed in the population that would introduce sampling error and bias the results.

To ensure that an adequate number of observations were available for the empirical analysis of the banks that partic-ipate in the Farmer Mac II loan sale program, all 312 commer-cial banks on the Farmer Mac list were surveyed--i.e., a sampling rate of 100 percent.

The initial wave of surveys was mailed near the end of November 1997. Nonrespondents were sent a follow-up letter with another survey instrument in February 1998. Of the 312 banks surveyed from the Farmer Mac list, a total of 94 were returned (a 30 percent response rate). The response rate of banks drawn from the USDA list was less successful; of the 1,941 surveys mailed, only 259 were returned (a response rate of roughly 13 percent).

FDIC "Summary Financial Report"

Upon receipt, each bank's survey was matched with its FDIC Summary Financial Report. Since some of the banks on the lists were branches, and since branch specific information is not available, branches were matched with their respective home office's consolidated report. If a bank had a change in ownership status after the lists were obtained, the new bank's report was used. The report content for each bank covered the period between December 31, 1996 and December 31, 1997.

Nonrespondent sample

The banks sampled from the list provided by Farmer Mac are the population of loan sale program participants. The systematic sample of banks drawn from the USDA list was large enough to make inferences about the population of nonparticipants. However, not all the banks on either list receiving a survey instrument chose to respond. As mentioned above, 30 percent of the Farmer Mac II loan sale program participants responded, while only 13 percent of the nonparticipants sampled did so. There was a possibility that the characteristics of the respondents in the sample differed in nature from those in the sample that did not respond. It was deemed necessary to select a number of defining bank characteristics and to investigate whether those characteristics differed between the respondents and nonrespondents in the sample.

In general, a bank can be characterized by its efficiency, liquidity, profitability, soundness or solvency, and size. Traditionally, these characteristics are measured using financial information garnered from a bank's balance sheet, income statement, and demographic information.

The following measures (and what characteristics they attempt to capture) were compared between the samples' respondents and nonrespondents: assets per employee (efficiency); loan-to-deposit ratio (liquidity and aggressiveness of lending); net income-to-asset ratio or return on assets (profitability); capital-to-asset ratio (soundness); risk-based

capital ratio (solvency); and total assets (size). The total

farm loans-to-loans ratio between groups was also examined to

assess a bank's degree of involvement in agricultural lending.

Two separate sets of statistical tests were performed.

First, the 94 Farmer Mac respondents' measures were compared

to a systematic sample of 31 banks drawn from the 218 banks in

the select sample of known participants that did not respond

to the survey. Next, a systematic sample of 29 banks was

generated from the 1,682 banks in the USDA sample that opted

not to respond. No significant differences were detected in

the means between the two groups in either set of samples at

the $\alpha=.05$ level of significance. Therefore, it was concluded

that the nonrespondents from both the Farmer Mac and USDA sam-

ples did not differ significantly from the respondents in the

samples with respect to the traditional measures used to

characterize a bank. The full panel of statistics generated

(mean, standard deviation, maximum, and minimum for each

variable and the test statistics) for the comparison of the

groups in the Farmer Mac sample appear in Table 5.2; the panel

for the groups in the USDA sample are found in Table 5.3.

Methodology

The data collected will be used two ways. Chapter 6

presents a descriptive analysis of secondary market participa-

tion using survey response data. The chapter examines why

banks choose to and not to participate in secondary markets in

Table 5.2. Farmer Mac II survey: respondents vs. nonrespondents

Variable[3]	Nonrespondents[1]				Respondents[2]				Test statistic	
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Std. err.	t
AGLNLN	0.333	0.225	0.000	0.748	0.395	0.244	0.000	0.852	0.047	1.32
CAPASST	0.092	0.041	0.063	0.293	0.101	0.028	0.055	0.197	0.008	1.10
ASSTEMP	2.445	0.930	1.250	5.507	5.569	0.765	1.167	4.963	0.182	0.68
LNDEP	0.757	0.090	0.534	0.998	0.768	0.134	0.387	1.208	0.021	0.55
RBCR	0.136	0.034	0.094	0.244	0.150	0.041	0.088	0.299	0.007	1.85
ROA	0.012	0.004	0.002	0.025	0.013	0.004	0.002	0.033	0.001	0.78
ASSETS[4]	0.600	1.284	0.023	5.855	0.370	1.346	0.010	9.699	0.266	0.86

Source: Computed using the bank's 1997 FDIC Summary Financial Report.

[1] n=31.

[2] n=94.

[3] The variables are defined as follows: AGLNLN is total agricultural loans to loans; CAPASST is the capital to asset ratio; ASSTEMP is assets per employee (measured in millions of dollars); LNDEP is the loan to deposit ratio, RBCR is the risk-based capital ratio; ROA is the return on assets; and ASSETS denotes bank assets (measured in billions of dollars).

[4] The median bank size for the nonrespondent sample was $124.2 million and $71.5 million for the respondents.

Table 5.3. USDA survey list: respondents vs. nonrespondents

Variable[3]	Nonrespondents[1]				Respondents[2]				Test Statistic	
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Std.err.	t
AGLNLN	0.277	0.211	0.027	0.793	0.343	0.238	0.000	0.885	0.042	1.58
CAPASST	0.099	0.033	0.061	0.215	0.103	0.031	0.053	0.224	0.007	0.63
ASSTEMP	2.444	0.827	1.290	4.800	2.505	0.713	0.747	4.692	0.153	0.40
LNDEP	0.747	0.132	0.455	1.059	0.733	0.154	0.207	1.296	0.026	0.55
RBCR	0.165	0.080	0.100	0.518	0.169	0.076	0.001	0.573	0.016	0.26
ROA	0.012	0.004	0.001	0.020	0.013	0.006	-0.007	0.053	0.001	1.28
ASSETS[4]	2.430	12.534	0.014	67.597	1.470	12.030	0.005	186.021	2.445	0.39

Source: Computed using the bank's 1997 FDIC Summary Financial Report.

[1] n=29.

[2] n=259.

[3] See Table 5.2 for a definition of the variables.

[4] The median bank size for the nonrespondent sample was $84.9 million and $56.3 million for the respondents.

general as well as Farmer Mac II in particular. Chapter 7
summarizes the results obtained from fitting a number of logit
models to a mixture of survey and Summary Financial Report
data. The logit models predict the probability of a bank
participating in Farmer Mac II and identify what bank and
market characteristics are important in influencing that
probability.

The participation decision process: what factors are relevant?

The simplest way to ascertain why a bank participates or
does not participate in Farmer Mac II is to ask the bank's
management. In other words, what factors do they deem rele-
vant? But before doing that, it may be insightful to ask them
why they do or do not participate in secondary markets in
general. Their responses are the essence of Chapter 6.

General secondary market activity

Recall, it was posited that banks may participate in
Farmer Mac II if they have experience participating in other
secondary markets. Managers with experience participating in
other secondary markets may be in a better position to evalu-
ate the potential advantages and disadvantages of selling
loans than managers with no experience. Moreover, they may
also be able to adapt quicker to the bureaucratic structure of
the Farmer Mac II program, given that Farmer Mac II is de-
signed similarly to other secondary market programs.

Understanding why banks use other secondary markets may
provide insight into whether a bank might sell loans into
Farmer Mac II. For instance, suppose a bank does not sell any
loans into any secondary market. If selling loans is not part
of management policy, it is highly unlikely that the bank
would sell loans to Farmer Mac (at least at this time). But,
what if a bank that did not sell loans into a secondary market
did sell loans to an affiliate or correspondent bank? In this
case, the bank may be a potential Farmer Mac II participant
because management policy is not set against loan sales, the
bank just does not engage in secondary market activity.

Why a bank sells loans into a secondary market also sheds
light on its management decision process. Suppose a bank
views loan sales into a secondary market as a way to avoid
interest rate risk. One could then assume that that bank
might sell off its long-term fixed-rate loans. So a better
understanding of bank managers' rationale for using secondary
markets is in order.

To do this, bankers that do not participate in secondary
markets will be asked a panel of questions regarding the
degree to which certain factors are relevant in their decision
to not participate. Similarly, secondary market participants
will be asked a separate array of questions about the degree
to which certain factors are relevant in their decision to
sell. The actual questions posed to nonparticipants appear on
page 2 of the survey in Appendix; those put to participants

are found on page 3 of the survey.

To rank the factor's degree of importance, a five-point Likert scale technique is used. A higher score implies the factor is more relevant to a bank's decision to participate or not participate.

A note about the questions asked is in order. The origin of the questions is based on the literature on loan sales, common sense, and suggestions received from the bankers in the preliminary survey. The questions are designed to "paint a descriptive picture" of various factors driving a bank's decision process.

After summarizing the responses from participants and nonparticipants, selected financial information will be compared across the two groups to see if the factors that are deemed relevant are consistent with actual balance sheet and income statement data. In particular, the financial information selected will include measures of liquidity, soundness, and profitability. For example, if nonparticipants report that sufficient liquidity makes loan sales unnecessary, and participants report that they sell loans into secondary markets to enhance liquidity, there should be a difference in the loan-to-deposit ratios between the two groups.

Farmer Mac II secondary market activity

Ultimately, the purpose of this work is to find out why banks participate in the Farmer Mac II loan sale program. So,

we will ask them. The design here is identical to the one described above for secondary market participation in general. Many of the questions are similar in nature to the questions asked regarding participation and nonparticipation in any secondary market. Added to these will be questions aimed at issues involving USDA guaranteed lending activity and the Farmer Mac II secondary market program itself. The questions addressed to nonparticipants appear on page 8 of the survey; those put to the participants are found on page 9.

No selection of financial information will compared across Farmer Mac II participants and nonparticipants. A more sophisticated analysis will be performed in Chapter 7 using a logit model to predict the probability of a bank participating and find what characteristics explain participation. We now turn to the procedure to be used to accomplish this task.

Logit regression analysis

This section describes several statistical techniques that can be employed to predict the probability of a bank participating in Farmer Mac II. The section ends with a discussion of logit regression analysis, the method selected for this study.

Model selection

We are interested in the probability of a bank partici-pating in Farmer Mac II, as well as identifying the variables

useful in making the prediction. Although not attempted in this work, an extension of the study would involve predicting the volume of Farmer Mac II secondary market activity.

A variety of multivariate statistical techniques can be used to predict a binary dependent variable using a set of independent variables. Multiple regression analysis (linear probability model) and discriminant analysis are two related techniques that quickly come to mind. However, these techniques pose difficulties when the dependent variable has only two values, as in our case--participate or not.

When the dependent variable takes on only two values, the assumptions necessary for hypothesis testing in regression analysis are violated (Maddala 1988). For example, it is unreasonable to assume that the distribution of errors is normal. Another difficulty with multiple regression analysis identified by Maddala is that the predicted values cannot be interpreted as probabilities because they are not constrained to the [0,1] interval.

Linear discriminant analysis does allow for the direct prediction of group membership. However, the assumption of multivariate normality of the independent variables, as well as equal variance-covariance matrices in the two groups, are required for the prediction rule to be optimal.

An alternative approach to using multiple regression or linear discriminant analysis is to use a logit or probit model. These models transform the original model using a

cumulative probability function that ensures that all pre-
dictions lie in the [0,1] interval. Essentially, logit and
probit models are constrained versions of the linear probabil-
ity model.

These models assume the existence of a "latent" (unob-
served) continuous variable which is specified as the usual
regression model. However, the latent variable can be only
observed as a dichotomous variable. The difference between
the logit and probit models arises from the assumptions made
about the error term. The logit model assumes the error term
has a logistic distribution; the probit model assumes the
error term has a normal distribution. From a practical point
of view, there is not much difference. The results are usual-
ly very similar (Greene 1993).

Both techniques require use of the maximum-likelihood
method to estimate the parameters of the model. This method
involves selecting the coefficients that make our observed
results "most" likely. Since the models are nonlinear, an
iterative algorithm is necessary to estimate the parameters.

The logit model was selected for the purposes of this
dissertation, in part because it does not need to be modified
when using unequal sampling rates. The estimated coefficients
are not affected by the unequal sampling rates of the Farmer
Mac II participants and nonparticipants; however, the constant
term is affected. The constant term must be increased by log
p_2 - log p_1, where p_1 is the proportion of observations chosen

from participating banks and p_2 is the sampling rate of non-participants (Maddala 1983).

The basic logit model

A logit model is based on the cumulative logistic probability function and is specified as

$$P_i = 1/(1+e^{-z}),$$

where P_i is the probability that bank i will participate in Farmer Mac II, e is the base of the natural logarithm, and z is the log-odds ratio. The log-odds ratio is a linear function of the explanatory variables and is given by

$$z = \log[P_i/(1-P_i)] = B_i + \Sigma B_i X_{ij},$$

where the X_{ij} are the j characteristics of bank i.

The intuition underlying the logit model is relatively simple. Suppose a bank faces two choices: participate or do not participate. The observed behavioral response of the bank (the dependent variable) is dichotomous. A bank that participates is assigned a value of one; those that do not participate are assigned a value of zero. The model assumes that a bank's decision depends on institutional characteristics and market realities.

Given the attributes and participation status for each bank in the sample, the problem is to estimate an equation which predicts the likelihood that a bank with given charac-

teristics will participate in Farmer Mac. The predicted dependent variable from the regression equation is simply the logarithm of the probability that a bank will participate in Farmer Mac.

The model is then tested against the sample. If the characteristics selected as the explanatory variables are correct, the model should discriminate between those banks that sell loans to Farmer Mac and those that do not. In other words, the model should have a relatively low false-negative rate (bank is predicted not to participate but in fact does) and a relatively low false-positive rate (bank is predicted to participate but in fact does not).

Several logit models will be constructed to predict the probability that a bank will participate in the Farmer Mac II loan sale program. The models differ according to how participation in Farmer Mac II is defined as well as the hypothesized reasons that explain participation. Namely, we want to predict whether a bank will sell any type of USDA guaranteed loans to Farmer Mac, sell newly originated USDA guaranteed Farm Ownership (FO) loans, sell newly originated USDA guaranteed Operating Loans (OL), sell "seasoned" USDA guaranteed FO loans, and sell "seasoned" USDA guaranteed OL loans. For each regression, we also wish to identify the variables useful in making each prediction.

Summary

This chapter reviewed and formalized the hypotheses to be tested using a logistic regression analysis in Chapter 7. It also explained how and where the data to be used in the analysis were obtained. Finally, it discussed the two methodologies that will be used in Chapters 6 and 7--descriptive statistical analysis and logistic regression analysis, respectively.

CHAPTER 6

SECONDARY MARKET PARTICIPATION:
A DESCRIPTIVE ANALYSIS

This chapter includes a descriptive analysis of why banks
participate and do not participate in secondary markets in
general as well as the Farmer Mac II secondary market. The
material for this chapter was obtained by asking bankers to
what degree certain factors were relevant to their decision to
sell or not sell loans into a secondary market. The first
section will provide a description of why banks participate in
any secondary market. The second section addresses why banks
participate in Farmer Mac II.

General Secondary Market Activity

Before questioning bankers specifically about the reasons
they do and do not participate in the Farmer Mac II loan sale
program, information was gathered related to why they partici-
pate in any secondary market--including, but not limited to:
Freddie Mac, Sallie Mae, Fannie Mae, and Ginnie Mae.

First, bankers that did not engage in any secondary
market activity were asked to indicate the degree (using a 5-
point Likert scale) to which various factors were relevant in
their decision to not sell any type of loans in a secondary

market. (The actual questions posed appear on page 2 of the survey found in the Appendix.) A higher rating implies the factor is more relevant to the bank. Similarly, banks that had secondary market experience were asked a separate panel of questions (page 3 of the survey) regarding the relevance of various factors regarding their decision to sell loans. The responses for banks reporting no secondary market activity are summarized in Table 6.1; the responses of those reporting activity are presented in Table 6.2. In discussing the 5-point Likert scale responses, the question asked on the survey question appears in bold underline followed by the mean response (m) and standard deviation (s) in parentheses. Reference to the scoring is labeled in ascending order of relevance--that is, 1="not relevant," 2="less relevant," 3="relevant," 4="more relevant," and 5="very relevant."

After reporting the responses from sellers and nonsellers, selected financial information will be compared across the two groups to see if the Likert scale responses are consistent with balance sheet and income statement data. In particular, the financial information selected will include measures of liquidity, soundness, and profitability. For example, if nonsellers report that sufficient liquidity makes loan sales unnecessary, and sellers report that they sell loans to enhance liquidity, there should be a difference in the loan-to-deposit ratios between the two groups.

Table 6.1. Reasons for not participating in any secondary market[1]

	not relevant		very relevant					Std.
	1	2	3	4	5	Total[2]	Mean	dev.
Loan sales are not part of	34	18	26	46	61	185	3.44	1.48
management strategy	(18)	(10)	(14)	(25)	(33)	(100)		
Prefer to hold and retain entire	4	4	10	54	98	170	4.40	0.88
net interest margin	(2)	(2)	(6)	(32)	(58)	(100)		
Bank has sufficient liquidity to	6	5	30	52	80	173	4.13	1.02
fund desired loan portfolio	(4)	(3)	(17)	(30)	(46)	(100)		
Bank is sufficiently capitalized	5	2	12	61	93	173	4.36	0.89
to support desired loan portfolio	(3)	(1)	(7)	(35)	(54)	(100)		
Insufficient loan demand makes	36	26	36	30	46	174	3.14	1.48
loan sales unnecessary	(21)	(15)	(21)	(17)	(26)	(100)		
Underwriting stds. do not conform	61	27	31	18	11	148	2.26	1.31
to those of secondary markets	(41)	(18)	(21)	(12)	(7)	(100)		
Bank already sells loans to	84	16	17	11	18	146	2.06	1.45
affiliates/correspondent banks	(58)	(11)	(12)	(8)	(13)	(100)		

[1] The top number is the frequency, the number below is the percent of total responses.

[2] Due to rounding, percent of total responses may not equal 100.

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Table 6.2. Reasons for participating in secondary markets[1]

	not relevant		very relevant					Std.
	1	2	3	4	5	Total[2]	Mean	dev.
Management strategy to sell	18	13	12	33	52	128	3.67	1.47
all loans of this type	(14)	(10)	(9)	(26)	(41)	(100)		
Loan sales reduce interest	5	14	31	57	53	160	3.88	1.06
rate risk	(3)	(9)	(19)	(36)	(33)	(100)		
Loan sales enhance portfolio	13	28	33	58	26	158	3.34	1.19
liquidity	(8)	(18)	(21)	(37)	(17)	(100)		
Loan sales allow bank to	21	27	38	48	26	160	3.19	1.27
satisfy heavy loan demand	(13)	(17)	(24)	(30)	(16)	(100)		
Loan sales reduce need to	19	39	45	38	18	159	2.96	1.20
attract retail deposits	(12)	(25)	(28)	(24)	(11)	(100)		
Loan sales reduce need to	25	35	38	42	19	159	2.95	1.26
purchase funds	(16)	(22)	(24)	(26)	(12)	(100)		
Loan sales offset declining	53	51	34	15	6	159	2.17	1.11
deposit base	(33)	(32)	(21)	(9)	(4)	(100)		
Loan sales offset insufficient	59	43	25	23	10	160	2.25	1.26
capital to support portfolio	(37)	(27)	(16)	(14)	(6)	(100)		
Loan sales offset insufficient	54	46	28	23	9	160	2.28	1.23
capital to support lg. borrowers	(34)	(29)	(18)	(14)	(6)	(100)		
Loan sales enhance return	15	24	36	59	25	159	3.34	1.20
on assets	(9)	(15)	(23)	(37)	(16)	(100)		
Loan sales allow funds to be re-	23	30	44	46	14	157	2.98	1.20
invested in loans of same type	(15)	(19)	(28)	(29)	(9)	(100)		

[1] The top number is the frequency, the number below is the percent of total responses.

[2] Due to rounding, the percent of total responses may not equal 100.

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Table 6.2. (continued)

	not relevant		very relevant					Std.
	1	2	3	4	5	Total	Mean	dev.
Loan sales allow funds to be re- invested elsewhere in portfolio	26 (16)	39 (25)	46 (29)	39 (25)	9 (6)	159 (100)	2.78	1.16
Loan sales allow an origination bank wouldn't make otherwise	14 (9)	24 (15)	30 (19)	47 (29)	45 (28)	160 (100)	3.53	1.28
Loan sales allow better rates for borrowers	2 (1)	11 (7)	23 (14)	59 (37)	65 (41)	160 (100)	4.10	0.96
Loan sales allow better terms for borrowers	3 (2)	10 (6)	24 (15)	59 (37)	64 (40)	160 (100)	4.07	0.98
Loan sales reduce loan monitoring costs	48 (30)	68 (43)	31 (20)	10 (6)	1 (1)	158 (100)	2.03	0.90

Respondents reporting no secondary market activity

In this section banks were asked to rank (using a 5-point scale) how relevant each of the following factors is in their decision to not sell any type of loans into a secondary market. A higher rating implies the factor is more relevant.

Loan sales are not part of our management strategy (m=3.44, s=1.48). The nature of this question was to ascertain the degree to which selling loans into secondary markets figured into management's strategy. As reported in Table 6.1, most (the mode) of the banks (61/185) responding cited management strategy as a "very relevant" reason for not participating in secondary markets. At this time, these banks would not be considered potential participants in Farmer Mac II. We say at this time because management is "free" to adopt different policies as time passes and circumstances change.

Nearly 20 percent of the banks indicated that management policy was "not relevant" in their decision to not sell loans into a secondary market. Evidently, their reasons for not selling lie elsewhere.

Prefer to hold and retain entire net interest margin (m=4.40, s=0.88). This question builds on the previous one. That is, if loan sales are not a part of management strategy, is holding the loans in their portfolio preferable? Without question, on average, these banks claimed that they preferred to

hold loans in their portfolio and retain the entire net interest margin (the difference between the yield on the loan and the cost of funding the loan) rather than sell them into a secondary market. Looking at Table 6.1, nearly 60 percent of the banks responding rated this reason for not selling a "5" ("very relevant"). Any bank that indicates that retaining loans for their portfolio is "very relevant" is not likely to participate in Farmer Mac II.

Generally speaking, this group of banks could be called "portfolio lenders." That is, they service and fund the loans they originate--i.e., they originate loans for their portfolio. Originating a loan and keeping it on the books reflects a very traditional approach to banking. Portfolio lending also avoids the so-called reinvestment problem, which will be discussed in more detail below when the questions addressed to secondary market participants are considered.

Our bank has sufficient liquidity to fund desired loan portfolio (m=4.13, s=1.02). Sufficient liquidity facilitates a bank's ability to fund deposit withdrawals and make loans-- i.e., conduct day to day business. The banks in this group appear to have adequate liquidity. From Table 6.1, it can be seen that nearly 50 percent of the banks score sufficient liquidity "very relevant" in their decision to not participate in secondary markets.

The group's ample liquidity could be the result of weak

loan demand or a robust deposit base. Regardless of the reason, banks reporting sufficient liquidity levels are not likely to have much incentive to participate in a secondary market, unless there are other compelling incentives present.

Our bank is sufficiently capitalized to support desired loan portfolio (m=4.36, s=0.89). Regulatory authorities require banks to meet specific capital guidelines with respect to the bank's portfolio as well as its individual assets. For instance, a bank must maintain a primary capital-to-asset ratio of at least 4 percent. In addition, lending to any particular borrower is limited to 25 percent of a bank's total capital. Historically, capital standards have been used as a measure of financial soundness because of capital's role as a buffer between a bank's assets and its liabilities. Banks have an incentive to participate in secondary markets if their capital levels are not sufficient to support their desired loan portfolio. From Table 6.1, it is evident that these banks taken as a group feel that they have sufficient capital to support their desired portfolio. Slightly over one-half (54 percent) report that sufficient liquidity is "very relevant" in their decision not to participate in a secondary market.

**Insufficient loan demand at our bank relative to desired
portfolio holdings make loan sales unnecessary (m=3.14,
s=1.48).** Insufficient loan demand is a plausible reason for
not participating in secondary markets. An examination of
Table 6.1 reveals that the responses to this question were
distributed almost uniformly across the entire Likert scale.
These results suggest that some bankers might use secondary
markets if loan demand was stronger, while others would not,
regardless of loan demand. What is not reported in the Table
is that about one-quarter (15/61) of the banks that indicated
that management policy was "very relevant" in their decision
not to sell, also reported that weak loan demand was "not
relevant." These 15 banks simply do not sell loans as a
matter of policy. No such contrast existed for the 36 banks
that reported that management policy was "not relevant" in
their decision not to sell. Some said weak loan demand was
"very relevant" but just as many claimed that weak loan demand
was "not relevant."

**Underwriting standards for our bank's loans do not conform to
those of secondary markets (m=2.26, s=1.31).** Secondary mar-
kets require a certain degree of standardization with regard
to the loans being securitized. For instance, the loan under-
writing standards or the documentation used by the bank may
not be compatible with that of any secondary market. In this
case, the bank would not be able to sell loans even if it

wanted to. Table 6.1 shows that most banks (41 percent) indicate that underwriting conformity is "not relevant."

Many banks design their underwriting requirements and documentation to be compatible with those of various secondary markets so that their loans are conforming. The issue of conforming loan underwriting standards is irrelevant in the case of the Farmer Mac II loan sale program--Farmer Mac will buy any guaranteed portion of a USDA guaranteed loan. If the bank has originated a USDA guarantee, it automatically conforms unless it matures in less than 12 months or is not current. (Of course, a USDA guaranteed loan must conform to USDA guidelines.)

We already sell loans to our affiliates or correspondent banks (m=2.06, s=1.45). Banks that do not engage in secondary market activity may be selling loans to affiliates or correspondent banks. But, as can be seen in Table 6.1, well over one-half (58 percent) of the banks indicated that loan sales to affiliates or correspondents was "not relevant" in their decision to not participate. This implies that these banks do not sell any loans out of their portfolio--to anyone. This puts to rest the notion that a majority of banks might be selling-off loans, but just not into secondary markets. It appears that if, on average, a bank does not participate in secondary markets, it probably does not sell loans to an affiliate or correspondent bank either.

Summary

The survey respondents that reported no secondary market activity have, as a group, somewhat weak loan demand, and sufficient deposit and capital resources to fund their desired portfolios. They indicate a preference for holding the loans they originate. Generally speaking, loan sales are not a significant part of management strategy. However, it is worth noting that a bank's management strategy is probably not independent of the current environment the bank operates in. That is, if the conditions above changed such that the incentives to participate in secondary markets were increased, these bank managers may in fact adapt their policies to the new environment.

Obviously, the banks considered above do not participate in the Farmer Mac II loan sale program. Next, responses to the panel of questions addressed to banks that do engage in secondary market activity will be analyzed. This group of 159 banks includes both Farmer Mac II program participants and nonparticipants.

Respondents reporting secondary market activity

Many of the questions put to this group were similar in nature to the questions put to the nonsellers, only reversed. For example, where nonsellers were asked if insufficient demand was relevant in their decision to not sell, sellers were asked if heavy loan demand was relevant in their decision

to sell. Other questions were designed to acquire information unique to secondary market participants--such as, What do you do with the proceeds of a sale? The results to this panel of questions appear in Table 6.2. The questions asked are found on page 3 of the survey in the Appendix.

Part of management strategy to sell all loans of this type **(m=3.67, s=1.45).** All banks in this group participate in secondary markets; this question attempts to reveal whether some banks sell certain types of loans as a matter of policy. For instance, a bank may sell all its long-term fixed-rate mortgage loans in order to avoid interest rate risk. Banks that adopt such a policy might then also sell their long-term fixed-rate USDA guaranteed Farm Ownership loans to Farmer Mac. From Table 6.2, 41 percent (the mode) of these banks responded that selling all loans of a certain type was "very relevant" in their decision to sell loans.

The types of loans that were singled out included guaranteed student loans, Small Business Administration (SBA) guaranteed loans, Farm Service Agency (FSA) guaranteed loans, and long-term fixed-rate mortgage loans. These loans have the characteristics that facilitate securitization--especially a guarantee in the case of the first three types mentioned. A bank selling all originations of a particular type of loan may be combining the various advantages a secondary market has to offer: improved ability to accommodate customers, better

interest risk rate management, enhanced liquidity, and higher profitability.

Loan sales reduce interest rate risk (m=3.88, s=1.06). As suggested by the responses to the preceding question, banks often sell long-term fixed-rate loans as a matter of policy. Funding longer-term fixed-rate assets with shorter-term liabilities creates so-called interest rate risk. The risk arises whenever the liabilities funding an asset are re-priced at different time intervals than the asset is re-priced. Re-pricing short-term deposits that are funding a long-term fixed-rate mortgage in an environment of rising interest rates will reduce the bank's income as well as erode its capital position. Of course, the bank could simply offer only adjustable rate mortgages (ARMs); however, some customers may prefer a fixed-rate mortgage and take their business elsewhere if not given the opportunity to obtain a fixed-rate loan. Pass-through loan sales eliminate the interest rate risk problem for the loan seller.

Looking at Table 6.2, nearly 90 percent of banks rank the prospect of reduced interest rate risk as "relevant" or higher in their decision to participate in secondary markets. Their answers are consistent with what the theoretical and empirical literature assert.

Loan sales enhance our portfolio liquidity (m=3.34, s=1.19).
In general, banks reported that the added liquidity a second-
ary market offers is relevant to their decision to sell. This
should not be surprising, since providing liquidity is a
primary function of these markets. Recall, liquidity is
needed to conduct the day to day business of the bank--that
is, funding deposit withdrawals and making loans. If banks
report that they use secondary markets to enhance liquidity,
it makes sense to look at questions pertaining to factors that
affect liquidity--namely, deposits and loans.

Loan sales allow bank to satisfy heavy loan demand (m=3.19,
s=1.27). Satisfying heavy loan demand complicates liquidity
management. To meet added loan demand, a bank can attract
additional deposits, borrow funds, reallocate its asset port-
folio (say, hold less secondary reserve assets such as govern-
ment securities), or sell loans. The method a bank chooses
will be the one that fits the needs and situation of the bank
the best.

From Table 6.2, the pattern of responses generated by
this question was similar to that of the question concerning
liquidity. The average response indicates that heavy loan
demand is a relevant reason for using secondary markets.

Loan sales reduce need to attract retail deposits to fund desired loan portfolio (m=2.96, s=1.20). Traditionally, deposits have been the primary source of funds used by banks to fund their portfolios. However, the increasing popularity of active liability management (borrowing) and loan sales has lessened the reliance on deposits as a source of funds. In part, the popularity of borrowing and loan sales has arisen in response to difficulty in attracting deposits. Looking at Table 6.2, bankers on average rated the reduced need to attract new deposits as "relevant" in their decision to sell loans into a secondary market. The responses around "relevant" are normally distributed (i.e., shaped like a bell).

Apparently, some banks do not have a sufficient deposit base to fund their desired portfolio, whereas others are well-supplied. The banks that need funding view loan sales as a way to avoid issuing deposits. If a bank indicates that using secondary markets to reduce the need to attract deposits is "not relevant," it probably has ample deposits on hand, and therefore sells loans for other reasons.

Loan sales reduce need to purchase funds (m=2.95, s=1.26). From the bank's point of view, if it has ample deposits, it need not acquire deposits, purchase funds (borrow), shuffle its asset portfolio, or sell loans; banks lacking funds can choose among these alternatives. Since selling loans replaces the need to borrow or raise deposits, banks that report the

reduced need to raise deposits by selling loans as important should indicate the same for the need to purchase funds.

What is apparent from Table 6.2 is that the average and distribution of the responses to the borrowing question are similar to those of the preceding deposit question. Some banks (16 percent) indicate the reduced need to purchase funds as "very relevant," and some (12 percent) cite it as "not relevant." Most (72 percent) fall in between. What is not reported in the table is that the banks that rank the reduced need to purchase loans as more relevant are the same banks that claim a reduced need to attract retail deposits as more relevant. The same holds true for the banks that rank the reduced need to purchase funds as less relevant. It is clear then that some of the sellers are using loan sale programs to offset funding shortages. Banks flush with deposits that sell loans must be selling them for other reasons.

Loan sales offset declining deposit base at our bank relative to demand for funds (m=2.17, s=1.11). Declining deposit bases have received a great deal of attention lately. Historically, banks have funded their loan portfolios using deposits. A deposit drain for a given demand for funds is tantamount to an increased demand for funds for a given deposit base. By and large, banks did not indicate that a declining deposit base relative to the demand for funds was very significant in their decision to sell loans, as is apparent in Table 6.2. In fact,

the mode response (53/159 or 33 percent) was "not relevant."

How come some banks reported that a reduced need to attract deposits is an important reason underlying their decision to participate in secondary markets, but that a de-clining deposit base is not? One explanation is that current deposit levels at many banks are adequate, but for some banks, adding deposits might be difficult.

Loan sales offset insufficient capital resources on hand at our bank to fund desired loan portfolio (m=2.25, s=1.26) and **Loan sales offset insufficient capital resources on hand at our bank to fund large individual borrowers** (m=2.28, s=1.23). Inadequate capital has been cited in the literature as a reason for secondary market participation. Recall, the group of nonsellers indicated that sufficient capitalization--either to support a bank's portfolio or large loans to individual borrowers--made loan sales unnecessary (see Table 6.1).

Table 6.2 reports the responses for those banks that do sell loans. Overall, these banks indicate that capital levels are not an issue in their decision to sell loans. These results do not contradict previous empirical findings. Rath-er, it appears that most banks are currently well capitalized.

Loan sales enhance our return on assets (m=3.34, s=1.20). A basic advantage of selling loans into the secondary market touted by the literature is that loan sales increase a bank's

return on assets (ROA). The idea is that a bank can earn fee income from servicing an asset that it does not hold--thus, increasing ROA. From Table 6.2, the average score of 3.34/5 means that increased ROA is a relevant factor for the banks taken as a group.

Of course, it could be the case that profits actually fall after a sale, although the bank's ROA rises. For instance, if a bank sells a $100 loan with a net interest margin of 4% and retains a service fee of 2%, its ROA has risen but its net income will fall. If the bank can replace that loan with another or an asset that earns more than 2%, then both its ROA and net income will rise. This simple scenario is revealing--that is, selling loans is dependent on what banks do with the proceeds from a sale. Enhancing ROA is not a sufficient incentive for participation in a secondary market; a bank must also be able to replace the sold loan with another asset whose return makes up for the difference between the net interest margin on the loan before the sale and the service fee on the loan after the sale so that its profits do not slip. This condition may well explain why many banks that do not sell loans prefer to hold their loans and retain the entire net interest margin.

Loan sales allow us to invest proceeds from sale into loans of similar type (m=2.98, s=1.20). As mentioned above, selling loans creates a reinvestment problem. One option available to a bank that sells loans is to use the proceeds to repeat the process--that is, originate more loans of the same type. The other would be to invest the proceeds elsewhere in the portfolio.

From Table 6.2, the group's average response is "relevant." However, the more extreme responses "very relevant" (14/157 or 9 percent) and "not relevant" (23/157 or 15 percent) merit further discussion. Banks responding "very relevant" may be using loan sales to service heavy loan demand for a particular type of loan. On the other hand, banks that responded "not relevant" cannot be using secondary markets to satisfy heavy loan demand. Rather, they must be selling loans for a different reason.

Loan sales allow us to invest proceeds from sale elsewhere in portfolio (m=2.78, s=1.16). This question addresses the portfolio diversification argument made in the literature, which is that banks that sell loans are able to fund a different portfolio of assets than they originate. The average response across all banks (reported above) suggests that diversification is not as compelling a reason to sell loans as some of the other factors. Rather, diversification may be a result of loan sales, as opposed to the cause of it.

Loan sales allow our bank to originate a loan it ordinarily would not if forced to hold the loan in portfolio (m=3.53, s=1.28). This incentive to sell loans cannot be captured directly by looking at financial statements. Yet, by looking at Table 6.2, nearly 30 percent of the banks (45/160) report this ability as "highly relevant" in their decision to sell. The high average score for the group (3.53) indicates that banks knowingly take advantage of the ability to originate loans they normally would not, if they had to keep them in their portfolio.

Loan sales allow better rates to our borrowers (m=4.10, s=0.96) and **Loan sales allow better terms to our borrowers (m=4.07, s=0.98).** The distribution of responses found in Table 6.2 to both questions shows that banks use secondary markets as a way to pass on better rates and terms to their customers. In fact, of all the incentives discussed so far, banks on average rated these two reasons as the most relevant reason for secondary market participation.

The portion of the sample reporting no loan sales may not be taking advantage of the improved ability to satisfy borrowers' needs offered by participating in secondary markets; these banks may only be originating the types of loans they are willing to hold at the rates and terms they decree. This lack of flexibility could manifest itself in a loss of business.

Loan sales reduce loan monitoring costs (m=2.03; s=0.90).
Although it has been suggested in the literature that loan
sales reduce loan monitoring costs, the statistics above tell
a different story. If loans could be sold outright without
recourse, monitoring costs would disappear. However, if the
bank continues to service the loan, it is doubtful that moni-
toring costs would change much. One banker noted that selling
loans actually increased monitoring costs.

Summary

Banks that report activity in secondary markets, as a
whole, have sufficient capital to fund their large borrowers
and desired portfolios. Some report ample deposits, while
others are experiencing a deposit drain. Banks cite heavy
loan demand as relevant to their loan sale decision. Borrower
accommodation also figures prominently. Finally, these banks
take advantage of the flexibility in liquidity and risk man-
agement as well as improved profitability that selling loans
into a secondary market offers.

Comparison between sellers and non-sellers

The Likert scale responses to the questions put to the
nonsellers and the responses to those asked of secondary
market participants suggest that differences between the two
groups may exist that can be identified and tested using
financial data drawn from the banks' balance sheets and income

statements. In particular, the Likert scale responses suggest
that differences exist between groups with respect to liquidi-
ty, soundness, and profitability.

The financial information selected for the comparison
include the following: the loan-to-deposit ratio, the deposit-
to-asset ratio, the yield on earning assets, the cost of
funding assets, the return on assets, the capital-to-asset
ratio, and the risk-based capital ratio. Table 6.3 provides
summary statistics for each of these variables, as well as the
results of the means tests.

Loan-to-deposit ratio

The Likert scale responses imply that the loan-to-deposit
ratio between groups differs. Banks indicating no secondary
market activity should have a lower loan-to-deposit ratio
because they have weaker loan demand relative to their deposit
base. The financial data presented in Table 6.3 seem to bear
this out. There is a significant difference in means between
the groups at the $\alpha=.01$ level. Nonsellers have more room in
their portfolio for additional loans than sellers do.

Deposit-to-asset ratio

The deposit-to-asset ratio was used to ascertain whether
sellers used relatively less deposits to fund their asset
portfolio than nonsellers. The data presented in Table 6.3
support the Likert responses; the deposit-to-asset ratio is

Table 6.3. Secondary market participation:
sellers vs. nonsellers

| Variables[3] | Nonsellers[1] | | Sellers[2] | | | |
	Mean	Std. dev.	Mean	Std. dev.	Std. err.	t
LNDEP	0.7210	0.1597	0.7693	0.1320	1.595E-02	3.085[***]
DEPASST	0.8512	0.0631	0.8386	0.0660	6.975E-03	1.803[*]
YIELD	0.0837	0.0075	0.0857	0.0080	8.370E-04	2.315[**]
COFA	0.0384	0.0042	0.0398	0.0045	4.713E-04	3.001[***]
ROA	0.0132	0.0060	0.0130	0.0043	5.550E-04	0.329
CAPASST	0.1067	0.0323	0.0963	0.0262	3.140E-03	3.326[***]
RBCR	0.1773	0.0753	0.1462	0.0541	6.950E-03	4.472[***]

Source: Computed using bank's 1997 FDIC Summary Financial Report.

[1] n=156.

[2] n=192.

[3] The vaiables are defined as follows: **LNDEP** is the loan-to-deposit ratio, **DEPASST** is the deposit-to-asset ratio, **YIELD** is the yield on earning assets, **COFA** is the cost of funding assets, **ROA** is the return on assts, **CAPASST** is the capital-to-asset ratio, and **RBCR** is the risk-based capital ratio.

[*] Significant at the 10 percent level.

[**] Significant at the 5 percent level.

[***] Significant at the 1 percent level.

significantly lower for sellers than nonsellers at the $\alpha=.1$ level. Nonsellers fund a larger proportion of their assets with deposits than sellers do.

Yield, funding costs, and ROA

The Likert scale responses also suggest that there may be differences between the two groups' yield on earning assets and their cost of funding assets, but no difference between groups in their return on assets (ROA). If sellers enjoy higher yields, they would then have a comparative advantage in originating loans; however, if at the same time they have higher funding costs, they would have a comparative disadvantage in funding the loans. Nonsellers of course would face the opposite set of circumstances; these banks would have a comparative advantage in funding loans and a comparative disadvantage in originating them. But, on balance, if each group exploits its strong suit, the return on assets is not likely to differ between groups.

The data and tests presented in Table 6.3 affirm this. Banks that sell loans in secondary markets have significantly higher yields ($\alpha=.05$ level) and funding costs ($\alpha=.01$ level), but no different ROAs than the group reporting no participation. Again, these results suggest that banks exploit the activities in which they have a comparative advantage.

Capital-to-asset ratio

The capital-to-asset ratio is a measure of financial leverage. Historically, it has been used as a measure of risk. A lower ratio means that there is a smaller buffer between the value of a bank's assets and its liabilities. A lower ratio therefore implies a more aggressive management style. As seen in Table 6.3, the capital-to-asset ratio does differ between groups at the $\alpha=.01$ level of significance. This suggests that sellers have a higher degree of financial leverage than banks that do not participate in secondary markets. A lower risk-based capital ratio, to be discussed next, would also imply a more aggressive management style.

Risk-based capital ratio

The risk-based capital ratio is more encompassing than the simple capital-to-asset ratio in the sense that it considers the types of assets held and the off-balance sheet activities a bank engages in. For any given capital-to-asset ratio, a bank would have a lower risk-based capital-to-asset ratio if a larger proportion of its portfolio was held in riskier assets (say, more loans and less government securities). Sellers do in fact have a statistically significant ($\alpha=.01$ level) lower risk-based capital ratio, as can be seen in Table 6.3.

A word of caution is in order. It could be the case that nonsellers have higher risk-based capital ratios (on average)

because they have weaker loan demand. That is, they might be holding relatively fewer loans in their portfolio by circum- stance, not by choice.

Summary

As was stated before, the Likert scale data generated from the survey instrument appear consistent with the theoret- ical and empirical literature. Moreover, the selected balance sheet and income statement items reinforce the survey results. The factors that banks cite as relevant in their decision to sell and not to sell loans are in fact reflected in differ- ences between the means using measures obtained from their financial statements.

In the next section, the focus narrows to the reasons why banks choose to participate in the Farmer Mac II program.

Farmer Mac II Secondary Market Activity

Table 6.4 summarizes the factors nonparticipants cite as important in their decision to not sell loans into Farmer Mac II; Table 6.5 reports the reasons participants indicate as relevant in their decision to sell.

Respondents reporting no participation in Farmer Mac II

Two hundred fifty-nine banks indicated no USDA guaranteed loan sales to Farmer Mac II. The banks reporting no partici- pation in any secondary market will also be responding to this

Table 6.4. Reasons for not participating in Farmer Mac II program[1]

	not relevant			very relevant				Std.
	1	2	3	4	5	Total[2]	Mean	dev.
Loan sales are not part of	53	46	45	47	65	256	3.09	1.49
management strategy	(21)	(18)	(18)	(18)	(25)	(100)		
USDA loan sales are not part	42	36	38	52	79	247	3.35	1.48
of management strategy	(17)	(15)	(15)	(21)	(32)	(100)		
Prefer to hold USDA loans and	20	13	32	74	106	245	3.96	1.23
retain entire net interest margin	(8)	(5)	(13)	(30)	(43)	(100)		
Bank has sufficient liquidity to	17	15	30	84	100	246	3.95	1.18
fund USDA loans	(7)	(6)	(12)	(34)	(41)	(100)		
Bank is sufficiently capitalized	16	12	26	81	111	246	4.05	1.15
to fund USDA loans	(7)	(5)	(11)	(33)	(45)	(100)		
Insufficient loan demand makes	56	36	48	52	56	248	3.06	1.47
loan sales unnecessary	(23)	(15)	(19)	(21)	(23)	(100)		
Insufficient USDA loan demand	38	32	45	55	75	245	3.40	1.43
makes loan sales unnecessary	(16)	(13)	(18)	(22)	(31)	(100)		
Bank sells USDA loans to	176	26	20	8	9	239	1.53	1.03
affiliates/correspondent banks	(74)	(11)	(8)	(3)	(4)	(100)		
Not familiar with Farmer Mac II	187	9	6	6	16	224	1.46	1.15
loan sale program	(84)	(4)	(3)	(3)	(7)	(100)		
Too much paperwork with	70	38	79	27	16	230	2.48	1.23
Farmer Mac II program	(30)	(17)	(34)	(12)	(7)	(100)		

[1] Top number is the frequency, number in parentheses is percent of total responses.

2 Due to rounding, the percent of total responses may not equal 100.

Table 6.5. Reasons for participating in Farmer Mac II[1]

	not relevant			very relevant				Std.
	1	2	3	4	5	Total[2]	Mean	dev.
Management strategy to sell	15	10	14	12	14	65	2.97	1.47
all USDA loans	(23)	(15)	(22)	(19)	(22)	(100)		
Loan sales reduce interest	2	5	8	26	27	68	4.04	1.03
rate risk	(3)	(7)	(12)	(38)	(40)	(100)		
Loan sales enhance portfolio	6	7	14	26	15	68	3.55	1.19
liquidity	(9)	(10)	(21)	(38)	(22)	(100)		
Loan sales allow bank to satisfy	12	21	14	13	8	68	2.78	1.27
heavy USDA loan demand	(18)	(31)	(21)	(19)	(12)	(100)		
Loan sales reduce need to	7	12	19	17	13	68	3.22	1.26
attract retail deposits	(10)	(18)	(28)	(25)	(19)	(100)		
Loan sales reduce need to	9	12	16	20	11	68	3.16	1.27
purchase funds	(13)	(18)	(24)	(29)	(16)	(100)		
Loan sales offset declining	25	23	9	7	4	68	2.13	1.19
deposit base	(37)	(34)	(13)	(10)	(6)	(100)		
Loan sales offset insufficient	21	20	14	7	5	67	2.31	1.23
capital to support portfolio	(31)	(30)	(21)	(10)	(8)	(100)		
Loan sales offset insufficient	20	21	15	7	4	67	2.29	1.18
capital to support lg. borrowers	(30)	(31)	(22)	(10)	(6)	(100)		

[1] The top number is the frequency, the number below is the percent of total responses.

[2] Due to rounding, the percent of total responses may not sum to 100.

Table 6.5.   (continued)

	not relevant		very relevant					Std.
	1	2	3	4	5	Total	Mean	dev.
Loan sales enhance return	0	7	11	32	17	67	3.90	0.91
on assets	(0)	(10)	(16)	(48)	(25)	(100)		
Loan sales allow funds to be re-	9	13	23	13	9	67	3.01	1.21
invested in more USDA loans	(13)	(19)	(34)	(19)	(13)	(100)		
Loan sales allow funds to be re-	9	12	25	16	6	68	2.99	1.14
invested elsewhere in portfolio	(13)	(18)	(37)	(24)	(9)	(100)		
Loan sales allow USDA origination	11	7	17	20	13	68	3.23	1.32
bank wouldn't make otherwise	(16)	(10)	(25)	(29)	(19)	(100)		
Loan sales allow better rates on	1	2	6	22	37	68	4.36	0.87
USDA loans for borrowers	(2)	(3)	(9)	(32)	(54)	(100)		
Loan sales allow better terms on	2	2	10	20	34	68	4.19	1.00
USDA loans for borrowers	(3)	(3)	(15)	(29)	(50)	(100)		

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panel of questions, so it should be expected that many banks are found not to make use of secondary markets as a matter of management policy here too. These results should also reflect the relatively weak loan demand at many nonparticipating banks, the adequate deposit and capital resources at hand, and the propensity for nonparticipating banks to hold onto the loans they originate. The only relative differences in the responses to this line of questioning should occur due to the addition of banks in this group that participate in secondary markets in general, but not the Farmer Mac II secondary market in particular. The results, presented in Table 6.4, were compiled from the responses to page 8 of the survey found in the Appendix.

Loan sales of any type are not a part of management strategy (m=3.09, s=1.49). As expected, a great many banks reported they do not participate in the Farmer Mac II program because loan sales of any kind are not part of management strategy (Table 6.4). However, since this group of respondents now includes banks that do sell loans, the frequency of "less relevant" (46/256 or 18 percent) and "not relevant" (53/256 or 21 percent) responses increased markedly. These banks are of particular interest since they do participate in secondary markets, albeit not Farmer Mac II.

USDA loan sales are not part of our management strategy

(m=3.35, s=1.48). Banks were asked how important management policy figured in their decision to not sell USDA loans to see if a bank's loan sales strategy differed across different types of loans. Looking at Table 6.4, it appears that many banks have a management strategy that allows for certain types of secondary market participation, but not others. To see this, notice that 65 of 256 banks (25 percent) responded that *loan sales [of any type] are not part of management strategy* was "very relevant" in their decision not to sell loans. When asked how relevant management strategy was in their decision not to participate in Farmer Mac II, 79 of 247 banks (32 percent) responded "very relevant." In other words, banks appear to have a loan sale strategy that differs across loans. Moreover, the many responses reported in Table 6.4 for this question between "not relevant" and "very relevant" implies that management directive does not "rule-in" or "rule-out" participation in secondary markets for a particular type of loan (such as USDA loans).

Prefer to hold USDA loans in portfolio and keep entire interest rate spread (m=3.96, s=1.23). From Table 6.4, the mode response to this question was "very relevant." From the responses of banks that did not participate in any secondary market we know that they preferred an *originate and earn the net interest margin* strategy (see Table 6.1). Now we find

that, on average, banks that do not participate in Farmer Mac II also prefer to originate USDA loans for their own portfolio and keep the interest rate spread.

Our bank has sufficient liquidity to fund USDA loans (m=3.95, s=1.18). One reason advanced by advocates of a secondary market for USDA guaranteed loans was that banks need such a program for liquidity purposes. However, inspection of Table 6.4 reveals that, at least for the average bank in this group, adequate liquidity is not an issue. Again, the mode response (41 percent of the banks) indicated that sufficient liquidity to fund USDA loans was "very relevant" in their decision not to participate in Farmer Mac II.

Sufficient liquidity to fund USDA guaranteed loans could be the result of weak overall loan demand, weak USDA guaranteed loan demand, or an ample deposit base. Regardless, banks that have (or perceive themselves to have) adequate liquidity are not likely candidates to participate in a secondary market, unless their participation is based on factors other than liquidity needs.

Our bank is sufficiently capitalized to fund USDA loans (m=4.05, s=1.15). On average, banks indicate that sufficient capital on hand to fund USDA loans is a large part of the reason they do not participate in the Farmer Mac II loan sale program. Again, looking at Table 6.4, the mode response was

"very relevant" (111/246 or 45 percent).

Recall, the proponents of secondary markets for agricultural loans maintained that small isolated rural banks might find it difficult to raise the capital needed to support their portfolio or large individual borrowers. Although this claim does not seem to apply to nonparticipants of Farmer Mac II, it may apply to those banks that do participate. The reason is that if the responses to this question are adjusted for the banks with no secondary market activity whatsoever, the remaining responses affirm earlier findings--that is, loan sellers tend be less well capitalized than their counterparts.

Insufficient overall loan demand at our bank relative to desired portfolio holdings make loan sales unnecessary
(m=3.06, s=1.47). This question was the same question addressed to the group of banks that do not participate in any secondary market. Looking at Table 6.4, the responses to this question are quite similar to those reported in Table 6.1 for the same question. Recall, some of the nonparticipants in any secondary market group reported weak loan demand being "very relevant" in their decision to not sell loans, but just as many others reported that weak loan demand was "not relevant." Most fell somewhere in between the two extremes.

Table 6.4 reflects the same pattern of responses for Farmer Mac nonparticipants because most of the banks that do not participate in Farmer Mac II do not participate in any

secondary market. Those banks that report weak loan demand as an important reason for not participating might participate if loan demand strengthened; those that report that weak loan demand is not relevant are in effect saying that they would not participate even if loan demand was stronger.

Insufficient USDA loan demand at our bank relative to desired portfolio holdings make loan sales unnecessary (m=3.40, s=1.43). Comparing the results of this question with the previous one suggests that loan demand may be a very important factor in a bank's decision to sell loans. From Table 6.4, most banks (75/245 or 31 percent) ranked the relevance a "5" (i.e., "very relevant"). This implies that, all else equal, if USDA loan demand was to increase, participation in the Farmer Mac II program would increase too.

A note on the reinvestment problem a bank faces if it sells loans and how the issue relates to loan demand is in order. If a bank sells loans, it would earn a modest servicing fee and be faced with a reinvestment problem (i.e., what to do with the proceeds from the sale). Weak USDA loan demand would make recycling the proceeds from the sale into more USDA loans difficult, whereas, weak overall demand would make it hard to even reinvest the funds elsewhere in the loan portfolio. So, weak overall loan demand or weak demand for USDA guaranteed loans weakens the incentives for a bank to participate in Farmer Mac II.

We already sell USDA loans to our affiliates or correspondent banks (m=1.53, s=1.03). This question was designed to find out if banks that were not selling their USDA guaranteed loans to Farmer Mac were selling them to some other third party. Inspection of Table 6.4 shows that nearly three-quarters of the respondents (176/239) indicated that *we already sell loans to our affiliates or correspondent banks* was "not relevant" to their decision to not sell loans into Farmer Mac II.

This is good news and not so good news for Farmer Mac. On one hand, most banks that sell their USDA guarantees sell them into Farmer Mac II. We know this because we know what banks sell into Farmer Mac II, and we know from the sample of banks that do not participate in Farmer Mac II that, by and large, they do not sell loans to their affiliates or to correspondent banks. On the other hand, if a great many banks were selling USDA loans to other buyers, the banks would represent potential business that could be competed for. In other words, although Farmer Mac enjoys the lion's share of the buyers' market in USDA loans, at this juncture it might be more advantageous for Farmer Mac to have a smaller share of a larger market.

Not familiar with Farmer Mac II program (m=1.46, s=1.15) **and Too much paperwork with Farmer Mac II** (m=2.48, s=1.23). The final two questions put to depositories that do not participate in the Farmer Mac II loan sale program concerned their

views of Farmer Mac. Most of the banks appeared to have some degree of familiarity with Farmer Mac II. On average, banks did not cite a lack of familiarity with the program as a reason for not participating in it. This finding should not be very surprising, given that the sample was drawn from banks holding USDA guaranteed loans and the fact that Farmer Mac sponsors a secondary market for USDA guarantees. This is to say that most have heard of Farmer Mac II, not that the banks are cognizant of the particular nuts and bolts of the program.

Banks seemed quite divided over whether the Farmer Mac II loan sale program involved too much paper shuffling. From Table 6.4, some thought it did and cited this as a strong reason for not participating, yet, many claimed that it was not important in their decision process. Many of the latter banks were banks that had secondary market selling experience. They would probably not be as overwhelmed by Farmer Mac's guidelines as those banks with no selling experience.

Summary

The descriptive results for the banks that do not sell USDA loans to Farmer Mac (Table 6.4) were similar in nature to the results that were tabulated for banks not participating in any secondary market (Table 6.1). Again, this should not be surprising--most banks that do not participate in Farmer Mac II do not participate in any secondary market. However, approximately 70 banks that do not participate in Farmer Mac

II do sell loans into other secondary markets. This fact did give rise to some differences.

Many banks claimed that USDA (or any other) loan sales are not an integral part of management policy. Insufficient overall and USDA loan demand, and adequate capital levels are consistent with the decision to originate and hold the loans in portfolio--that is, engage in conventional banking practices. Finally, it appears that banks that do not participate in Farmer Mac II do not sell loans to buyers other than Farmer Mac.

In the next section, banks that participate in the Farmer Mac II loan sale program will be asked what factors underlie their decision to sell USDA guarantees to Farmer Mac.

Respondents reporting participation in Farmer Mac II

The results discussed here are summarized in Table 6.5. They were generated from questions appearing on page 9 of the survey instrument found in the Appendix. Questions put to this group were similar in nature to those asked banks that reported secondary market activity--with the major difference involving the importance of USDA guaranteed lending characteristics. Since this group is a primarily a subset of banks that sell loans in general, the responses should be in harmony with those reported earlier in Table 6.2. It is worth noting that, for a handful of banks, Farmer Mac II was the only secondary market they participated in. Some of the signifi-

cant differences delineated between the group of sellers and nonsellers before (reported in Table 6.3) may disappear when banks that participate in Farmer Mac II are compared to those that do not. The underlying reason is attributable to the fact that the group of banks not participating in Farmer Mac II now includes banks that have secondary market experience, thus clouding the distinction between sellers and nonsellers that existed before. In other words, any differences discovered between Farmer Mac II participants and nonparticipants is likely to be based on factors pertaining to USDA lending.

Part of management strategy to sell all USDA loans (m=2.97, s=1.47). The answers to this question were uniformly distributed across the whole 5-point Likert scale. For some banks, selling all USDA guaranteed loans is a set policy; for others, the decision to sell is evidently made on a case by case basis.

Loan sales reduce interest rate risk (m=4.04, s=1.03). For Farmer Mac II participants, the decision to sell USDA loans hinges on the reduction in interest rate risk that accompanies participation. The greatest reduction in interest rate risk would come from selling long-term fixed-rate FO loans. Farmer Mac was, in part, created to increase the amount of medium- and long-term fixed-rate credit available to farmers. So, the program may be fulfilling one of its intended purposes.

Loan sales enhance portfolio liquidity (m=3.55, s=1.19). On average, enhanced portfolio liquidity figured prominently in Farmer Mac II participants' decisions to sell USDA loans. Without question, the use of Farmer Mac II (or any other) secondary market enhances liquidity. This attribute of Farmer Mac II was stressed by advocates of the loan sale program.

Recall that heavy loan demand or a declining deposit base could put pressure on a bank to improve its liquidity position. Next, we will look at loan demand and funding factors.

Loan sales allow our bank to satisfy heavy loan demand for USDA loans (m=2.78, s=1.27). Surprisingly, on average, participants in Farmer Mac II do not report that heavy USDA loan demand is "relevant" (i.e., a score of "3") in their decision to sell USDA loans. Recall, Farmer Mac II nonparticipants overwhelmingly reported that weak USDA loan demand was "very relevant" (see Table 6.4). Evidently, the presence of heavy loan demand is not a necessary condition for loan sales to occur. One possible explanation for this observation--borrower accommodation--will be dealt with in more detail below.

One of the compelling reasons for establishing a secondary market in USDA guaranteed loans rested on the notion that there would be an increased demand for USDA guaranteed loans as a result of the policy shift away from USDA direct lending. In other words, the implication of the policy shift was that farmers who had previously received direct loans from the USDA

would now show up at their local banks to apply for USDA guaranteed loans. Local banks, facing an increased demand for credit without an associated increase in available local funding, would need a secondary market to be able to satisfy the farmers' credit needs. From the survey results (see Tables 6.4 and 6.5), many banks do not currently seem to be experiencing heavy demand for USDA loans. However, changing conditions in the farm economy could quickly swamp banks with borrowers whose only access to credit would be the USDA guaranteed loan program.

Loan sales reduce the need to attract retail deposits to fund desired loan portfolio (m=3.22, s=1.26). From a bank's vantage point, it can fund new loans using existing deposits and reducing other assets, increasing deposits, purchasing funds, or selling the loans. Selling the loans eliminates the need for the funding to appear on a bank's balance sheet. Recall that earlier, loan sellers, on average, were found to have lower deposit-to-asset ratios and higher costs of funding assets than nonsellers, implying that some sellers might be having difficulty raising new deposits. Some sellers, however, appeared to have ample deposits (see Table 6.2).

For Farmer Mac II participants, the pattern of responses appears to be the same (Table 6.5). Some participants indicate that selling USDA loans circumvents the need to issue deposits; others do not rank this reason as important.

Loan sales reduce the need to purchase funds to fund desired loan portfolio (m=3.16, s=1.27). The responses to this question by Farmer Mac II participants were similar to their responses to the preceding question. What is not reported in Table 6.5 is that the banks that reported that selling loans reduced the need for attracting deposits were the same banks that indicated that loan sales reduced the need to purchase funds. For these banks then, it is obvious that they sell loans to Farmer Mac as a way of avoiding the need to fund the loans using deposits or borrowed funds. In large part, this is exactly what the Farmer Mac II program was created and designed for.

Loan sales offset declining deposit base at our bank relative to demand for funds (m=2.13, s=1.19). On average, Farmer Mac II participants do not cite a declining deposit base as important to their decision to sell. The mode response (25/68 or 37 percent), found in Table 6.5, was "not relevant." Although so-called deposit drain does not afflict this group, adding to the deposit base may be problematic.

Loan sales offset insufficient capital to fund desired loan portfolio (m=2.31, s=1.23) and **...fund large individual borrowers** (m=2.29, s=1.18). These two questions generated nearly identical responses. Farmer Mac II participants, as a group, do not rate insufficient capital to support their portfolio or

large borrowers as "relevant" in their decision to sell their
USDA guaranteed loans.

Loan sales enhance return on assets (m=3.90, s=0.91). In-
creased ROA is often touted as a major benefit derived from
secondary market participation. Banks that participate in
Farmer Mac II largely agree. The average response across
participants indicates that increased ROA is important in
their decision to sell USDA guarantees to Farmer Mac.

**Loan sales allow our bank to invest proceeds from sale into
more USDA loans** (m=3.01, s=1.21). Participation in a second-
ary market allows a bank to sell loans and then turn around
and originate more loans of the same type. From Table 6.5, a
number of banks report this ability as a reason they partici-
pate. However, the same number also indicate that originating
more USDA guaranteed loans with the proceeds from a sale is
not a strong reason they participate in Farmer Mac II.

The responses to this question are important from a
policy standpoint. An original argument put forward for the
creation of the loan sale program was that banks would need
added liquidity to meet the demand created by the policy
transition from direct credit supplied by the USDA to USDA
guaranteed lending provided by commercial sources. Certainly,
reinvesting the proceeds from a sale into more USDA guarantees
is consistent with the intent of the legislation.

But, can it be said that not plowing the funds from a
sale back into additional USDA guaranteed originations vio-
lates the purpose of the program? No. It could well be that
the Farmer Mac II loan sale program allows a bank to serve a
USDA guarantee borrower that it ordinarily would pass over.
As a rule, some banks might not originate USDA guaranteed
loans that could not be sold. In this sense, the program is
just as beneficial.

**Loan sales allow our bank to invest the proceeds from sale
elsewhere in portfolio (m=2.99, s=1.14).** Farmer Mac partici-
pants as a group do not indicate that selling their USDA
guaranteed loans to invest the funds elsewhere in their port-
folio is of major relevance in their decision to sell loans.
The investment of funds from the sale of USDA guarantees
elsewhere in a bank's portfolio may be more a result of a sale
than a cause of it.

**Loan sales allow our bank to originate a USDA loan it ordi-
narily would not if forced to hold the loan in portfolio
(m=3.23, s=1.32); ...allow for better rates to our borrowers
on USDA loans (m=4.36, s=0.87); and ...allow for better terms
to our borrowers on USDA loans (m=4.19, s=1.00).** This group
of questions is designed to see if borrower accommodation is a
reason for participating in Farmer Mac II.   From Table 6.5,
most banks ranked the ability to extend USDA borrowers better

rates and terms as "very relevant" in the decision to partici-
pate. In fact, on average, better rates and terms ranked
higher on average than any of the other factors reported in
Table 6.5. In addition to better rates and terms, Farmer Mac
II participants indicate that they can originate and sell a
USDA guaranteed loan they ordinarily would not originate if
Farmer Mac did not exist.

These three reasons for participating in Farmer Mac II
suggest that the Farmer Mac II loan sale program does in fact
enhance the efficiency of the agricultural credit market. By
allowing a bank to make loans that they would normally under-
invest in and passing on better rates and terms to borrowers
than would ordinarily be available, the existence of Farmer
Mac II benefits USDA lenders and borrowers alike.

Summary

The factors that banks consider relevant in their deci-
sion to participate in the Farmer Mac II loan sale program
include the following: enhanced liquidity, increased ROA,
reduced interest rate risk, added capacity to meet heavy USDA
loan demand, and the ability to serve their customers better.

It should not be concluded that the banks that do not
participate in Farmer Mac II are unaware of the benefits
associated with selling loans that accrue to the participants.
Rather, the market realities confronting nonparticipants--
especially with respect to USDA lending--make selling their

USDA loans into Farmer Mac II unnecessary. As circumstances change, so too could their participation status.

Summary

This chapter provided a descriptive analysis of secondary market participation in general, and Farmer Mac II in particular. The next step is to see if we can predict whether a bank will participate in the Farmer Mac II secondary market, as well as identify what variables are useful in making that prediction.

In Chapter 7, a logit analysis will be used to test the hypotheses outlined in Chapter 5. This analysis adds to the descriptive analysis in Chapter 6. We will attempt to predict whether a bank will participate and identify which factors are statistically significant. The logit analysis considers the explanatory variables as a group so that it is possible to isolate the effect of one factor by controlling for the effects of other factors (or eliminating the effect of the other variables).

CHAPTER 7

LOGISTIC REGRESSION RESULTS

A number of logit models will be constructed to estimate
the probability of a bank participating in Farmer Mac II and
test the hypotheses concerning participation outlined in
Chapter 5. In total, five models are fitted. Each model
differs in terms of how participation is defined and the
explanatory variables included. Participation differs accord-
ing to whether a bank sells any USDA guaranteed loans to
Farmer Mac, sells newly originated USDA guaranteed Farm Owner-
ship (FO) loans, sells newly originated USDA guaranteed Oper-
ating Loans (OL), or sells USDA "seasoned" FO loans, or sells
"seasoned" OL loans. The software package used to run the
logit regressions was SPSS version 7.5 (1996).

Sale of any USDA Guaranteed Loans into Farmer Mac II

The first logit run predicts the probability of a bank
selling any type of USDA guaranteed loans into Farmer Mac II.
The types of USDA guaranteed loans that a bank may have avail-
able for sale include newly originated Farm Ownership and
Operating Loans, and "seasoned" Farm Ownership and Operating
Loans. A loan is considered "seasoned" if it has been

"booked" for a year or more.

The logit model to be estimated is:

$$SALNFM = b_0 + b_1NCLNLN + b_2NCOLN + b_3ASSTEMP + b_4RBCR$$
$$+ b_5DEMAND + b_6COMP + b_7GLV + b_8AGBANK$$
$$+ b_9LNDEP + b_{10}DEPASST + b_{11}YLD + b_{12}COFA$$
$$+ b_{13}SALNSM + b_{14}ASSETS + u_i.$$

Dependent and explanatory variables

SALNFM: The dependent variable, SALNFM, is a dichotomous variable taking on a value of one if the bank sells any type of USDA guaranteed loans into Farmer Mac II, and zero other-wise. Whether a bank participated in Farmer Mac II was deter-mined from the survey results.

NCLNLN: NCLNLN is the banks' noncurrent loans to loans ratio. The noncurrent loans to loans ratio is all loans and leases 90 days or more past due plus loans in nonaccrual status as a percentage of gross loans and leases. This vari-able was computed using information taken from each bank's 1997 FDIC Summary Financial Report.

NCLNLN measures the riskiness of a bank's loan portfolio taken as a whole; that is, NCLNLN includes noncurrent USDA guaranteed loans plus any other noncurrent loans. Test of the hypothesis is that a bank with riskier loans will be less apt

to participate in Farmer Mac II, not that banks with riskier USDA guaranteed loans will be less likely to participate. The latter effect would be a separate hypothesis and will be addressed after the explanatory variables in the model are discussed.

NCOLN: Net charge-offs to loans, NCOLN, considers the recovery rate across a bank's entire portfolio. NCOLN is gross loan and lease financing receivable charge-offs less gross recoveries, as a percentage of total loans and lease financing receivables. NCOLN was computed from data obtained from each bank's 1997 FDIC Summary Financial Report. The idea is that a higher recovery rate should be associated with lower net charge-offs. The hypothesis is that higher net charge-offs in the portfolio compel a bank to sell appreciating loans elsewhere in the portfolio to replenish their capital base.

The NCOLN variable represents the loss rate for a bank's whole portfolio, not just its charge-offs due to USDA de-faults. The hypothesis is that higher charge-offs are in-versely related to participation in Farmer Mac II, not the "narrower" hypothesis that higher USDA guaranteed loan charge-offs are negatively related to participation. Charge-offs on USDA guaranteed loans are taken up after the explanatory variables included in the model are described.

USDA guarantee rate: The theoretical model derived in Chapter 4 included the USDA guarantee rate. Recall, the guarantee rate is the proportion of the difference between the total principal and interest owed on a loan and the value received upon liquidation should the borrower default. A higher guarantee rate affixed to a bank's USDA guaranteed loans should increase the probability of loan sales to Farmer Mac II. This variable was omitted from the empirical model because there was no variability in the guarantee rate across banks; banks responding to the survey almost universally reported guaranteeing their USDA loans at 90 percent. Note however, that the guarantee rate is important to banks in the sense that they invariably seek the maximum rate of 90 percent allowed by the USDA.

ASSTEMP: The next explanatory variable, assets per employee or ASSTEMP, is a measure of a bank's cost efficiency. This measure was also computed using each bank's FDIC report. A higher ratio implies a bank is more efficient in managing its assets, and therefore more likely to sell loans.

RBCR: The risk-based capital ratio, RBCR, attempts to capture management's tolerance for risk. The risk-based capital ratio is total risk-based capital (primary capital plus secondary capital) as a percentage of risk-weighted assets. RBCR was taken directly from the FDIC Summary Finan-

cial Reports. The risk-weighted assets measure is calculated by attaching risk-weights to each of a bank's assets as well as its off-balance sheet activities (such as selling loans with recourse). A lower RBCR reflects a more aggressive management style. Participation should be associated with lower risk-based capital ratios.

DEMAND: DEMAND is a composite variable created by adding the Likert scale responses for USDA guaranteed Farm Ownership and Operating Loan demand from the survey (see page 5 of the survey in the Appendix). Banks were asked to rank the current demand for both types of loans relative to historical levels using a 5-point scale. The maximum value for DEMAND is a score of "10", indicating very strong demand; the minimum, a score of "2", implying very weak demand. Whether increased demand leads to a higher chance of participation is theoretically ambiguous. From a bank's vantage, servicing higher demand increases both profit and risk; if the extra return warrants the additional risk, the extra demand will be met. Recall, DEMAND attempts to capture the effect of changes in the competitive USDA loan rate, and therefore represents a bank's ability to reinvest the proceeds from a sale back into more USDA guaranteed loans.

COMP: The COMP variable was constructed in the same fashion as DEMAND. Banks were asked to rank the degree of

competition in their relevant market area for USDA guaranteed FO and OL loans (see page 5 of the survey in the Appendix). The two 5-point Likert scale responses were then combined to form COMP. Like DEMAND, the sign on COMP is ambiguous, albeit for a different reason. When demand increases, a bank can extend more credit at the same interest rate. The issue then, is whether the added return is sufficient to offset the added risk.

As competition weakens, a bank is able to add a larger monopoly premium to the competitive rate. However, since the minimum marginal revenue ever earned on a loan is the competitive rate (due to the specification of the demand curve), a bank may not want to reduce its loan volume to capture the higher monopoly premium--especially if its loan volume is already very high or the competitive loan rate is high relative to the monopoly premium. So, the sign on COMP is theoretically ambiguous.

GLV: An increase in the size of a bank's USDA guaranteed loan volume, GLV, is expected to increase the probability of participation. GLV was obtained from the survey instrument (see page 5 of the survey). A larger guaranteed loan volume would create a greater pool of loans for a bank to sell from. GLV also indicates a bank's willingness to originate USDA guaranteed loans.

AGBANK: AGBANK is a dummy variable that takes on a value of one if the bank is classified as an agricultural bank (an agricultural loans to loans ratio of 17 percent or more), and zero otherwise. A bank's agricultural loans to loans ratio was computed by adding together the dollar volume of "Farm-land" loans and "Farm loans" from the FDIC Summary Financial Reports and then dividing by the bank's total loan volume. The FDIC defines the category "Farmland" as loans secured by farmland and the category "Farm loans" as loans to finance agricultural production and other loans to farmers. In an attempt to accommodate its farm customers and foster goodwill, an agricultural bank might be more likely to use Farmer Mac II. Recall, Dixon, et al. (1997) found that higher propor-tions of farm loan volume in the portfolio increased a bank's use of USDA guarantees, and in the case of OL loans, increased USDA guaranteed loan volume.

LNDEP: The loan-to-deposit ratio, LNDEP, is a measure of a bank's ability to fund loans using deposits. This measure was computed using the same FDIC bank reports as described above. The higher this measure, the more "loaned-up" a bank is--that is, the less room a bank would have to fund more loans from its deposit base. Banks with higher loan-to-depos-it ratios should be more likely to sell loans into Farmer Mac II.

DEPASST: The deposit-to-asset ratio, DEPASST, measures
the proportion of a bank's assets that are financed using
deposits. DEPASST was computed using the FDIC reports. If a
bank is experiencing so-called deposit drain, it should have a
lower deposit-to-asset ratio, and be more likely to sell
loans.

YLD: As previously noted, loan sales involve a reinvest-
ment problem for a bank. The yield on earning assets, YLD,
would be the rate a bank earns after selling loans to Farmer
Mac and then allocating the proceeds across its portfolio.
YLD was taken directly from the "Performance Ratios" section
of the FDIC Summary Financial Reports. A higher YLD will be
associated with participation if a bank uses secondary markets
in order to exploit its comparative advantage in originating
loans. The yield a bank would earn by reinvesting the pro-
ceeds from a sale is measured by the DEMAND and COMP variables
explained above.

COFA: The cost of funding assets, COFA, should be posi-
tively related with participation in Farmer Mac II. COFA was
obtained the same way as YLD. A higher cost of funding assets
means that a bank has a comparative disadvantage in funding
the loans it originates, and therefore may be more apt to sell
loans.

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SALNSM: SALNSM is a dummy variable that controls for other experience selling loans into a secondary market. It takes on a value of one if management has any experience, and zero otherwise. Whether a bank was classified as having other experience was determined from the survey instrument. Banks were asked if they had experience in secondary markets, and if so, which secondary market. If a bank responded that its secondary market experience was limited to Farmer Mac II, then SALNSM=0.

If management has other experience selling loans into a secondary market, they may be more likely to sell loans to Farmer Mac for a number of reasons. First, managers with experience participating in other secondary markets may be in a better position to evaluate the potential advantages and disadvantages of selling loans than managers with no experience. Second, they may also be able to adapt quicker to the bureaucratic structure of the Farmer Mac II program, given that Farmer Mac II is similar to other secondary market programs. Third, other secondary market experience may be indicative of a bank's superior personnel, technology, tax or legal support. Finally, other experience may be a manifestation of the bank characteristics and market forces that spur a bank to participate in secondary markets.

ASSETS: The variable ASSETS controls for bank size. ASSETS is the total dollar volume of a bank's assets measured

in millions of dollars. The data for ASSETS came directly from each bank's FDIC report.

Pavel and Phillis (1987) found that increased bank size was a significant factor underlying loan sales; however, the proponents of Farmer Mac claimed that the program would be of greatest benefit to small rural banks and their borrowers. The a priori sign on ASSETS is indeterminate.

Variables omitted from the model

A number of hypotheses outlined in Chapter 5 will not be tested because of a failure to collect sufficient or accurate data. These hypotheses involve USDA loan quality and a bank's efficiency regarding the origination and servicing of USDA guaranteed loans. A brief discussion of each follows.

The model developed in Chapter 4 indicated that banks that experienced a lower expected default rate and variance of the default rate on their USDA guarantees would be more likely to participate in Farmer Mac II. An attempt was made to collect this data from the survey via a series of questions (see page 7 of the survey in the Appendix) that could be used to construct a triangular distribution. Given the lowest, most likely (mode), and highest default rates for each bank, it would have been possible to calculate a mean and variance of the default rate on USDA guaranteed loans for each bank. The survey responses were so incomplete that it was decided that the information collected was of no use.

In hindsight, a different method for collecting information on each bank's USDA guaranteed loan default rate experience would have been to find the national averages (available from USDA data) and then ask each bank whether its default rates were higher or lower rate than the national averages. A dummy variable could then have been incorporated into the regression model to capture the effect of default rates on loan sales. This method would provide less quantitative information than a mean and variance, but it would likely produce more responses.

An attempt to collect information on how much a bank recovered in the event of default (recovery rate) was not successful. Banks were asked to indicate the percentage of principal and interest due (net of all foreclosure costs) that was recovered in the event of a USDA guaranteed loan default. Roughly one-third of the banks failed to provide a number. One plausible explanation for the dismal response rate is that the liquidation of a loan is handled by another department in the bank or sub-contracted out to a specialist. Some banks indicated such cases. We cannot say for certain, but this may be true for some of the other banks that did not respond.

The measures to be used to assess a bank's efficiency in originating and servicing loans included the number of hours needed to originate a USDA guaranteed loan and the average number of hours required by year to service it. The poor response rate for these variables may have been in part due to

the ambiguous way in which the questions were worded. Many
banks apparently reported the total number of hours per year
spent originating and servicing their USDA guaranteed loans.
Others reported the information on a per loan basis. This
problem was not revealed during the pre-test of the survey. A
second problem was that these particular questions seemed to
pique some bankers sense of frustration with the bureaucracy.
Common responses included "days," "weeks," and "too many."
Needless to say, coding these responses into useful data is
impossible. Finally, a number of banks reported that the
origination process was out-sourced to a specialist.

Logit model results: SALNFM

The descriptive statistics of the variables included in
the model for the sample appear in Table 7.1. The logit model
results appear in Table 7.2. Goodness of fit is considered
first, followed by a discussion of the explanatory variables.

Goodness of fit

The measures used to assess the goodness of fit include
the likelihood ratio test, the Madalla R^2, and the Cragg-Uhler
R^2. These statistics appear in Table 7.2. A classification
table that compares the predictions of the model to the ob-
served outcomes is presented in Table 7.3. Figure 7.1 depicts
the observed groups and predicted probabilities.

Table 7.1. Description of sample for SALNFM logit model

Variable[3]	Nonparticipants (SALNFM=0)[1]				Participants (SALNFM=1)[2]			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
NCLNLN	0.011	0.016	0.000	0.141	0.012	0.013	0.000	0.077
NCOLN	0.002	0.005	-0.008	0.042	0.002	0.004	-0.004	0.026
ASSTEMP	2.488	0.724	0.747	4.692	2.530	0.754	1.167	4.963
RBCR	0.165	0.066	0.098	0.573	0.147	0.038	0.088	0.299
DEMAND	5.456	1.796	2.000	10.000	6.549	1.492	2.000	10.000
COMP	5.317	1.967	2.000	10.000	5.609	1.893	2.000	10.000
GLV	1.603	1.992	0.000	12.500	3.496	3.475	0.300	18.000
AGBANK	0.696	0.461	0.000	1.000	0.781	0.417	0.000	1.000
LNDEP	0.733	0.150	0.207	1.296	0.767	0.130	0.387	1.098
DEPASST	0.848	0.063	0.525	0.937	0.846	0.062	0.591	1.000
YLD	0.084	0.008	0.067	0.118	0.087	0.008	0.071	0.122
COFA	0.039	0.004	0.027	0.050	0.040	0.004	0.029	0.054
SALNSM	0.338	0.474	0.000	1.000	0.707	0.458	0.000	1.000
ASSETS	1.596	12.571	0.005	186.000	0.375	1.423	0.010	9.699

[1] n=237.

[2] n=82.

[3] **SALNFM** is the dichotomous dependent variable which takes on a value of 1 if a bank sells any type of USDA guaranteed loan to Farmer Mac II, and 0 otherwise; **NCLNLN** is non-current loans to loans; **NCOLN** is net charge-offs to loans; **ASSTEMP** is assets per employee measured in millions of dollars; **RBCR** is the risk-based capital ratio; **DEMAND** is a composite variable for USDA guaranteed loan demand; **COMP** is a composite variable for competition among USDA guaranteed lenders; **GLV** is the bank's USDA guaranteed loan volume measured in millions of dollars; **AGBANK** is a dummy variable that takes on a value of 1 if the bank has 17 percent or more of its loan portfolio in agricultural loans, and 0 otherwise; **LNDEP** is the loan-to-deposit ratio; **DEPASST** is the deposit-to-asset ratio; **YLD** is the yield on earning assets; **COFA** is the cost of funding earning assets; **SALNSM** is a dummy variable that takes on a value of 1 if the bank has other secondary market experience, and 0 otherwise; and **ASSETS** is bank assets measured in billions of dollars.

Table 7.2.   SALNFM logit model results[1]

Variable[2]	Est. coeff.	Std. error	t-ratio	Elast. at means[3]
NCLNLN	-3.1749	11.6379	-0.273	-0.0322
NCOLN	-31.6599	38.2924	-0.827	-0.0642
ASSTEMP	0.5421	0.2990	1.813 *	1.3074
RBCR	-3.2442	4.2567	-0.762	-0.5029
DEMAND	0.3801	0.1095	3.471 ***	2.1046
COMP	-0.0997	0.0901	-1.107	-0.5152
GLV	0.1518	0.0575	2.640 ***	0.3062
AGBANK	0.6763	0.3986	1.697 *	--
LNDEP	-1.5587	1.6491	-0.945	-1.1211
DEPASST	-2.9166	3.2474	-0.898	-2.3852
YLD	64.4562	25.7403	2.504 **	5.2757
COFA	-37.6899	44.3385	-0.850	-1.4187
SALNSM	1.4083	0.3311	4.253 ***	--
ASSETS	-7.3E-05	7.9E-05	-0.924	-0.0903
CONSTANT[4]	-7.3859			

LOG LIKELIHOOD (restricted) = -181.815
LOG LIKELIHOOD (unrestricted) = -141.998
LIKELIHOOD RATIO TEST = 79.634 with 14 d.f.
MADDALA R-SQUARE = .221
CRAGG-UHLER R-SQUARE = .325

[1] SALNFM=1 if bank sells any USDA guaranteed loans into Farmer Mac II and SALNFM=0 otherwise.

[2] See Table 7.1 for a description of the variables.

[3] Prob=.0223 if AGBANK=0, Prob=.0428 if AGBANK=1; and Prob=.0192 if SALNSM=0, Prob=.0741 if SALNSM=1.

[4] Adjusted by $\ln(p2)-\ln(p1) = \ln(.0407)-\ln(.2628) = -1.8652$ due to different sampling rates of the participants and nonparticipants.

  * Significant at the .1 level.
 ** Significant at the .05 level.
*** Significant at the .01 level.

Table 7.3.   SALNFM classification table[1]

Predicted

		0	1	Total	
Observed	0	237	0	237	100.00%
	1	79	3	82	3.66%
	Total	316	3	319	

overall 75.24%

[1] 1=participant in Farmer Mac II; 0=nonparticipant.

```
Freq.|
     |    1
     |    0
     |    0
     |    0
     |    0
     |    0
     |    0
     |    0
     |    0
     |    0    1
     |    0    1
     |    0    0
     |    0    0
     |    0    0         1
     |0   0    0    1    1
     |0   0    0    1    1    1                                  1
     |0   0    0    0    0    0    1                   1    1
     |0   0    0    0    0    0    0         1              1    1    1
     |0   0    0    0    0    0    0         0              1    1    1
     |0   0    0    0    0    0    0    1    0         1    0    1    1
     |0   0    0    0    0    0    0    0    0    1    1    0    0    0    1
     |0   0    0    0    0    0    0    0    0    0    0    0    0    0    1         1
      +--------------------------------------------------------------------------------------------------
SALNFM
 HAT:  .00  .01  .02  .03  .04  .05  .06  .07  .08  .09  .10  .15  .20  .30  .40  .50  .60  .70  .80  .90  1.0

Group:  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    1    1    1    1    1
```
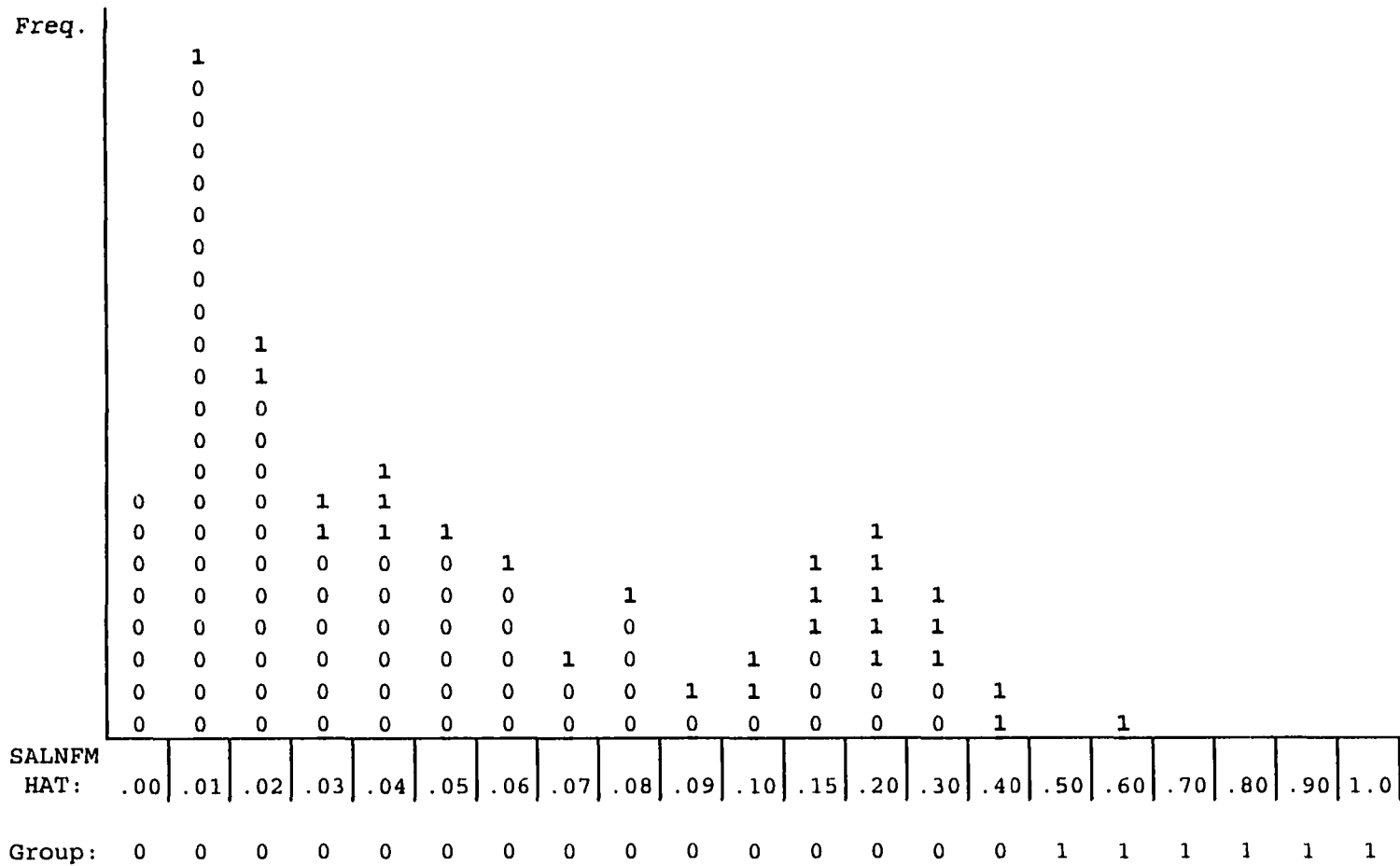
Predicted probability is of membership for SALNFM=1.
Each symbol represents 3 cases.

Figure 7.1. Observed groups and predicted probabilities: SALNFM

A likelihood ratio test was performed using the log
likelihood of the restricted model (model with all slopes
equal to zero) and the maximized value of the log likelihood
function (unrestricted model). The model χ^2 (chi-square)--
which tests the null hypothesis that all coefficients in the
estimated model, except the constant, are zero--is 79.634 with
14 degrees of freedom (df). Since $\chi^2_{x=.005}$ with 14 df is 31.32,
we can conclude that the model taken as a whole has explan-
atory power.

The Maddala R^2 and Cragg-Uhler R^2 are statistics that
attempt to quantify the proportion of explained "variation" in
the logistic regression model. They are similar in intent to
the R^2 in a linear regression model, although the variation in
a logit model must be defined differently. The maximum like-
lihood estimator (MLE) is not chosen in order to maximize a
fitting criterion based on the prediction of the dependent
variable, as it is in the classical regression (which maximiz-
es R^2). Rather, it is chosen to maximize the joint density of
the observed dependent variables.

The Maddala R^2 for the model is .221; the Cragg-Uhler R^2,
.325. The Cragg-Uhler R^2 is calculated by dividing the
Maddala R^2 by the upper bound of the Maddala R^2 (which is less
than 1). The Cragg-Uhler statistic, unlike the Maddala R^2,
can achieve a maximum of 1 (Maddala 1988).

The classification table presented in Table 7.3 compares
observed and predicted group membership. Banks with a pre-

dicted probability of 0.5 or greater are classified as partic-
ipants, whereas banks with a predicted probability of less
than 0.5 are classified as nonparticipants. Although the
model classification power is good in the sense of correctly
classifying nonparticipants (237/237 or 100 percent), the
model's ability to classify participants is weak (3/82 or 3.7
percent). In other words, the model has a zero false-positive
rate (bank is predicted to participate but in fact does not)
and a 96.3 percent false-negative rate (bank is predicted to
not participate but in fact does).

However, it is important not to place too much emphasis
on this measure of goodness of fit. A naive model, which
predicts that a bank will not participate if the proportion of
banks in the sample that do not participate (p) is greater
than one-half, will always predict p of the observations
correctly. Because the proportion of nonparticipants in the
sample (adjusting for the difference in sampling rates) is
94.8 percent, the naive model will have an overall prediction
rate of 94.8 percent. Notice that the naive model (which is
the model with all slopes restricted to zero), generates more
correct predictions than the estimated model, even though the
estimated model exhibits statistical explanatory power. This
oddity is not a flaw in the estimated model; rather, it is due
to the goodness of fit measure (Greene 1993).

The observed groups and predicted probabilities are
depicted in Figure 7.1. This figure illustrates that the

predicted probabilities for the Farmer Mac II participants (symbolized by "1"s) tend to be higher than those of the nonparticipants (symbolized by "0"s)--i.e., the model can somewhat distinguish between groups.

Explanatory variables

The estimated coefficients and their standard errors are presented in Table 7.2. The indicated level of significance is based on a two-tailed test.

The elasticities of the variables evaluated at the sample means of the regressors are also presented. By evaluating all changes at the sample means of the regressors, we are essentially measuring the change in the probability of participation for a bank that is "average in every way." According to this model, the average bank has a 3.5 percent probability of participating in Farmer Mac II. Elasticities are useful in that they are unitless measures, and can therefore be compared across the independent variables. For example, one can compare how much the predicted probability of participation will change due to a 1 percent change in YLD with how much it will change given a 1 percent change in COFA. To put the elasticity into perspective, the probability of participating given a one standard deviation change in the sample regressor, calculated at its mean will also be reported. Given that the distribution of the independent variable is approximately bell-shaped, the "empirical rule" tells us that approximately

68 percent of the observations for the variable fall in the interval $(\mu \pm \sigma)$.

Of course, reporting the elasticities for the dummy variables, AGBANK and SALNSM, would not be meaningful since these variables are not continuous. For these variables, the probability of participating is reported for each value of the binary variable (calculated at the sample means).

NCLNLN. Noncurrent loans to loans, NCLNLN, has the correct sign, but the hypothesis that the estimated coefficient is different from zero cannot be rejected at any reasonable level of significance. Again, this variable includes the value of all a bank's noncurrent loans, not just its USDA guaranteed loans. We cannot conclude that poor overall portfolio performance leads to participation in Farmer Mac II.

Another hypothesis test would have been to see whether the riskiness of USDA guaranteed loans was related to participation. As mentioned previously, inadequate data prevented such a test.

NCOLN. Theoretically, higher net charge-offs to loans, NCOLN, should increase participation. The estimated coefficient for NCOLN is negative, but statistically insignificant.

Pavel and Phillis (1987) found that net charge-offs had a significant positive effect on loan sales in general. One plausible reason that their finding is not replicated here is

that a bank selling its appreciating loans to restore its
capital base because of higher net charge-offs is more likely
to sell various types of loans rather than sell just one kind
(such as USDA guaranteed loans). Thus, the finding here does
not necessarily invalidate their finding.

The other hypothesis regarding charge-offs, one that
could not be tested because of poor data, was that higher net
charge-offs on a particular type of loan reduces loan sales of
that type of loan. If a particular type of loan in a bank's
portfolio begins to experience high net charge-offs, the bank
is likely to curtail its origination of those types of loans,
and therefore be less apt to participate in a secondary market
for those loans. Since this effect cannot be isolated using a
measure that reflects net charge-offs across a bank's entire
portfolio, we cannot conclude from this model specification
that there is no discernable effect on participation due to
higher net charge-offs on USDA guaranteed loans.

ASSTEMP. The measure of bank efficiency, assets per em-
ployee or ASSTEMP, has a significant positive effect on the
probability of participating in Farmer Mac II at the $\alpha=.1$
level of significance. The more efficient a bank is in manag-
ing its assets, the more loans it can service per employee.
The elasticity of ASSTEMP calculated at the sample means of
the regressors is 1.31. That implies that a 1 percent in-
crease in the dollar volume of assets per employee (measured

in millions of dollars per employee) will increase the proba-
bility of participating in Farmer Mac II by 1.31 percent. Put
another way, if the average bank's ASSTEMP increased by one
standard deviation, its probability of participating would
rise by 38.5 percent.

Caution is in order when interpreting the elasticities.
A one percent increase in ASSTEMP is only .025 million dollars
per employee. But a one standard deviation increase is .727
million dollars per employee, which is nearly a 30 percent
increase in the variable. The point is that the interpreta-
tion using the standard deviation combines the magnitude of
the effect of a change in a variable along with a sense of
what a change means relative to the distribution of the vari-
able. (Recall, roughly 68 percent of all observations fall
within ±1 standard deviation of the mean.) Also keep in mind
that an increase in the probability of participating of 38.5
percent would increase the average bank's probability of
participating from 3.5 percent to 4.8 percent or 1.3 percent-
age points.

RBCR. Although the expected sign on risk-based capital
ratio, RBCR, is correct, the estimated coefficient is not
statistically significant. Recall that in the means tests
between secondary market participants and nonparticipants (see
Table 6.3), participants were found to have significantly
lower risk-based capital ratios. Since the group of Farmer

Mac II nonparticipants includes banks that do participate in secondary markets, this characteristic may not be as differentiating as before. We cannot conclude that management aggressiveness, as measured by RBCR, leads to participation in Farmer Mac II.

DEMAND. DEMAND, a composite variable constructed by combining the Likert scale responses for USDA guaranteed Farm Ownership and Operating Loan demand, is positive and significantly different from zero at the $\alpha=.001$ level. This is consistent with the notion that loan sales is a volume business. The elasticity of DEMAND is 2.1. This means that a one standard deviation increase in the average bank's DEMAND would increase the probability of participating by 63.0 percent or 5.7 percentage points.

The usual issue arises when interpreting Likert scale data. That is, whether interpreting an ordinal measure as though it is interval data is appropriate. For example, What does it mean to rank the demand for loans a "3" vs. a "4"? And, How can one bank's response be compared to another's? In a sense, the Likert scale responses were standardized by the phrasing of the survey question. Banks did not merely rank the strength of demand (which would make interbank comparisons difficult), but rather ranked it relative to the bank's own historical demand (which makes comparisons more valid).

COMP. COMP, the degree of competition for borrowers among USDA guaranteed lenders, does not have a statistically significant influence on participation in Farmer Mac II. Although the theoretical sign on COMP is ambiguous, the estimated coefficient had a negative sign. This would imply that greater competition among banks reduces the chances of participation.

GLV. The size of a bank's USDA guaranteed loan volume, GLV, has a positive, statistically significant effect on the probability of participation at the $\alpha=.01$ level of significance. This makes sense for two reasons. First, banks that have more USDA guaranteed loans on the books have a larger pool of loans to sell into Farmer Mac II from. Secondly, banks may adopt more sophisticated management techniques if the volume and importance of a particular asset in the portfolio warrants it.

The elasticity of GLV is roughly one-third (.31), which means that a 1 percent increase in the average bank's USDA guaranteed loan volume (measured in millions of dollars) would increase its probability of participating by .31 percent. Looked at alternatively, a one standard deviation increase in the average bank's GLV will increase the probability of participating by 34.8 percent or 1.2 percentage points.

AGBANK. The coefficient on AGBANK is positive and statistically significant at the $\alpha=.1$ level. A bank is classified as an agricultural bank if its agricultural loans to loans ratio is at least 17 percent. This result indicates that being an agricultural bank increases the probability of participation in Farmer Mac II.

Since calculating an elasticity does not make sense for a binary variable, the probability of participating was calculated for each value of AGBANK (0 and 1) at the means of the regressors. The probability of participating in Farmer Mac II if AGBANK=0 is .022, and .043 if AGBANK=1. Being an agricultural bank nearly doubles the probability of participating for the average bank.

LNDEP and _DEPASST_. These two explanatory variables measure bank liquidity. The coefficient on LNDEP (loan-to-deposit ratio) had the opposite sign of what was expected but was not statistically significant. The deposit-to-asset ratio, DEPASST, had the expected sign but was not statistically significantly either. Again, the implication is that a higher loan-to-deposit ratio and a lower deposit-to-asset ratio may distinguish a secondary market participant in general from a nonparticipant, but it does not distinguish a participant in Farmer Mac II from a nonparticipant, controlling for the other variables in the model.

YLD. The effect of the yield on earning assets (YLD) on the probability of participating in Farmer Mac II is positive and statistically significant at the $\alpha=.05$ level of significance. Banks that enjoy a higher yield on their earning assets have a comparative advantage in originating loans and therefore less of a reinvestment problem should they sell loans into a secondary market. Yield is relevant to the bank when it sells a loan to Farmer Mac II and reinvests the funds in its portfolio.

YLD's elasticity is 5.28. A 1 percent increase in a bank's yield on earning assets will increase the probability of participation by 5.28 percent. Moreover, YLD has a higher elasticity than that of all the other independent variables with continuous measurements, and therefore has the greatest effect on the probability of participation among them for a given percentage change in the variable. A one standard deviation increase in yield amounts to a 9.1 percent increase in YLD, and would increase the probability of the average bank participating by 48.1 percent or 1.7 percentage points.

COFA. The coefficient on the cost of funding assets, COFA, did not have the expected sign nor was it statistically significant. This variable was intended to see if banks that had a comparative advantage in funding loans were less likely to participate. Banks that participate in secondary markets in general had higher finding costs than those that do not,

but we cannot conclude that the banks that participate in Farmer Mac II have higher funding costs, all else equal.

SALNSM. A bank that sells loans into other secondary markets is more likely to participate in Farmer Mac II. The coefficient on the dummy variable SALNSM (which takes on a value of 1 if a bank participates in other secondary markets, and 0 otherwise) was positive and statistically significant at the $\alpha=.01$ level of significance. This result implies that a bank that participates in one secondary market is apt to participate in others too.

Again, since SALNSM is a binary variable, calculating an elasticity is not meaningful. The probability of participating in Farmer Mac II if the average bank participates in other secondary markets is 7.41 percent and 1.92 percent if that bank does not participate in other secondary markets.

SALNSM seems to capture, controlling for all other effects, the propensity of bank managers to use more than one secondary market. However, there were banks that used other secondary markets but not Farmer Mac II, and a small number of banks that used only Farmer Mac II.

ASSETS. The ASSETS variable was included to control for bank size. Its coefficient was negative and not statistically significant. Pavel and Phillis (1987) found that size had a large impact on being a loan seller. However, to repeat--what

is true about participating in secondary markets in general is
not necessarily true for a particular secondary market.

Summary

The most significant factors in explaining participation
in the Farmer Mac II loan sale program are the variables that
relate to agricultural lending in general (AGBANK) and USDA
guaranteed lending in particular (DEMAND and GLV). This
should not be surprising given that Farmer Mac II is a second-
ary market for USDA guaranteed farm loans. The bank charac-
teristics not directly related to agricultural lending that
have an impact on the probability of participation include the
efficiency measure (ASSTEMP) and the yield on earning assets
(YLD). Whether a bank has experience selling loans into other
secondary markets (SALNSM) is the most telling of all the
explanatory variables in the model.

The variables that failed to distinguish between Farmer
Mac II participants and nonparticipants tended to be financial
ratios not directly related to a bank's USDA lending charac-
teristics. So, although (say) a higher loan-to-deposit ratio
may be associated with selling loans in general, it may not be
associated with selling particular types of loans, controlling
for other variables. Furthermore, the NCOLN and NCLNLN vari-
ables tested hypotheses that deal with overall loan portfolio
risk and participation in Farmer Mac II, rather than the more
"narrow" hypotheses of testing whether USDA guaranteed loan

risk affects participation.

In the next section, participation in Farmer Mac II will be redefined to include only those banks that sell new originations of USDA guaranteed Farm Ownership loans. A new logit model will be fitted using different independent variables.

Sale of Newly Originated USDA Guaranteed Farm Ownership (FO) Loans to Farmer Mac II

In addition to redefining what it means to be classified as a participant in Farmer Mac II, the logit model to be estimated here has slightly different explanatory variables.

The logit model to be estimated is:

$$SFOFM = b_0 + b_1NCLNLN + b_2NCOLN + b_3ASSTEMP + b_4RBCR$$
$$+ b_5FOD + b_6FOC + b_7GLV + b_8AGBANK + b_9FLFMLN$$
$$+ b_{10}LNDEP + b_{11}DEPASST + b_{12}YLD + b_{13}COFA$$
$$+ b_{14}SALNSM + b_{15}ASSETS + u_i.$$

Dependent and independent variables

SFOFM: If a bank sells newly originated (booked less than 12 months) USDA guaranteed Farm Ownership (FO) loans into Farmer Mac II, then SFOFM=1. Otherwise, SFOFM=0. Of the total 311 banks included in this analysis, 41 participate in Farmer Mac II as defined. The total number of banks in this analysis is lower than the total of 319 banks in the previous

analysis because not all banks that indicated that they sold
USDA guaranteed loans to Farmer Mac II reported the particular
types of USDA loans they sold. These banks were dropped from
the analysis and the sampling rates were adjusted accordingly.

FOD: FOD is the demand for USDA guaranteed Farm Operat-
ing (FO) loans. Data on this variable was obtained from the
survey instrument (page 5 of the survey found in the Appen-
dix). Banks were asked to rank the demand for FO loans rela-
tive to historical levels using a 5 point Likert scale. A
higher rating implies stronger demand for FO loans.

Theoretically, the sign on FOD is ambiguous. An increase
in demand means that a bank can extend additional credit at
the same interest rate, but whether it will depends on whether
the additional profit from making the loan is worth the addi-
tional risk involved in keeping all or part of it on the books
(from a bank's vantage). Recall, DEMAND had a statistically
significant positive effect on participation in Farmer Mac II
when sales of any USDA guaranteed loan type were considered.
DEMAND was found to be one of the stronger determinants of
participation in that model.

FOC: FOC attempts to measure the degree of lender compe-
tition for USDA guaranteed FO loans. Like FOD, it comes from
the survey, and is constructed similarly. A higher rating on
the 5 point Likert scale implies that local competition rel-

ative to historical levels is greater.

Theoretically, FOC could not be "signed" for reasons discussed earlier. The bottom line is that how a bank responds to changes in the degree of competition depends on how many USDA guaranteed loans it already has in its portfolio (i.e., where it is on its demand curve). In the prior estimation, the coefficient on COMP was negative but not statistically significantly different from zero at customary levels of significance.

FLFMLN: FLFMLN, the farmland loans to total agricultural loans (farmland loans plus farm loans) ratio was added as an explanatory variable to measure the extent to which a bank extends farm ownership credit relative to its total amount of agricultural loans. This ratio was calculated from each bank's FDIC Summary Financial report. Each report classifies agricultural assets as "farmland loans" (loans secured by farmland) or "farm loans" (loans to finance agricultural production and other loans to farmers).

A bank may be classified as agricultural (AGBANK=1) but may not lend for farm ownership purposes. Lower levels of FLFMLN should increase the probability of participation. A lower FLFMLN may be symptomatic of a bank's aversion to originating and holding longer-term loans in their portfolio due to interest rate risk. By selling into a secondary market, a bank can originate loans without keeping them on the books.

The independent variables noncurrent loans to loans, NCLNLN; net charge-offs to loans, NCOLN; assets per employee, ASSTEMP; risk-based capital ratio, RBCR; USDA guaranteed loan volume, GLV; the classification dummy for an agricultural bank, AGBANK; loan-to-deposit ratio, LNDEP; deposit-to-asset ratio, DEPASST; yield on earning assets, YLD; the cost of funding assets, COFA; the binary variable for other secondary market experience, SALNSM; and bank size, ASSETS; are all defined and expected to have the same effect on participation as outlined earlier.

Logit regression results: SFOFM

The descriptive statistics of the variables included in the model for the sample appear in Table 7.4. The regression results appear in Table 7.5. The overall model has explanatory power, as well as seven of the independent variables. According to this model, the average bank has a 10.9 percent probability of selling newly originated USDA guaranteed FO loans into Farmer Mac II. The results of this logit regression are discussed in detail below.

Goodness of fit

The likelihood ratio test, Madalla R^2, and Cragg-Uhler R^2 measures are presented in Table 7.5. The classification table of observed and predicted outcomes appears in Table 7.6. Figure 7.2 depicts the observed groups and predicted probabilities.

Table 7.4. Description of sample for SFOFM logit model

	Nonparticipants (SFOFM=0)[1]				Participants (SFOFM=1)[2]			
Variable[3]	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
NCLNLN	0.011	0.015	0.000	0.141	0.013	0.015	0.000	0.077
NCOLN	0.002	0.005	-0.008	0.042	0.002	0.005	-0.004	0.026
ASSTEMP	2.499	0.704	0.750	4.690	2.555	0.917	1.167	4.963
RBCR	0.164	0.063	0.098	0.573	0.143	0.040	0.088	0.299
FOD	2.646	0.955	1.000	5.000	3.317	0.789	1.000	5.000
FOC	2.686	1.033	1.000	5.000	2.732	0.923	1.000	5.000
GLV	1.739	2.100	0.000	12.500	3.536	3.141	0.500	14.000
AGBANK	0.712	0.454	0.000	1.000	0.781	0.419	0.000	1.000
FLFMLN	0.375	0.193	0.000	0.970	0.318	0.174	0.000	0.810
LNDEP	0.735	0.147	0.207	1.296	0.806	0.133	0.480	1.098
DEPASST	0.849	0.063	0.525	0.995	0.837	0.065	0.591	0.920
YLD	0.084	0.008	0.067	0.118	0.089	0.009	0.076	0.122
COFA	0.039	0.004	0.027	0.050	0.040	0.005	0.029	0.054
SALNSM	0.369	0.483	0.000	1.000	0.781	0.419	0.000	1.000
ASSETS	1.453	11.774	0.005	186.000	0.346	1.329	0.010	8.547

[1] n=270.

[2] n=41.

[3] **SFOFM** is the dichotomous dependent variable which takes on a value of 1 if a bank sells USDA guaranteed FO loans into Farmer Mac II, and 0 otherwise; **NCLNLN** is noncurrent loans to loans; **NCOLN** is net charge-offs to loans; **ASSTEMP** is assets per employee measured in millions of dollars; **RBCR** is the risk-based capital ratio; **FOD** is a scalar variable for USDA guaranteed FO loan demand; **FOC** is a scalar variable for competition among USDA guaranteed FO lenders; **GLV** is the bank's USDA guaranteed loan volume measured in millions of dollars; **AGBANK** is a dummy variable that takes on a value of 1 if the bank has 17 percent or more of its loan portfolio in agricultural loans, and 0 otherwise; **FLFMLN** is farmland loans to farm loans; **LNDEP** is the loan-to-deposit ratio; **DEPASST** is the deposit-to-asset ratio; **YLD** is the yield on earning assets; **COFA** is the cost of funding earning assets; **SALNSM** is a dummy variable that takes on a value of 1 if the bank has other secondary market experience, and 0 otherwise; and **ASSETS** is bank assets measured in billions of dollars.

Table 7.5.   SFOFM logit model results[1]

Variable[2]	Est. coeff.	Std. error	t-ratio		Elast. at means[3]
NCLNLN	1.0062	14.7071	0.068		0.0100
NCOLN	-31.1102	49.9516	-0.623		-0.0588
ASSTEMP	0.6843	0.3466	1.974	**	1.5284
RBCR	-2.1132	5.8341	-0.362		-0.3035
FOD	0.7838	0.2507	3.126	***	1.9098
FOC	-0.4611	0.2420	-1.905	*	-1.0819
GLV	0.1976	0.0766	2.580	***	0.3478
AGBANK	0.6546	0.5524	1.185		--
FLFMLN	-2.2281	1.3063	-1.706	*	-0.9203
LNDEP	1.3334	2.1938	0.608		0.8844
DEPASST	-6.0967	4.0769	-1.495		-4.6048
YLD	82.5524	32.8845	2.510	**	6.2388
COFA	-68.7025	58.9961	-1.165		-0.0239
SALNSM	1.5284	0.4732	3.230	***	--
ASSETS	-2.4E-04	2.0E-04	-1.175		-0.0274
CONSTANT[4]	-7.5687				

LOG LIKELIHOOD (restricted) = -121.245
LOG LIKELIHOOD (unrestricted) = -86.604
LIKELIHOOD RATIO TEST = 69.283 with 15 d.f.
MADDALA R-SQUARE = .200
CRAGG-UHLER R-SQUARE = .369

[1] SFOFM=1 if bank sells USDA guaranteed FO loans into Farmer Mac II and SFOFM=0 otherwise.

[2] See Table 7.4 for a description of the variables.

[3] Prob=.0708 if AGBANK=0, Prob=.1278 if AGBANK=1; and Prob=.0601 if SALNSM=0, Prob=.2277 if SALNSM=1.

[4] Adjusted by $\ln(p2)-\ln(p1)=\ln(.0451)-\ln(.2852)$ = -1.8443 due to different sampling rates of the participants and nonparticipants.

  * Significant at the .1 level.
 ** Significant at the .05 level.
*** Significant at the .01 level.

Table 7.6.   SFOFM classification table[1]

Predicted

		0	1	Total	
	0	270	0	270	100.00%
Observed					
	1	39	2	41	4.87%
	Total	309	2	311	

overall 87.45%

[1] 1=participant in Farmer Mac II; 0=nonparticipant.

```
Freq.
      0
      0
      0
      0
      0
      0
      0
      0
      0
      0   1
      0   1
      0   1
      0   0
      0   0
      0   0
      0   0
      0   0   1
      0   0   1
      0   0   1
      0   0   0
      0   0   0                                           1
      0   0   0   1               1                       1
      0   0   0   0   1           1               1       1
      0   0   0   0   0           0               1   0   1
      0   0   0   0   0   0   0   1   0   1   0   0   1               1
SFOFM
HAT:  .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 | .10 | .15 | .20 | .30 | .40 | .50 | .60 | .70 | .80 | .90 | 1.0

Group:  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    1    1    1    1    1
```

Predicted probability is of membership for SFOFM-1

Symbol 0 represents 5 cases.

Symbol 1 represents 2 cases.

Figure 7.2. Observed groups and predicted probabilities: SFOFM

The likelihood ratio test is used to test whether all of the coefficients in the model are equal to zero (except the intercept. The model χ^2 is 69.283 with 15 degrees of freedom (df). Since $\chi^2_{x=.05}$ with 15 df is 32.8, we can conclude that the model taken as a whole has explanatory power--i.e., we can reject the hypothesis that the restrictions do not apply. The values for the log likelihood functions can be found in Table 7.5.

The Maddala R^2 for the model is .200; the Cragg-Uhler R^2 is .369. Again, these measures are calculated using the maximums of the likelihood functions from the restricted and unrestricted model. Thus, they are not completely analogous to R^2 in a classical regression model.

Table 7.6 compares observed and predicted group member-ship. Banks with a predicted probability of 0.5 or greater are classified as participants in Farmer Mac II (SFOFM HAT=1). Banks with a predicted probability of less than 0.5 are class-ified as nonparticipants (SFOFM HAT=0). Banks are also class-ified according to their observed status. A bank that has a probability of participating equal to 25 percent and does not participate would be counted in the upper left hand cell of Table 7.6. A bank that was not predicted to participate but does would appear in the lower left hand cell. This would be a so-called false-negative--that is, the model predicted that the bank does not participate in Farmer Mac II, but the bank really does.

The model correctly classifies all nonparticipants (270/270 or 100 percent); the model's ability to classify participants, however, is weak (2/41 or 4.9 percent). The overall prediction rate is 87.5 percent (272 of 311). Clearly, the model is better at predicting which banks do not participate in Farmer Mac II than it is at predicting participation, using this goodness of fit measure.

The same pitfall applies here as before in placing too much emphasis on the classification table as a measure of goodness of fit. The model has explanatory power in the sense that participants have higher probabilities of participating than nonparticipants, but the small percentage of participants combined with the arbitrary classification rule used (SFOFM HAT=1 if Prob>.5) obscures this power when presented in a classification table.

Figure 7.2 shows the observed groups and predicted probabilities. This figure is a more useful depiction of the model's explanatory power than the classification table because it provides the predicted probabilities of participating. In other words, we can see that as a group, the observed participants have higher predicted probabilities than the observed nonparticipants.

Explanatory variables

The coefficients on NCLNLN, NCOLN, RBCR, AGBANK, LNDEP, COFA, and ASSETS are all statistically insignificant. The

sign on NCLNLN and COFA are the opposite of what was expected. We cannot conclude that these variables have a significant effect on the probability of a bank selling USDA Farm Owner-ship loans into Farmer Mac II.

ASSTEMP. Assets per employee, ASSTEMP, has a positive statistically significant effect on participation at the $\alpha=.05$ level of significance. Once more, efficiency is an important determinant of participation. The elasticity calculated at the regressor means is 1.5. A one standard deviation in ASST-EMP will increase the average bank's probability of participa-tion by 44.7 percent. Again, this sounds like a large change. However, the average bank's probability of participating is only 10.9 percent before the one standard deviation increase in ASSTEMP and 15.7 percent after the increase, which amounts to a 5.2 percentage point increase.

GLV. USDA guaranteed loan volume, GLV, is also signif-icant ($\alpha=.01$ level) and has the expected sign. Its elasticity is .35, indicating that higher USDA guaranteed loan volume increases the probability of participating by a less than proportionate amount of the increase in GLV. If GLV were to rise by one standard deviation, the average bank's probability of participating in Farmer Mac II would increase by 35 percent or 3.8 percentage points.

FOD. USDA Farm Ownership (FO) loan demand, FOD, influences whether a bank sells FO loans into Farmer Mac II. Its coefficient is positive and statistically significant at the $\alpha=.01$ level of significance. FOD's elasticity is 1.91. A one standard deviation increase in the average bank's FOD will increase its probability of selling loans into Farmer Mac II by 65.2 percent or 7.1 percentage points. Evidently, given the chance to increase its profits by servicing additional borrowers, a bank will accept the marginal risk.

FOC. The degree of competition among lenders for USDA guaranteed FO borrowers, FOC, has a statistically significant negative impact on the probability of participation. FOC's elasticity and effect on the probability of participation due to a one standard deviation increase is -1.1 and -40.9 percent, respectively. That translates into a decrease of 4.6 percentage points in the probability of the average bank selling FO loans into Farmer Mac II if FOC increases by one standard deviation.

One possible explanation for the sign on FOC is that banks with little competition make FO loans that they do not want to hold to foster goodwill, and then sell them into Farmer Mac II. A bank with many competitors may refer an FO borrower to a bank that originates FO loans for its portfolio (or sells them). A second plausible reason for the unexpected sign is that greater competition lowers the interest rate a

bank can charge on the loan, thus reducing one benefit of participating. The benefit of participating in this case would be the spread a bank receives after the sale. The spread is the difference between a loan's interest rate and the rate that must be passed on to Farmer Mac (called the "net yield"). Competition that reduced loan rates would shrink the spread left over after a sale (called the "management premium") and thus reduce the incentive to participate.

FLFMLN. The proportion of "Farmland" loans to total agricultural loans, FLFMLN, has a negative sign and is significant at the $\alpha=.01$ level of significance. This result is consistent with the hypothesis that participating in secondary markets allows a bank to originate loans that it does not want to hold in its portfolio. Its elasticity is -0.9. A one standard deviation increase in FLFMLN reduces the average bank's probability of participating by nearly 48 percent or 5.2 percentage points.

DEPASST. DEPASST was significant at the less customary $\alpha=.15$ level of significance. Its sign is negative, as expected. This finding suggests that using secondary markets is a substitute for the more traditional way of funding loans by issuing deposits, at least in the case of selling USDA guaranteed FO loans into Farmer Mac II.

In terms of the elasticities of the continuous explanato-

ry variables, DEPASST has the strongest effect on participation, except for YLD. A 1 percent decrease in the deposit-to-asset ratio increases the probability of selling USDA guaranteed FO loans to Farmer Mac by 4.6 percent. If the average bank was to experience a one standard deviation increase in its deposit-to-asset ratio, its probability of selling loans into Farmer Mac II would decrease by 34 percent or 3.7 percentage points.

YLD. YLD again has a positive, significant effect on the probability of participation. And again, it has the strongest influence among the continuously measured regressors in terms of elasticity. A 1 percent increase in YLD increases the probability of participating by 6.2 percent. If the average bank's YLD increases by one standard deviation, the probability of it participating increases by 57 percent or 6.2 percentage points. The incentive to participate is enhanced considerably if a bank can reinvest the proceeds from a loan sale into other high yielding assets in their portfolio.

SALNSM. Experience participating in other secondary markets (SALNSM) has a significant positive effect on a bank's probability of participating in Farmer Mac II. The probability of the average bank participating if it does not have experience selling loans into other secondary markets is just .06 compared to .23 if the bank does have such experience.

Other experience increases a manager's assuredness about participating in new secondary markets as well as allows him to conform to the nuts and bolts of the Farmer Mac II program more easily. Other experience may also be indirectly capturing the management sophistication required to engage in secondary markets.

Summary

This model attempts to explain why banks sell USDA guaranteed Farm Ownership loans into Farmer Mac II. Seven explanatory variables have statistically significant effects. They are: assets per employee, ASSTEMP; FO loan demand, FOD; competition among lenders for FO loans, FOC; USDA guaranteed loan volume, GLV; farm ownership loans as a fraction of total agricultural lending, FLFMLN; yield on earning assets, YLD; and whether a bank has experience selling loans into other secondary markets, SALNSM. Of the statistically significant continuous explanatory variables, yield has the greatest impact on participation. Overall, whether the bank sells loans into other secondary markets is the most telling variable.

In the next section a model will be estimated to see if a different set of explanatory variables can distinguish between banks that sell USDA guaranteed Operating Loans (OL) to Farmer Mac and those that do not.

Sale of Newly Originated USDA Guaranteed Operating Loans (OL) into Farmer Mac II

In this section, a model is fit that predicts the probability that a bank will sell USDA guaranteed Operating Loans into Farmer Mac II. This entails redefining the binary dependant variable and modifying the list of explanatory variables. The new independent variables are specific to agricultural lending as well as USDA guaranteed OL lending.

The logit model to be estimated is:

$$SOLFM = b_0 + b_1NCLNLN + b_2NCOLN + b_3ASSTEMP + b_4RBCR$$
$$+ b_5OLD + b_6OLC + b_7GLV + b_8AGBANK + b_9OLFMLN$$
$$+ b_{10}LNDEP + b_{11}DEPASST + b_{12}YLD + b_{13}COFA$$
$$+ b_{14}SALNSM + b_{15}ASSETS + u_i.$$

Dependent and independent variables

SOLFM: If a bank sells newly originated (booked less than 12 months) USDA guaranteed Operating Loans (OL) into Farmer Mac II, then SOLFM=1. Otherwise, SOLFM=0. Of the total 311 banks included in this analysis, 25 participate in Farmer Mac II as defined above. The total number of banks in this analysis is again 311.

OLD: OLD is the demand for USDA guaranteed Operating Loans (OL). Data on this variable was obtained from the survey instrument (see page 5 of the survey found in the

Appendix). Banks were asked to rank borrower demand for OL loans relative to historical levels using a 5 point Likert scale. A higher rating implies stronger demand for OL loans. This variable is similar to FOD, which was used in the prior model.

Theoretically, the sign on OLD is ambiguous. An increase in demand allows a bank to extend additional credit at the same interest rate or originate the same amount of loans at a higher interest rate. As the bank makes more loans, however, its portfolio risk rises. The bank will decide whether to service the additional demand by weighing the additional risk against the additional return. DEMAND had a statistically significant positive effect on participation in Farmer Mac II when the sale of any USDA guaranteed loan type (SALNFM) was considered and FOD had a significant positive effect on sales of USDA guaranteed FO loans (SFOFM).

OLC: OLC measures the degree of competition among lenders for USDA guaranteed FO loans. Like FOC, it comes from the survey, is constructed similarly, and is designed to proxy local lender competition. A score of "1" would reflect very weak competition. Higher scores imply that local competition relative to historical levels is greater.

The theoretical sign on OLC is indeterminate. In the estimation of the logit model with SALNFM as the dependent variable, the coefficient on COMP was negative but statis-

tically insignificant. However, FOC was found to have a significantly negative effect with respect to selling USDA guaranteed FO loans to Farmer Mac.

OLFMLN: OLFMLN, the farm loans (loans to finance agricultural production and other loans to farmers) to agricultural loans (farmland loans plus farm loans) ratio was added as an explanatory variable to measure the extent to which a bank extends farm operating credit relative to its total agricultural lending. A bank may be classified as an agricultural bank (AGBANK=1) but may not lend for farm operation purposes. Higher levels of OLFMLN should increase the probability of participation.

Dixon et al. (1997) show that a greater proportion of farm loans in the portfolio increases the use of USDA loan guarantees and in the case of OL loans, a larger USDA guarantee volume. However, it is not clear what incentives exist to sell shorter-term assets--especially with regard to reducing interest rate risk. On the other hand, if a bank is faced with liquidity problems, it may indeed sell loans, even operating loans.

The independent variables noncurrent loans to loans, NCLNLN; net charge-offs to loans, NCOLN; assets per employee, ASSTEMP; risk-based capital ratio, RBCR; USDA guaranteed loan volume, GLV; the classification dummy for an agricultural bank, AGBANK; loan-to-deposit ratio, LNDEP; deposit-to-asset

ratio, DEPASST; yield on earning assets, YLD; the cost of funding assets, COFA; the binary variable for other secondary market experience, SALNSM; and bank size, ASSETS; are all defined and expected to have the same effect on participation as outlined earlier.

Logit regression results: SOLFM

The descriptive statistics of the variables included in the model for the sample appear in Table 7.7. The goodness of fit statistics suggest the model has modest explanatory power. Four of the independent variables have statistical signif-icance. The estimation results appear in Table 7.8. Accord-ing to this model, the average bank has a .19 percent (.0019) probability of participating in Farmer Mac II. The results of the logit regression are discussed below.

Goodness of fit

The measures used to assess the goodness of fit again include the likelihood ratio test, the Madalla R^2, and the Cragg-Uhler R^2. A classification table that compares the predictions of the model to the observed outcomes appears in Table 7.9. The observed groups and predicted probabilities for the model are presented in Figure 7.3.

With regard to the likelihood ratio test, the model χ^2 is 67.826 with 15 degrees of freedom (df). Since $\chi^2_{\alpha=.005}$ with 15 df is 32.8, we can conclude that the model taken as a whole

Table 7.7. Description of sample for SOLFM logit model

Variable[3]	Nonparticipants (SOLFM=0)[1]				Participants (SOLFM=1)[2]			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
NCLNLN	0.002	0.005	0.000	0.141	0.014	0.015	0.000	0.077
NCOLN	0.011	0.015	-0.008	0.042	0.003	0.005	-0.002	0.026
ASSTEMP	2.498	0.720	0.750	4.690	2.553	0.877	1.167	4.930
RBCR	0.163	0.062	0.098	0.573	0.140	0.048	0.088	0.299
OLD	2.965	1.047	1.000	5.000	3.400	0.817	1.000	5.000
OLC	2.686	1.003	1.000	5.000	2.520	1.046	1.000	5.000
GLV	1.791	2.113	0.000	12.500	4.108	3.530	0.600	14.000
AGBANK	0.721	0.449	0.000	1.000	0.680	0.476	0.000	1.000
OLFMLN	0.631	0.191	0.030	1.000	0.649	0.195	0.190	0.910
LNDEP	0.735	0.145	0.207	1.296	0.853	0.121	0.560	1.098
DEPASST	0.849	0.063	0.525	0.995	0.834	0.058	0.710	0.920
YLD	0.084	0.008	0.068	0.118	0.090	0.010	0.079	0.122
COFA	0.039	0.004	0.027	0.050	0.041	0.005	0.029	0.054
SALNSM	0.380	0.486	0.000	1.000	0.920	0.277	0.000	1.000
ASSETS	1.378	11.444	0.005	186.000	0.514	1.689	0.017	8.547

[1] n=286.

[2] n=25.

[3] **SOLFM** is the dichotomous dependent variable which takes on a value of 1 if a bank sells USDA guaranteed OL loans to Farmer Mac II, and 0 otherwise; **NCLNLN** is noncurrent loans to loans; **NCOLN** is net charge-offs to loans; **ASSTEMP** is assets per employee measured in millions of dollars; **RBCR** is the risk-based capital ratio; **OLD** is a scalar variable for USDA guaranteed OL loan demand; **OLC** is a scalar variable for competition among USDA guaranteed OL lenders; **GLV** is the bank's USDA guaranteed loan volume measured in millions of dollars; **AGBANK** is a dummy variable that takes on a value of 1 if the bank has 17 percent or more of its loan portfolio in agricultural loans, and 0 otherwise; **OLFMLN** is operating loans to farm loans; **LNDEP** is the loan-to-deposit ratio; **DEPASST** is the deposit-to-asset ratio; **YLD** is the yield on earning assets; **COFA** is the cost of funding earning assets; **SALNSM** is a dummy variable that takes on a value of 1 if the bank has other secondary market experience, and 0 otherwise; and **ASSETS** denotes the bank's assets measured in billions of dollars.

Table 7.8.   SOLFM logit model results[2]

Variable[2]	Est. coeff.	Std. error	t-ratio	Elast. at means[3]
NCLNLN	-3.9313	20.7284	-0.190	-0.0455
NCOLN	72.6714	53.7758	1.351	0.1523
ASSTEMP	0.3702	0.4212	0.879	0.9239
RBCR	12.8312	7.9993	1.604	2.0632
OLD	0.4771	0.3300	1.446	1.4286
OLC	-0.6523	0.3230	-2.020 **	-1.7404
GLV	0.3031	0.0986	3.074 ***	0.5980
AGBANK	-0.1158	0.6341	-0.183	--
OLFMLN	1.4540	1.6236	0.896	0.9184
LNDEP	10.6394	3.4938	3.045 ***	7.9007
DEPASST	3.7430	6.0637	0.617	3.1658
YLD	24.9364	38.8887	0.641	2.1106
COFA	-12.0150	74.0284	-0.162	0.4677
SALNSM	2.9808	0.8705	3.424 ***	--
ASSETS	2.0E-04	1.7E-04	1.176	-0.2613
CONSTANT[4]	-24.2077			

LOG LIKELIHOOD (restricted) = -86.990
LOG LIKELIHOOD (unrestricted) = -53.076
LIKELIHOOD RATIO TEST = 67.826 with 15 d.f.
MADDALA R-SQUARE = .196
CRAGG-UHLER R-SQUARE = .457

[1] SOLFM=1 if bank sells USDA guaranteed OL loans into Farmer Mac II and SOLFM=0 otherwise.
[2] See Table 7.7 for a description of the variables.
[3] Prob=.0021 if AGBANK=0, Prob=.0019 if AGBANK=1; and Prob=.0005 if SALNSM=0, Prob=.0106 if SALNSM=1.
[4] Adjusted by $\ln(p2)-\ln(p1)=\ln(.0473)-\ln(.2907)=$ -1.8157 due to different sampling rates of the participants and nonparticipants.

  * Significant at the .1 level.
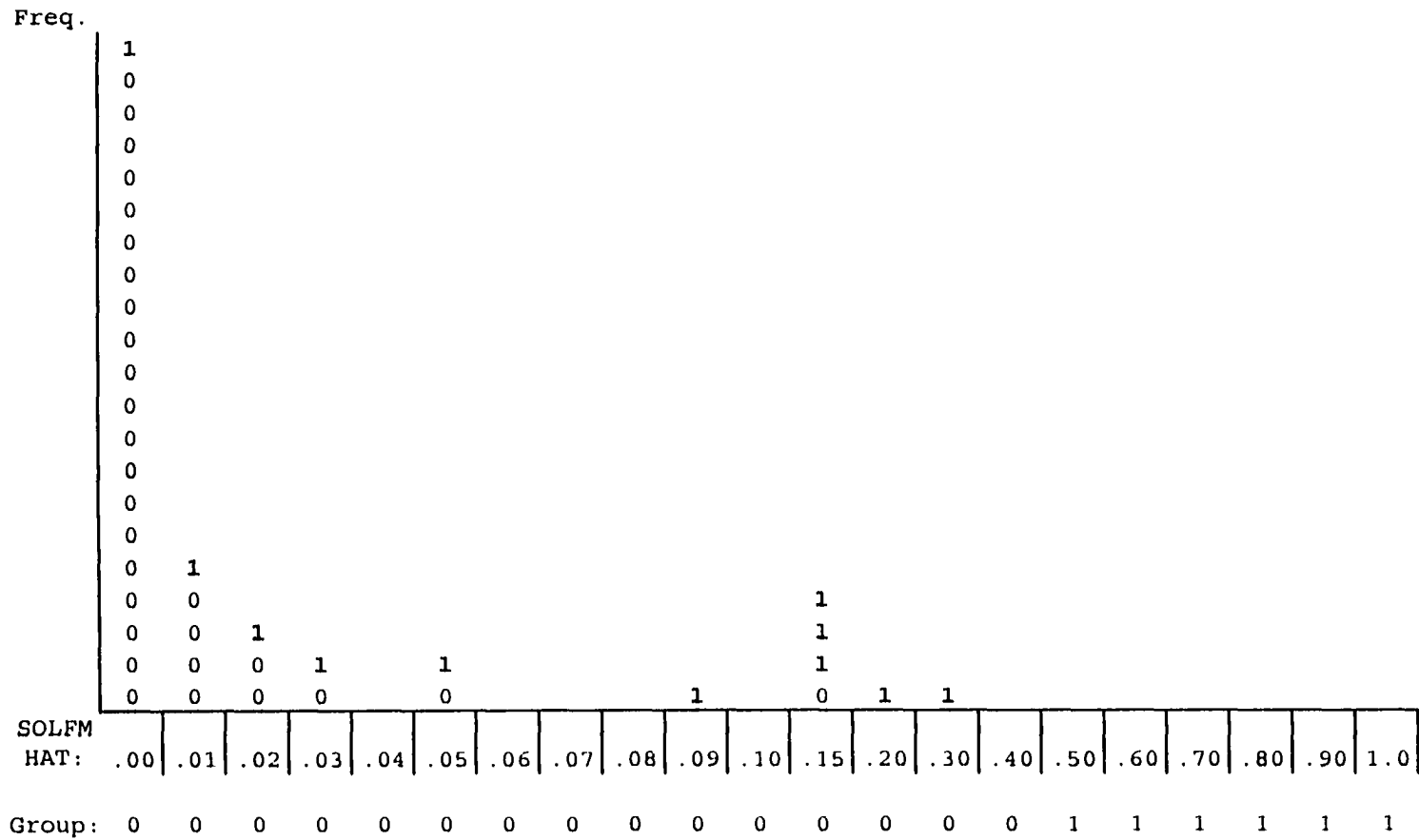 ** Significant at the .05 level.
*** Significant at the .01 level.

Table 7.9. SOLFM classification table[1]

Predicted

		0	1	Total	
	0	286	0	286	100.00%
Observed					
	1	24	1	25	4.00%
	Total	310	1	311	

overall 92.28%

[1] 1=participant in Farmer Mac II; 0=nonparticipant.

Freq.

```
        1
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0   1
        0   0                                        1
        0   0   1                                    1
        0   0   0   1       1                        1
        0   0   0   0       0           1        0   1   1
SOLFM
HAT:  .00| .01| .02| .03| .04| .05| .06| .07| .08| .09| .10| .15| .20| .30| .40| .50| .60| .70| .80| .90|1.0|

Group:  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    1    1    1    1    1
```

Predicted probability is of membership for SOLFM=1
Symbol 0 represents 10 cases.
Symbol 1 represents 2 cases.

Figure 7.3. Observed groups and predicted probabilities: SOLFM

has explanatory power. The values for the log likelihood functions (restricted and unrestricted) can be found in Table 7.8. The Maddala R^2 for the model is .196; the Cragg-Uhler R^2 is .457. These statistics appear in the same table.

Table 7.9 compares observed and predicted group membership. Banks with a predicted probability of participating that is greater than .5 are classified as participants. Banks are also classified as to whether they actually participate or not. The model's overall percent correct is 92.28 (287/311). It correctly classifies every nonparticipant (286/286 or 100 percent), but incorrectly classifies all but one participants (1/25 or 4.0 percent). In other words, the model has a zero false-positive rate (bank is predicted to participate but in fact does not) and a 96.0 percent false-negative rate (bank is predicted to not participate but in fact does). The same pit-fall applies here as before in placing too much emphasis on the classification table as a measure of goodness of fit. The classification table reflects the fact that there are so few banks that sell USDA guaranteed OL loans in the population. In addition, although the model has explanatory power, its ex-planatory power is by no means exceptional.

The observed groups and predicted membership depicted in Figure 7.3 show that the model does distinguish between par-ticipating banks and nonparticipating banks. The power to distinguish between groups is evident in the pattern of the predicted probabilities. The banks that do not participate

(denoted by "0"s) tend to have lower probabilities than the banks that participate (denoted by "1"s). Another way of thinking about it is that the "0"s should tend to group to the left and the "1"s should group to the right in Figure 7.3, if the model has the ability to distinguish between groups.

Explanatory variables

The coefficients on NCLNLN, NCOLN, ASSTEMP, AGBANK, OLFMLN, DEPASST, YLD, COFA, and ASSETS were all statistically insignificant. The signs on AGBANK, DEPASST, and COFA were the opposite of what was expected.

Assets per employee and yield, which had statistically significant positive effects on the probability of participating as defined earlier, do not explain why banks sell OL loans. The deposit-to-asset ratio, which has a statistically significant influence on the sale of FO loans, does not affect the probability of selling OL loans to Farmer Mac. These results suggest that FO loans and OL loans are sold into the Farmer Mac II loan sale program for different reasons.

RBCR. The risk-based capital ratio, RBCR, has a statistically significant positive effect on the probability of selling OL loans to Farmer Mac at the $\alpha=.15$ level of significance. The significance of the RBCR variable is noteworthy for 2 reasons. First, the sign is opposite of what was expected. Second, the elasticity of RBCR is 2.1, which means

that increases in a bank's risk-based capital will have a fairly strong effect on its probability of participation--especially compared to the other continuous variables. A one standard deviation increase in the average bank's RBCR increases the probability of it participating by 77.9 percent, which amounts to a .15 percentage point increase.

One possible explanation why an increase in a bank's risk-based capital ratio increases the probability of participating, given that a higher loan-to-deposit ratio also increases the chances of participating, is that sellers have higher capital levels.

OLD and **OLC**. The strength of OL demand, OLD, and the degree of competition among OL lenders, OLC, influence the probability of participation. OLC has a statistically significant negative effect at the $\alpha=.05$ level of significance. OLD has a positive effect but is weaker in influence than OLC in terms of elasticities. Furthermore, OLD is significant only at the $\alpha=.15$ level of significance. OLD and OLC have the same qualitative effects on the probability of selling OL loans to Farmer Mac as FOD and FOC have on the probability of a bank selling FO loans. For the average bank, a one standard deviation increase in OLD increases the probability of participating by 49 percent or .09 percentage points; a one standard deviation increase in OLC reduces the probability of participating by 65.5 percent or .12 percentage points.

GLV. USDA guaranteed loan volume, GLV, has a positive statistically significant effect on the probability of participation at the $\alpha=.01$ level of significance. Like the demand and competition measures, GLV repeatedly shows up as a significant explanatory variable. However, unlike these variables, GLV's elasticity is less than 1. In this model, its elasticity is .60. So, although higher levels of GLV are associated with a greater probability of selling OL loans into Farmer Mac II, the effect is fairly weak.

LNDEP. The coefficient on LNDEP has the expected sign and is significantly positive at the $\alpha=.01$ level of significance. LNDEP's elasticity calculated at the regressor means is 7.9. Not only does the loan-to-deposit ratio significantly explain the probability of selling OL loans into Farmer Mac II, but a 1 percent increase increases the probability of participation by nearly 8 percent. For the average bank, a one standard deviation increase in LNDEP increases the probability of participating by 84 percent or .16 percentage points. This result suggests that Farmer Mac II provides an important liquidity management tool for USDA OL lenders.

SALNSM. SALNSM is again the independent variable with the most explanatory power. The probability of participating for the average bank when SALNSM=0 is a paltry .0005 and increases to .0106 if SALNSM=1.

Summary

The variables related to USDA guaranteed lending (OLD, OLC, and GLV) are statistically significant determinants of the probability of participating in Farmer Mac II. A bank's loan-to-deposit ratio (LNDEP) and experience in other secondary markets have the greatest influence. Surprisingly, yield (YLD) and efficiency (ASSTEMP), which were important in explaining the sale of USDA guaranteed FO loans to Farmer Mac, are not helpful in distinguishing banks that sell OL loans from those that do not. This suggests that banks that sell OL loans into Farmer Mac II are not doing so in order to exploit a comparative advantage in originating loans.

In the next two sections, participation will be redefined to mean the selling of "seasoned" USDA guaranteed loans into Farmer Mac II. The focus is two-fold. First, Can the theoretical model predict which banks will participate? Secondly, Do the variables that explain the sale of newly originated USDA guaranteed loans to Farmer Mac explain the sale of "seasoned" loans?

Sale of "Seasoned" USDA guaranteed Farm Ownership (FO) Loans into Farmer Mac II

A bank is considered to participate in Farmer Mac II if it sells "seasoned" (booked more than 12 months) USDA guaranteed Farm Ownership (FO) loans to Farmer Mac.

The logit model to be estimated is:

$$SSFOFM = b_0 + b_1NCLNLN + b_2NCOLN + b_3ASSTEMP + b_4RBCR$$
$$+ b_5FOD + b_6FOC + b_7GLV + b_8AGBANK + b_9FLFMLN$$
$$+ b_{10}LNDEP + b_{11}DEPASST + b_{12}YLD + b_{13}COFA$$
$$+ b_{14}SALNSM + b_{15}ASSETS + u_i.$$

Dependent and independent variables

SSFOFM: If a bank sells "seasoned" USDA guaranteed FO loans into Farmer Mac II, then SSFOFM=1. Otherwise, SSFOFM=0. Of the total 311 banks included in this analysis, 24 participate in Farmer Mac II as defined. Recall, 41 banks sold newly originated FO loans, so not all banks that sell newly originated loans sell "seasoned" FO loans. Furthermore, not all banks that sell "seasoned" loans into Farmer Mac II sell new FO originations.

The independent variables noncurrent loans to loans, NCLNLN; net charge-offs to loans, NCOLN; assets per employee, ASSTEMP; risk-based capital ratio, RBCR; USDA guaranteed FO loan demand, FOD; competition among lenders for USDA guaranteed FO loans, FOC; USDA guaranteed loan volume, GLV; the agricultural bank classification dummy, AGBANK; farmland loans to agricultural loans ratio, FLFMLN; loan-to-deposit ratio, LNDEP; deposit-to-asset ratio, DEPASST; yield on earning

assets, YLD; the cost of funding assets, COFA; the binary variable for other secondary market experience, SALNSM; and bank size, ASSETS; are all defined and expected to have the same effect on participation as for the case of selling new FO originations.

Logit regression results: SSFOFM

The descriptive statistics of the model variables for the sample appear in Table 7.10. The regression results can be found in Table 7.11. The model has very modest explanatory power. Of the 15 independent variables, only 3 are statistically significant. The average bank has a .85 percent (.0085) probability of participating. The goodness of fit is poorer than the SFOFM model and the number of significant explanatory variables have also decreased. This suggests that the independent variables that explain SFOFM are not as useful in predicting whether a bank will sell "seasoned" USDA guaranteed FO loans. The results of the logit regression are discussed below.

Goodness of fit

The likelihood ratio test, the Madalla R^2, and the Cragg-Uhler R^2 measures are given in Table 7.11. A classification table comparing the predictions of the model with the observed outcomes appears in Table 7.12. The observed groups and predicted probabilities for SSFOFM are presented in Figure 7.4.

Table 7.10. Description of sample for SSFOFM logit model

Variable[3]	Nonparticipants (SSFOFM=0)[1]				Participants (SSFOFM=1)[2]			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
NCLNLN	0.011	0.015	0.000	0.141	0.010	0.008	0.000	0.029
NCOLN	0.002	0.005	-0.008	0.042	0.002	0.002	-0.001	0.006
ASSTEMP	2.499	0.733	0.750	4.930	2.588	0.761	1.167	4.963
RBCR	0.162	0.063	0.088	0.573	0.152	0.041	0.099	0.274
FOD	2.694	0.958	1.000	5.000	3.208	0.884	1.000	5.000
FOC	2.674	1.008	1.000	5.000	2.917	1.139	1.000	5.000
GLV	1.852	2.176	0.000	13.600	3.458	3.516	0.400	14.000
AGBANK	0.726	0.447	0.000	1.000	0.667	0.482	0.000	1.000
FLFMLN	0.369	0.192	0.000	0.970	0.352	0.181	0.000	0.810
LNDEP	0.744	0.149	0.207	1.296	0.749	0.118	0.550	0.990
DEPASST	0.848	0.063	0.525	0.995	0.838	0.065	0.591	0.920
YLD	0.085	0.008	0.067	0.122	0.085	0.005	0.076	0.093
COFA	0.039	0.004	0.027	0.050	0.038	0.003	0.029	0.040
SALNSM	0.389	0.488	0.000	1.000	0.833	0.381	0.000	1.000
ASSETS	1.371	11.421	0.005	186.000	0.559	1.954	0.010	9.699

[1] n=287.

[2] n=24.

[3] **SSFOFM** is the dichotomous dependent variable which takes on a value of 1 if a bank sells "seasomed" USDA guaranteed FO loans to Farmer Mac II, and 0 otherwise; **NCLNLN** is noncurrent loans to loans; **NCOLN** is net charge-offs to loans; **ASSTEMP** is assets per employee measured in millions of dollars; **RBCR** is the risk-based capital ratio; **FOD** is a scalar variable for USDA guaranteed FO loan demand; **FOC** is a scalar variable for competition among USDA guaranteed FO lenders; **GLV** is the bank's USDA guaranteed loan volume measured in millions of dollars; **AGBANK** is a dummy variable that takes on a value of 1 if the bank has 17 percent or more of its loan portfolio in agricultural loans, and 0 otherwise; **FLFMLN** is farmland loans to farm loans; **LNDEP** is the loan-to-deposit ratio; **DEPASST** is the deposit-to-asset ratio; **YLD** is the yield on earning assets; **COFA** is the cost of funding earning assets; **SALNSM** is a dummy variable that takes on a value of 1 if the bank has other secondary market experience, and 0 otherwise; and **ASSETS** denotes the bank's assets measured in billions of dollars.

Table 7.11.   SSFOFM logit model results[1]

Variable[2]	Est. coeff.	Std. error	t-ratio	Elast. at means[3]
NCLNLN	-8.6180	23.3039	-0.370	-0.0948
NCOLN	0.9014	69.8470	0.013	0.0019
ASSTEMP	0.4038	0.4000	1.010	1.0034
RBCR	-1.8568	6.2387	-0.298	-0.2968
FOD	0.5863	0.2955	1.984 **	1.5893
FOC	0.0004	0.2630	0.002	0.0011
GLV	0.1328	0.0824	1.612	0.2601
AGBANK	-0.0203	0.5847	-0.035	--
FLFMLN	-0.7953	1.5412	-0.516	-0.2889
LNDEP	-1.0663	2.4974	-0.427	-0.7869
DEPASST	-2.9779	4.7011	-0.633	-2.5023
YLD	-6.8636	47.7495	-0.144	0.5770
COFA	-118.1330	69.9779	-1.688 *	-4.5680
SALNSM	1.9461	0.6182	3.148 **	--
ASSETS	8.1E-05	1.0E-04	0.810	0.1050
CONSTANT[4]	0.6399			

LOG LIKELIHOOD (restricted) = -84531
LOG LIKELIHOOD (unrestricted) = -68.844
LIKELIHOOD RATIO TEST = 31.375 with 15 d.f.
MADDALA R-SQUARE = .096
CRAGG-UHLER R-SQUARE = .229

[1] SSFOFM=1 if bank sells "seasoned" USDA guaranteed FO loans to Farmer Mac and SSFOFM=0 otherwise.
[2] See Table 7.10 for a description of the variables.
[3] Prob=.0086 if AGBANK=0 and Prob=.0085 if AGBANK=1; Prob=.0038 if SALNSM=0 and P=.0257 if SALNSM=1.
[4] Adjusted by $\ln(p2)-\ln(p1)=\ln(.0475)-\ln(.2667)$ = -1.7254 due to different sampling rates of the participants and nonparticipants.

* Significant at the .1 level.
** Significant at the .05 level.

Table 7.12. SSFOFM classification table[1]

Predicted

		0	1	Total	Correct
	0	287	0	287	100.00%
Observed					
	1	24	0	24	0.00%
	Total	311	0	311	

Overall correc 92.28%

[1] 1=participant in Farmer Mac II; 0=nonparticipant.

Freq.

```
          0
          0
          0
          0
          0
          0
          0
          0
          0
          0   1
          0   1
          0   0
          0   0
          0   0
          0   0   1   1
          0   0   0   1
          0   0   0   0           1
          0   0   0   0   1   0       1           1
          0   0   0   0   0   0   1   0       1   0
```

SSFOFM
HAT:

```
    .00 .01 .02 .03 .04 .05 .06 .07 .08 .09 .10 .15 .20 .30 .40 .50 .60 .70 .80 .90 1.0
```

Group: 0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   1   1   1   1   1   1

Predicted probability is of membership for SSFOFM=1
Symbol 0 represents 7.5 cases.
Symbol 1 represents 2 cases.

Figure 7.4.   Observed groups and predicted probabilities: SSFOFM

The model χ^2 is 31.375 with 15 degrees of freedom (df).
Since $\chi^2_{\alpha=.01}$ with 15 df is 30.58, we can conclude that the
model taken as a whole has explanatory power. The values for
the log likelihood functions can be found in Table 7.11. The
Maddala R^2 for the model is .096; the Cragg-Uhler R^2 is .229.
This model does not fit as well as the one fitted to the sale
of newly originated USDA guaranteed FO loans (SFOFM). In
other words, the independent variables taken as a whole were
more suited to distinguishing between banks that sell new FO
originations vs. those that do not than they were suited to
distinguishing between banks that sell "seasoned" FO loans vs.
those that do not.

Table 7.12 compares observed and predicted group member-
ship. The model has an overall prediction rate of 92.28
percent. It correctly predicts all nonparticipants but incor-
rectly predicts all participants. In other words, the model
predicts that none of the banks in the sample will participate
in Farmer Mac II. Figure 7.4 illustrates that the predicted
probabilities of participants tend to be somewhat higher than
those of nonparticipants. However, it is also apparent from
the figure that the model has modest explanatory power.

Explanatory variables

The coefficients on NCLNLN, NCOLN, ASSTEMP, RBCR, FOC,
AGBANK, FLFMLN, LNDEP, DEPASST, YLD, and ASSETS were all
statistically insignificant. Of these, LNDEP and YLD had

signs opposite of what was expected. Recall, ASSTEMP, FOC,
FLFMLN, and YLD were all statistically significant determi-
nants of the probability of selling new FO originations into
Farmer Mac II.

COFA. The coefficient on the cost of funding earning
assets has a negative sign and is significantly different from
zero at the $\alpha=.1$ level of significance. We find that, all
else equal, a higher cost of funding reduces the probability
of participating in Farmer Mac II. Moreover, with an elastic-
ity of -4.6, the effect is quite strong. A one standard
deviation increase in COFA decreases the probability of the
average bank participating by 50.4 percent or .43 percentage
points. COFA had a negative sign in the model with SFOFM as
the dependent variable but its coefficient was significant at
only the 75 percent level and its elasticity was only -.02.

The sign on COFA is contrary to the notion that banks
with a comparative advantage in funding loans should hold
them. This peculiar result might be the result of reverse
causality--i.e., that by selling loans the cost of funding
assets falls. This argument is consistent with the negative
sign on DEPASST, which means that banks are more likely to
participate if they fund less of their assets using deposits.
Furthermore, the negative sign on LNDEP would then mean that
increases in loan sales reduce the loan-to-deposit ratio.

FOD and *GLV*. USDA guaranteed FO loan demand, FOD, has a positive statistically significant influence on the probability of participating in Farmer Mac II at the $\alpha=.05$ level of significance. FOD has an elasticity of 1.58. The effect of USDA guaranteed loan volume, GLV, is positive and statistically significant once again. Its elasticity is .26. FOD and GLV each have roughly the same quantitative effect on the probability of participation as in the case of selling newly originated FO loans.

SALNSM. Other experience selling loans into secondary markets again has the most power to distinguish Farmer Mac II participants from nonparticipants. If the average bank has participated in other secondary markets, the probability of participating in Farmer Mac II is 2.6 percent; if not, the probability falls to .38 percent.

Summary

Higher demand for USDA guaranteed FO loans, larger USDA guaranteed loan volume, and other secondary market experience in part explain why banks sell "seasoned" FO loans. These variables also helped explain why banks sell new FO originations. The cost of funding, which is statistically significant and has a strong impact on the probability of selling "seasoned" FO loans, is only significant at the $\alpha=.25$ level and has a very weak impact on the probability of selling new

FO originations. Moreover, variables such as assets per employee, competition among lenders for FO loans, farmland loans to farm loans, deposits-to-assets, and yield, which could explain why banks sold new FO originations, do not explain the sale of "seasoned" FO loans.

In the next section, a final logit model is fit to see if the explanatory variables are useful in predicting which banks sell "seasoned" USDA guaranteed Operating Loans into the Farmer Mac II loan sale program.

Sale of "seasoned" USDA guaranteed Operating Loans (OL) into Farmer Mac II

The model in this section is similar to the third model estimated. The explanatory variables used in that model are the same as included here. The only difference is that they are fit using a different binary dependent variable. A bank is considered to participate in Farmer Mac II if it sells "seasoned" (booked more than 12 months) USDA guaranteed Operating Loans (OL) to Farmer Mac.

The logit model to be estimated is:

$$
\begin{aligned}
SSFOFM = b_0 &+ b_1 NCLNLN + b_2 NCOLN + b_3 ASSTEMP + b_4 RBCR \\
&+ b_5 OLD + b_6 OLC + b_7 GLV + b_8 AGBANK + b_9 OLFMLN \\
&+ b_{10} LNDEP + b_{11} DEPASST + b_{12} YLD + b_{13} COFA \\
&+ b_{14} SALNSM + b_{15} ASSETS + u_1.
\end{aligned}
$$

Dependent and independent variables

**SSOLFM**: If a bank sells "seasoned" USDA guaranteed OL loans into Farmer Mac II, then SSOLFM=1. Otherwise, SSOLFM=0. Of the total 311 banks included in this analysis, 14 partici- pate in Farmer Mac II as defined. Recall, 25 banks sold newly originated OL loans, so not all banks that sell newly origi- nated loans sell "seasoned" OL loans. And, some banks that sell "seasoned" OL loans do not sell new OL originations.

The independent variables noncurrent loans to loans, NCLNLN; net charge-offs to loans, NCOLN; assets per employee, ASSTEMP; risk-based capital ratio, RBCR; USDA guaranteed OL loan demand, OLD; competition among lenders for USDA guaran- teed OL loans, OLC; USDA guaranteed loan volume, GLV; the agricultural bank classification dummy, AGBANK; farm operating loans to agricultural loans ratio, OLFMLN; loan-to-deposit ratio, LNDEP; deposit-to-asset ratio, DEPASST; yield on earn- ing assets, YLD; the cost of funding assets, COFA; the binary variable for other secondary market experience, SALNSM; and bank size, ASSETS; are all defined and expected to have the same effect on participation as for the case of selling new OL originations.

Logit regression results: SSOLFM

Table 7.13 provides descriptive statistics for the sample
with respect to each independent variable included in the
model. The estimation results of this logit model are not as
promising as the prior models. The overall fit is poor and
only 2 of the 15 independent variables are statistically
significant. The results of the regression are found in Table
7.14. According to this model, the average bank has a .15
percent (.0015) probability of selling "seasoned" OL loans
into Farmer Mac II. The results of this logit regression are
discussed below.

Goodness of fit

The measures used to assess the goodness of fit again
include the likelihood ratio test, the Madalla R^2, and the
Cragg-Uhler R^2. A classification table that compares the
predictions of the model to the observed outcomes appears in
Table 7.15. The observed groups and predicted probabilities
for SSOLFM are presented in Figure 7.5.

The model χ^2 is 21.330 with 15 degrees of freedom (df).
Since $\chi^2_{\alpha=.1}$ with 15 df is 21.3, we can conclude that not all
the coefficients in the model are zero--that is, the model has
some explanatory power. The values for the log likelihood
functions can be found in Table 7.14. The Maddala R^2 for the
model is .066; the Cragg-Uhler R^2 is .216. This model has the
poorest fit of the five estimated models in terms of the 3

Table 7.13. Description of sample for SSOLFM logit model

Variable[3]	Nonparticipants (SSOLFM=0)[1]				Participants (SSOLFM=1)[2]			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
NCLNLN	0.011	0.015	0.000	0.141	0.011	0.012	0.000	0.046
NCOLN	0.002	0.005	-0.008	0.042	0.001	0.002	-0.001	0.006
ASSTEMP	2.493	0.728	0.750	4.960	2.649	0.839	1.550	4.180
RBCR	0.162	0.062	0.098	0.573	0.149	0.030	0.113	0.211
OLD	3.007	1.041	1.000	5.000	2.857	0.949	1.000	4.000
OLC	2.678	1.010	1.000	5.000	2.571	0.938	1.000	4.000
GLV	1.906	2.248	0.000	13.600	3.464	3.574	0.400	14.000
AGBANK	0.722	0.449	0.000	1.000	0.643	0.497	0.000	1.000
OLFMLN	0.633	0.193	0.030	1.000	0.630	0.166	0.190	0.880
LNDEP	0.744	0.148	0.207	1.296	0.741	0.111	0.550	0.380
DEPASST	0.847	0.063	0.525	0.995	0.849	0.067	0.640	0.910
YLD	0.085	0.008	0.068	0.122	0.086	0.005	0.075	0.095
COFA	0.039	0.004	0.027	0.050	0.041	0.003	0.029	0.054
SALNSM	0.403	0.491	0.000	1.000	0.857	0.363	0.000	1.000
ASSETS	1.362	11.240	0.005	186.000	0.175	0.180	0.012	0.628

[1] n=297.

[2] n=14.

[3] **SSOLFM** is the dichotomous dependent variable which takes on a value of 1 if a bank sells "seasoned" USDA guaranteed OL loans to Farmer Mac II, and 0 otherwise; **NCLNLN** is noncurrent loans to loans; **NCOLN** is net charge-offs to loans; **ASSTEMP** is assets per employee measured in millions of dollars; **RBCR** is the risk-based capital ratio; **OLD** is a scalar variable for USDA guaranteed OL loan demand; **OLC** is a scalar variable for competition among USDA guaranteed OL lenders; **GLV** is the bank's USDA guaranteed loan volume measured in millions of dollars; **AGBANK** is a dummy variable that takes on a value of 1 if the bank has 17 percent or more of its loan portfolio in agricultural loans, and 0 otherwise; **OLFMLN** is operating loans to farm loans; **LNDEP** is the loan-to-deposit ratio; **DEPASST** is the deposit-to-asset ratio; **YLD** is the yield on earning assets; **COFA** is the cost of funding earning assets; **SALNSM** is a dummy variable that takes on a value of 1 if the bank has other secondary market experience, and 0 otherwise; and **ASSETS** denotes the bank's assets measured in billions of dollars.

Table 7.14.   SSOLFM logit model results[1]

Variable[2]	Est. coeff.	Std. error	t-ratio	Elast. at means[3]
NCLNLN	1.6283	24.2206	0.067	0.0189
NCOLN	-86.6173	109.9076	-0.788	-0.1816
ASSTEMP	0.4774	0.4799	0.995	1.1789
RBCR	3.0560	7.4588	0.410	0.4916
OLD	-0.3329	0.3438	-0.968	-0.9972
OLC	-0.2296	0.3445	-0.666	-0.6128
GLV	0.1768	0.1040	1.700 *	0.3487
AGBANK	-0.5614	0.6956	-0.807	--
OLFMLN	0.0445	1.7142	0.026	0.0279
LNDEP	-2.5561	3.2486	-0.787	-1.8996
DEPASST	4.2481	6.5515	0.648	3.5940
YLD	26.7086	45.6891	0.585	2.2615
COFA	101.2842	86.9447	1.165	3.9442
SALNSM	2.1902	0.8984	2.438 **	--
ASSETS	-0.0007	0.0015	-0.467	-0.9149
CONSTANT[4]	-14.3155			

LOG LIKELIHOOD (restricted) = -57.09
LOG LIKELIHOOD (unrestricted) = -46.42
LIKELIHOOD RATIO TEST = 21.33 with 15 d.f.
MADDALA R-SQUARE = .066
CRAGG-UHLER R-SQUARE = .216

[1] SSOLFM=1 if bank sells "seasoned" USDA guaranteed OL loans into Farmer Mac II and SSOLFM=0 otherwise.
[2] See Table 7.13 for a description of the variables.
[3] Prob=.0022 if AGBANK=0 and Prob=.0013 if AGBANK=1; Prob=.0006 if SALNSM=0 and Prob=.0052 if SALNSM=1.
[4] Adjusted by ln(p2)-ln(p1)=ln(.0488)-ln(.3000) =-1.8158 due to different sampling rates of the participants and nonparticipants.

 * Significant at the .1 level.
** Significant at the .05 level.

Table 7.15. SSOLFM classification table[1]

Predicted

		0	1	Total	
	0	297	0	297	100.00%
Observed					
	1	14	0	14	0.00%
	Total	311	0	311	

overall 95.50%

[1] 1=participant in Farmer Mac II; 0=nonparticipant.

Freq.

```
        1
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0
        0   1
        0   0
        0   0   1
        0   0   1
        0   0   0
        0   0   0   1   1
        0   0   0   0   0
```

SSOLFM
HAT: .00| .01| .02| .03| .04| .05| .06| .07| .08| .09| .10| .15| .20| .30| .40| .50| .60| .70| .80| .90|1.0|

Group: 0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   1   1   1   1   1   1
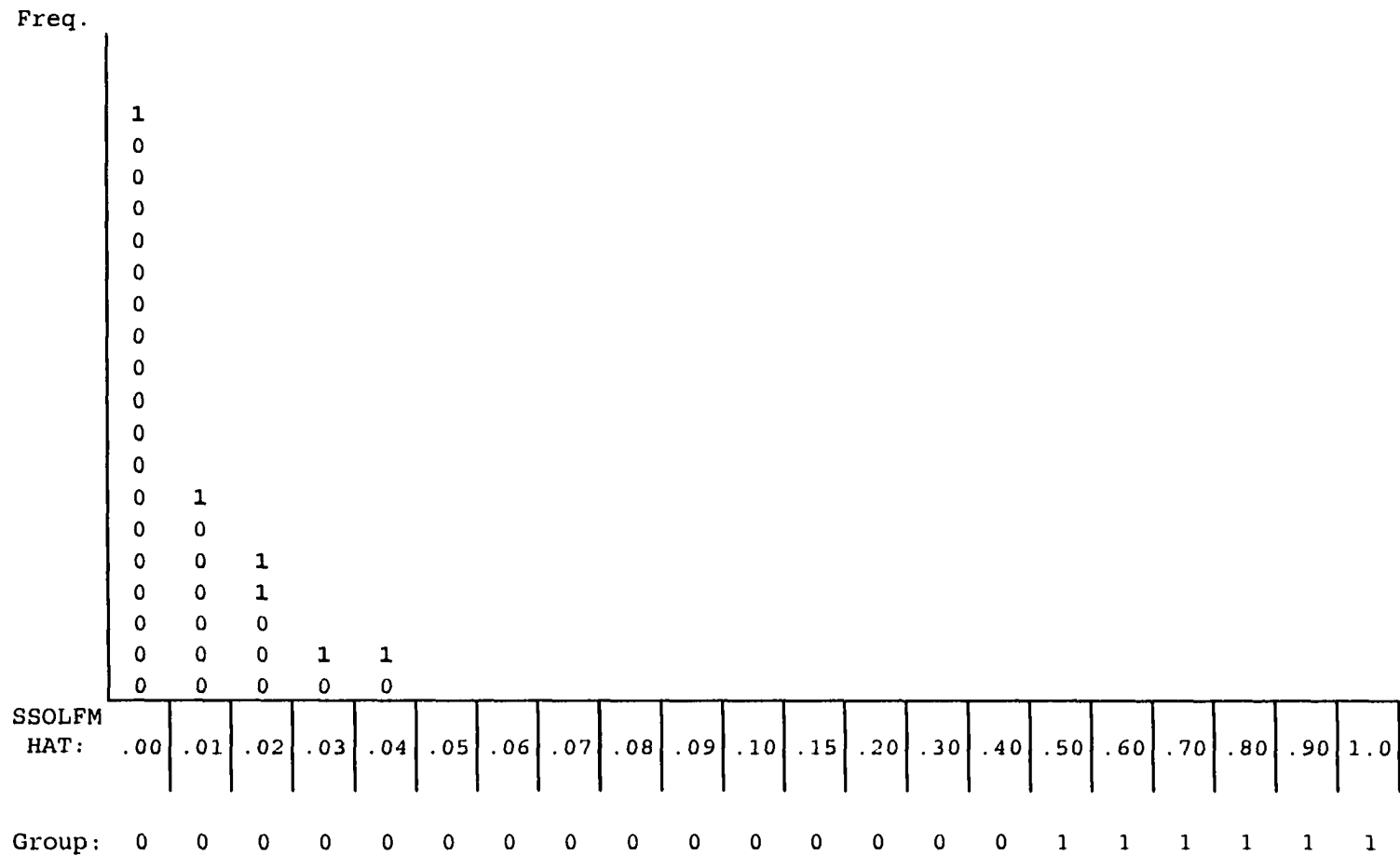
Predicted probability is of membership for SSOLFM=1.
Symbol 0 represents 10 cases.
Symbol 1 represents 2 cases.

Figure 7.5. Observed groups and predicted probabilities: SSOLFM

goodness of fit criteria above.

Table 7.15 compares the observed and predicted group membership. This model has the highest overall prediction rate at 95.5 percent. This is so for 2 reasons. First, the model predicts that none of the banks in the sample will participate. Second, since only 14 banks do participate, only 14 of 311 are misclassified. Thus, although the model may appear superior to prior models using the percent overall correct, such a conclusion would be erroneous.

Figure 7.5 reveals that the model does in fact have trouble distinguishing between participants and nonpartici-pants. Notice that instead of the observed participants grouping together at higher predicted probabilities and the observed nonparticipants grouping together at lower predicted probabilities, the observed participants' predicted probabil-ities are "nested" or "cradled" inside those of the observed nonparticipants. This is indicative of the model's lack of ability to distinguish well between participants and nonparti-cipants.

Explanatory variables

The coefficients on NCLNLN, NCOLN, ASSTEMP, RBCR, OLD, OLC, AGBANK, OLFMLN, DEPASST, LNDEP, YLD, COFA, and ASSETS were all statistically insignificant. Moreover, the coeffi-cients on DEPASST, LNDEP, RBCR, and OLD had signs opposite of what was expected.

GLV. The only 2 independent variables with statistical significance are GLV and SALNSM. USDA guaranteed loan volume has a positive statistically significant effect at the $\alpha=.1$ level of significance. Again, its elasticity calculated at the sample means of the regressors is .35. Although GLV is useful in explaining the probability of participating, its impact is weak.

SALNSM. Experience selling loans into other secondary markets is a distinguishing characteristic of participants. Its coefficient is positive and statistically significant at the $\alpha=.05$ level of significance. The probability of the average bank participating if it does not have other secondary market experience is .06 percent compared with .52 percent if it does.

Summary

This model provides little insight into why banks sell "seasoned" OL loans other than that a higher guaranteed loan volume and experience selling loans into other secondary markets increases the probability of participation in Farmer Mac II as defined. None of the financial characteristics (e.g., yield) or external forces (e.g., competition) suggested by the theoretical model or empirical literature have statistically significant explanatory power. The only conclusion that might be drawn is that participants may have a management

policy to sell these types of loans and that their strategy does not manifest itself in the chosen independent variables.

Summary

Five logit models were estimated in order to find which independent variables explained why banks sell USDA guaranteed loans of any kind, new FO originations, new OL originations, "seasoned" FO loans, and "seasoned" OL loans into Farmer Mac II. Each of the models displayed some explanatory power and statistical significance. The model fits for newly originated FO and OL loans were the best in terms of the various R^2s and number of significant explanatory variables. The logit models estimated for "seasoned" FO and OL loans fit rather poorly and had many fewer significant variables.

Two of the independent variables repeatedly showed up as significant across all the models. Higher USDA guaranteed loan volume and experience selling loans into other secondary markets increase the probability of selling USDA guaranteed loans to Farmer Mac, regardless of how participation is defined. Although a higher GLV increases the probability of participating, its effect is weak in terms of its elasticity. Experience selling loans into other secondary markets has the largest impact on the probability of participating in every model that was estimated.

The demand for USDA guaranteed loans and competition among lenders for USDA guaranteed loans had statistically

significant effects on the probability of selling new FO and OL originations into Farmer Mac II. As a rule, these variables were less effective in distinguishing between banks that sold "seasoned" loans to Farmer Mac and those that did not.

No rule of thumb applies for the other independent variables' effects on the probability of selling newly originated or "seasoned" FO or OL loans. It appears that the reasons for selling FO and OL loans are quite different.

For new FO originations, ASSTEMP, DEPASST, FLFMLN, and YLD are significant determinants of participation. Increased efficiency at the bank level, less deposits available to fund the loan portfolio, fewer farm ownership loans as a fraction of farm loans and a higher yield on earning assets increase the probability of participating in Farmer Mac II.

For new OL originations, a higher loan-to-deposit ratio (LNDEP) and risk-based capital ratio (RBCR) increase the probability of a bank selling USDA guaranteed loans to Farmer Mac. It is not obvious why a higher risk-based capital ratio would increase the chances of participating. One reason may be that sellers have greater rates of capitalization.

The only generalizations that will be made about participation with respect to "seasoned" FO and OL loans is that a bank with more of these loans in its portfolio and experience selling loans into other secondary markets is more likely to participate in the Farmer Mac II loan sale program.

CONCLUSIONS

This chapter includes a summary of major findings: the significance of the research; the limitations of the model, data, and empirical analysis; followed by the implications for further research.

Summary of Major Findings

The intent of this dissertation was to better understand what incentives or other factors exist that would lead a bank to participate in the Farmer Mac II loan sale program. Two distinct methods of inquiry were employed to accomplish this task: a descriptive analysis and a logistic regression analysis of participation.

Descriptive analysis

The descriptive analysis was based on bankers' responses to a series of survey questions. The questions asked bankers the degree to which various factors were relevant in their decision to participate or not participate in Farmer Mac II. The findings of the descriptive analysis were largely consistent with the reasons for participation casually posited at the outset of study and formally developed in the literature.

Nonparticipants reported that weak USDA guaranteed and overall loan demand made participation unnecessary. They also indicate sufficient deposit and capital levels to fund USDA guaranteed loans, and prefer to hold the USDA loans they originate. In general, nonparticipants do not sell USDA guaranteed loans to buyers other than Farmer Mac. Although much of this group claims that USDA guaranteed loan sales are not a part of management strategy, their strategy is probably not independent of the current environment confronting their banks. That is, if the conditions above changed such that the incentives to participate in Farmer Mac II were increased, these bankers may well decide to participate in the program.

Farmer Mac II participants have a slightly different story to tell. They report that their decision to participate is based on enhanced liquidity, increased ROA, reduced interest rate risk, added capacity to meet heavy USDA guaranteed loan demand, and ability to serve their customers better. In fact, the added ability to serve their customers better was one of the most germane reasons banks cited for participating. Better service includes passing on better rates and terms to their customers as well as originating a loan it would not if it could not be sold into Farmer Mac II.

Logit regression analysis

The second thrust of the inquiry was to predict the probability of a bank participating in Farmer Mac II and

identify the characteristics useful in making the prediction. This was done using a logit regression analysis. In total, five models were fitted. The first sought to predict which banks would sell any type of USDA guaranteed loans--be they newly originated or "seasoned" FO or OL loans--into Farmer Mac II. The next two estimations attempted to predict participation based on newly originated FO and OL loans, respectively. The final runs redefined participation in terms of "seasoned" FO and OL loans and included the same explanatory variables used to fit the FO and OL models.

Each model displayed some explanatory power and statistical significance. The model fits for newly originated FO and OL loans were the best in terms of the Maddala and Cragg-Uhler R^2s and number of significant explanatory variables. The logit models estimated for "seasoned" FO and OL loans fit rather poorly and had many fewer significant variables.

Two of the independent variables repeatedly showed up as significant in all the models. Higher USDA guaranteed loan volume and experience selling loans into other secondary markets increase the probability of selling USDA guaranteed loans into Farmer Mac II, regardless of how participation is defined. Although an increase in a bank's USDA guaranteed loan volume increases the probability of participating, its effect is weak in terms of its elasticity. Experience selling loans into other secondary markets has the greatest impact on the probability of participating in every model estimated.

The demand for USDA guaranteed loans and the degree of competition among lenders for USDA guaranteed loans have a statistically significant effect on the probability of selling new FO and OL originations into Farmer Mac II. Increases in demand increase the probability of participating in each case, while the opposite is true for the degree of competition. As competition increases, a bank must lower the interest rate it charges on USDA guaranteed loans thereby reducing the spread it would earn if the loan was sold--and the incentive to sell with it. As a rule, the demand and competition variables were less effective in distinguishing between banks that sold "seasoned" loans to Farmer Mac and those that did not.

No rule of thumb applies for the other independent variables' effects on the probability of selling newly originated or "seasoned" FO or OL loans. It appears that the reasons for selling FO and OL loans are quite different.

For new FO originations, higher assets per employee, a lower deposit-to-asset ratio, fewer farm ownership loans to total farm loans, and a higher yield on earning assets increase a bank's chances of participating. More assets per employee implies greater efficiency at the bank level. Lower deposits as a fraction of assets indicates that a bank is less reliant on deposits for funding. Fewer farm ownership loans relative to all farm loans may be a signal that a bank avoids holding longer-term fixed-rate loans because of interest rate risk but is not dissuaded from originating them for sale.

For new OL originations, a higher loan-to-deposit ratio
and risk-based capital ratio increased the probability of
participating. Banks with higher loan-to-deposit ratios may
be selling loans into Farmer Mac II because they do not have
room for them in their portfolios. Higher risk-based capital
ratios may be significant because participants are well capi-
talized, despite high loan-to-deposit ratios.

No generalizations will be made about participation with
respect to FO or OL "seasoned" loans other than that increased
USDA guaranteed loan volume and experience selling loans into
other secondary markets increases the probability of partici-
pating in Farmer Mac II.

Significance of the Research

This research has implications that are relevant to other
researchers, agricultural policy makers, and Farmer Mac. We
will touch on each in turn.

Other researchers

This research makes a modest contribution to the theoret-
ical literature in finance. The model extends the simple
model of portfolio selection by incorporating a downward
sloping demand curve for the risky asset and including second-
ary market participation as a way to leverage the portfolio.

This research adds to the body of literature regarding
the sale of loans into secondary markets. In particular, it

looks at why a bank might sell a particular type of loan into a particular secondary market. Most studies of secondary market participation have used bank level characteristics to explain why a bank sells loans in general (i.e., the dependent variable is sells any loans). So the methodology used in this work would also be useful for those interested in guaranteed student loan or SBA guaranteed loan secondary market partici-pation.

Finally, this work attempts to replace some of the anec-dotal claims and beliefs regarding the Farmer Mac II loan sale program with more solid evidence. That is not to say that this study is completely definitive. Quite the contrary. And, although the findings are not in stark contrast to widely held beliefs about the loan sale program, it is comforting to know that there is some evidence to support what we believe to be true.

Agricultural policy makers

Farmer Mac II, in part, was established to ameliorate an increased burden on local credit supplies created by a policy shift away from direct lending by the USDA to commercial lending guaranteed by the USDA. The program supposedly ex-panded vitally needed credit availability for financially troubled farmers and ranchers by providing a significant measure of liquidity to rural lending institutions. Without Farmer Mac II, it was believed that increased demand for USDA

guaranteed credit would exceed the ability of rural lending institutions to adequately respond.

Farmer Mac was to provide an efficient source of liquidity by providing a continuous, predictable, and competitively priced secondary market for the sale of guaranteed portions of USDA guaranteed loans and to accept the guaranteed portions as they are generated by the USDA loan programs without involvement in the administration of those programs. Banks would find the program attractive because of greater liquidity and lending capacity, interest rate risk reduction or elimination, fee income from origination and servicing, increased return on retained unguaranteed portions, and opportunity to offer more favorable loan terms to borrowers.

The program does what it is designed to do, according to participants. For brevity, the descriptive analysis of the survey responses detailed in Chapter 6 will not be rehashed here. However, recall that as of the end of 1997, only 312 of the over 6,000 commercial banks guaranteeing loans have sold loans into Farmer Mac II since its inception in 1991. The aggregate principal amount of loans purchased by Farmer Mac II over this period was $364 million. To put this figure in perspective, as of the end of 1997, USDA guaranteed farm loan program principal outstanding totaled over $6.5 billion. But if this $6.5 billion in outstanding principal is divided by program area, slightly less than half is guaranteed FO debt. This roughly $3 billion in outstanding FO principal may be the

better measure to use in assessing Farmer Mac II's market penetration. The reason is because guaranteed OL debt is less likely to have the minimum of 12 months remaining until maturity required to qualify for sale into Farmer Mac II. To understand the limited market penetration, we need only to revisit the descriptive analysis of the nonparticipants. In brief, they have little need or incentive to use the program.

One could quickly conclude that the secondary market program benefits a few but cannot be viewed as "vital." But, such a strong determination requires some qualifying remarks. The legislation that mandated a secondary market for USDA guaranteed loans (Agricultural Credit Act of 1987, Section 1350) was passed in response to the farm financial crisis enveloping farmers at the time. However, Farmer Mac II has largely operated during a period of stability in the farm sector. The point is that the need for the program may increase as farmers' prospects change.

What policy changes could be made to improve participation? The design of the program itself is as accommodating to lenders as can be. What would increase participation has more to do with the design of the USDA guaranteed farm loan programs. A higher guarantee rate (say, 100 percent) and the ability to sell loans to a third party without retaining the servicing obligation would increase participation. Adopting these changes to increase participation in Farmer Mac II could only be made after a thorough understanding of how they would

affect the USDA guaranteed farm loan programs. That analysis is far beyond the scope of this work.

Finally, there is the issue of so-called mission drift. Farmer Mac currently engages in issuing discount notes and medium-term obligations and then buys interest-earning invest-ment assets. Farmer Mac can borrow money at near U.S. Trea-sury rates and invest the funds in high-quality higher-yield-ing investments with similar maturities. Under this strategy, the larger the volume, the greater the profits. It is worth noting that other GSEs are "guilty" of this practice too. Nonetheless, Farmer Mac seems to take greater advantage of this opportunity than the other GSEs--perhaps based purely on the instinct to survive. What a GSE is created for and is authorized to do to meet its mission is an important policy issue. This issue is beyond the purview of this dissertation because it does not directly affect a bank's decision to participate.

Farmer Mac

Presumably, Farmer Mac officials know a great deal more about the banks that participate in the Farmer Mac II second-ary market program than they do about the nonparticipating banks. However, it is helpful compare the two groups to create a useful contrast.

Farmer Mac II is a secondary market for USDA guaranteed loans. Although secondary markets have existed for some time,

and participation in them for many banks is routine, the majority of banks that do not participate in Farmer Mac II do not participate in any secondary market. In effect, Farmer Mac officials have two hurdles to clear--convincing these banks of the advantages participation in a secondary market offers in general, and Farmer Mac II in particular. On the other hand, except for a very small minority, Farmer Mac II participants have experience selling loans into other secondary markets.

Nonparticipants largely report that participating in any secondary market is not part of management strategy. Some of the banks that do report participating in other secondary markets indicate that selling USDA guaranteed loans into a secondary market is not part of management strategy. Should these banks be "written-off" as lost causes? Not necessarily. This point is better understood if management policy is set endogenously rather than exogenously. By this we mean that managers are likely to adapt policy as conditions in their operating environment change--that is, loan sales are probably not part of management's policy because the incentives to use them are *currently* absent.

What factors are behind the incentive to participate? Increased USDA guaranteed loan volume is associated with a higher probability of participating. An initial question at the outset of this project was whether participation rates differed between large volume lenders and smaller volume

lenders. In other words, if Farmer Mac focused its business development on large volume lenders, would it be overlooking a vast majority of smaller volume lenders that in the aggregate might create a large volume of Farmer Mac business? Apparently, the answer is no. Moreover, these banks report weak USDA loan demand. The implication is that loan volume, at this time, is not likely to expand. Of course, this could change as conditions in the farm economy change.

Nonparticipants in general report that overall demand is also weak. If a bank has room in its portfolio for additional loans, many of the incentives of participating in a loan sale program are diminished. For example, greater liquidity and lending capacity are unnecessary. The fee income from origination and servicing retained after a loan is sold is only attractive if the seller can replace the sold loan with another. The same applies to the increased return on the retained unguaranteed portion. Higher ROA is not a sufficient condition for secondary market participation. Higher profit is.

However, not all the incentives to participate are eliminated by weak overall or USDA guaranteed loan demand. In fact, the program paves an avenue for banks to expand their market. Lenders previously reluctant to extend long-term fixed-rate Farm Ownership loans due to interest rate risk exposure would find Farmer Mac II very useful. Participants cite a reduction in interest rate risk as very relevant in their decision to sell loans into Farmer Mac II. By using the

program, a bank can originate a loan it does not wish to hold. This could include a long-term fixed-rate loan or foray into agricultural mortgage lending for a non-traditional lender. For the more traditional farm lender this could mean penetrating the USDA rural business and industry loan or community development loan markets. Although the focus in this dissertation concentrated on USDA guaranteed farm loan programs, the USDA guaranteed loans mentioned above are also qualified for purchase by Farmer Mac II.

According to participants, the most significant reason for participating was the ability to serve their customers better through lower rates and better terms. Better rates and terms allow a bank to compete more vigorously so that loan volume can increase.

With respect to business development then, Farmer Mac would be wise to place as much emphasis on the customer accommodation aspects their program has to offer as they do on the enhanced liquidity and increased return on assets benefits.

Finally, banks that do not participate in Farmer Mac do not tend to sell USDA guaranteed loans to other third parties. The fact that Farmer Mac enjoys the lion's share of the sale activity in these loans reflects that the program is competitive and attractive to those banks seeking the advantages that secondary markets afford. The downside is that this means that Farmer Mac cannot "simply" compete business away from other USDA guaranteed buyers. Rather, Farmer Mac must hope

that nonparticipants alter their credit delivery systems to
include selling loans as a part of their management strategy.
Given the farm economy conditions that prevail at this time,
this is unlikely to happen.

Limitations of the Research

The limitations of the research fall into three general
categories. They are: (1) limitations of the theoretical
model; (2) limitations of the FDIC and survey data; and (3)
limitations of the empirical methods employed in the analysis.

Limitations of the theoretical model

The model in Chapter 4 examines the asset portfolio
decision of a risk-averse profit maximizing bank. The bank
can invest its fixed internal resources of deposits and capi-
tal into USDA guaranteed loans and a risk-free security. The
focus is on how much USDA guaranteed loan volume the bank
wishes to hold. If it wishes to hold more than it has in
internal resources, it can leverage its portfolio by partici-
pating in Farmer Mac II. This set-up stresses the liquidity
function that Farmer Mac II is supposed to provide. This
limits the ability of the model to consider aspects of the
participation decision which are as follows: the decision to
participate in order to avoid interest rate risk; the decision
to participate in order to pass on better rates and terms to
borrowers; and the decision to participate in order to invest

the proceeds in higher earning assets elsewhere in the portfolio.

A major drawback of modelling the bank in this way is that the bank originates and holds the guaranteed loans until its own funding sources are exhausted, and then utilizes the loan sale program. This overemphasizes the liquidity aspect of the program. In other words, it assumes a bank would hold USDA guaranteed loans if it had the internal resources available and only sell them if it did not. But, we know this is not really true. For example, a bank may originate a long-term fixed-rate USDA guaranteed FO loan with no intention of holding it despite the fact that the bank has the resources to fund it. A "loose" interpretation of the model might be that the bank did not have the "type" of deposits available to fund a loan of this nature, and then rely on the liquidity argument once again.

A second deficiency in the model is that there is no explicit way to consider that a bank may use the program to pass on better rates and terms to its borrowers. Again, a "loose" interpretation of the model is that a decline in the risk-free Farmer Mac security rate leads a bank to make more USDA loans at a lower interest rate.

Finally, the model's only alternative asset for a bank to invest in besides USDA guaranteed loans was a risk-free Farmer Mac security. This limitation implied that an increase in the average yield on earning assets was interpreted in the model

as an increase in the yield of the Farmer Mac security. An increase in the yield on the Farmer Mac security then led to a reduction in USDA guaranteed loan volume which would then reduce the bank's chances of participating. But what happens is that increases in the yield on other assets causes banks to participate so that they can invest the proceeds in the higher yielding assets in their portfolio. This limitation is related to the first deficiency outlined.

Limitations of the data

The data collected for the descriptive and empirical analyses had a number of obvious shortcomings. The issues involving the survey are addressed first.

The survey instrument should have been sent to a larger number of banks in the pre-test. Some information was lost when a bank did not understand a question and therefore did not answer it or provided an answer that was of no use. A brief example of each instance will illustrate. In an attempt to ascertain a bank's efficiency, banks were asked to indicate the "average number of man-hours historically required" to originate and service USDA guaranteed loans. The intent was to collect total hours needed to originate and hours per year to supervise, both on a per loan basis. The ambiguity was not detected during the pre-test. Some banks obviously reported total hours for all loans on a yearly basis. Others responded with a question mark. When this researcher does another

survey, more emphasis will be placed on pre-testing.

The second shortcoming, and the most major, was the response rate. Of the 312 banks sampled using the Farmer Mac list, 94 responded. While more responses were hoped for, a 30 percent was acceptable. More disappointing was the response rate of the banks sampled from the USDA list. Of the 1,941 banks sampled, only 263 or 13.5 percent responded.

A number of related explanations exist for the poor response rates. First, many people are simply not interested in filling out survey instruments. Second, many of the nonrespondents on the USDA list may not have a large USDA guaranteed loan volume and therefore thought their response was not important. Third, many banks that do not use Farmer Mac II may not have been interested in filling out a survey instrument involving participation in it. Fourth, some banks may have interpreted the survey instrument as "invasive." Fifth and finally, some banks may have viewed the survey instrument as a business development ploy by Farmer Mac. For whatever reason, the response rate was less than hoped for.

A means test was performed to see if various characteristics between the survey respondents differed from those in the sample that did not respond. They did not differ with respect to the characteristics selected, but they could well differ with information that was not available to compare. For instance, nonrespondents may engage in other secondary markets at a higher rate than survey respondents. Or they may have a

higher incidence of selling USDA guaranteed loans to parties other than Farmer Mac.

The FDIC Summary Financial Report data posed a separate set of problems. The main two difficulties had to do with branch banks and changes in ownership. Many of the banks that were sampled were branches. Branch level data is not available from the FDIC. In the event that the bank sampled was a branch, the home office information was used. If a bank is smaller and its management structure is highly centralized, using the home office information may be reasonable. But for a very large bank or one that is more decentralized, using home office information is less satisfactory.

The second problem was how to match a bank with its FDIC report if it changed ownership. A handful of the banks surveyed changed ownership during 1997 (the year under analysis). The survey was matched with the new bank's FDIC Summary Financial Report. This is unsatisfactory in the sense that the new bank's financial information may be quite different from the old bank's. Usually the buyer was a larger bank from an urban area. One example of how this could affect the data was if an agricultural bank (farm loans/loans > 17 percent) was purchased by an urban bank that is not classified as an agricultural bank. Or that same agricultural bank did not participate in any secondary market, but the urban bank does. These differences could also apply for a branch vs. its home office.

Limitations of the empirical methods

The empirical methodology employed included a descriptive analysis of the reasons for participation presented in Chapter 6 and a logit regression analysis in Chapter 7. The logit regression estimated the probability of a bank participating and showed what characteristics are helpful in making the prediction. Both methods are legitimate modes of inquiry if their limitations are understood.

The descriptive analysis used asked bankers to rank the degree of importance to which various factors were relevant in their decision to participate and not participate in Farmer Mac II. This assumes the that the scale is approximately an interval scale (i.e., the distance between a 1 and 3 are is the same as the distance between 3 and 5). A second assumption is that different individuals must interpret the scale similarly. This assumption is more reasonable the more the individuals are alike. Although the method used to develop the descriptive analysis is not ideal, it has widespread acceptance in the social sciences and is utilized here.

The second method of inquiry used was a logit model regression to predict the probability of a bank participating in Farmer Mac II and to see what variables were useful in making that prediction. One limitation of this method is that a bank that sells one loan into Farmer Mac II is given as much weight as a bank that sells many loans. Another technique would have been to use a tobit model. In a tobit regression

model, the dependent variable is limited or constrained. A
bank would not only face the decision to sell or not sell, but
would also decide how much, if any, to sell. Another way to
estimate a model with a truncated dependent variable is using
Heckman's two step approach. These techniques were not em-
ployed because the loan sale volumes reported in the surveys
were incomplete. Farmer Mac may be able to provide reliable
data with respect to each bank's total volume of loan sales
and sales by type of loan.

Finally, the period of study under consideration was a
single year. Banks that sell loans this year may not sell
loans next year. Over time, the farm economy may change. And
so on and so forth. A dynamic analysis of secondary market
participation would add significantly to the literature.

Implications for Further Research

This section is exploratory in nature. The goal is to
put on paper some of the unanswered questions that might be
addressed in future studies. One obvious implication for
further research is that any model dealing with a bank's
decision to sell loans should explicitly account for interest
rate risk in the model. The literature contains models that
base loan sales on regulatory reasons for selling (e.g.,
regulatory capital constraints) and non-regulatory reasons
(e.g., yield, and now funding constraints) but not for what
bankers claim to be a "very relevant" reason to sell--interest

rate risk. More work needs to be done in this area.

Most of the literature on loan sales focuses on "bank level" reasons for selling loans. While this work attempts to consider bank level and loan level reasons for secondary market participation, more work needs to be done in this area. For instance, 30 percent of all SBA loans are sold, half of all student loans and home mortgages are securitized, and nearly 90 percent of FHA/VA loans are sold. Why such a varied range? Does the reason have to do with the type of loans? Of borrower? Of lender? Of program? Of investors?

Farmer Mac claims that part of its failure to penetrate the farm real estate market has to do with farmers' preferences for adjustable-rate credit in lieu of fixed-rate financing. This strategy is understandable when the yield curve is steep, but less so as the yield curve flattens. Clearly, the demand for the types of credit that can be securitized is an area for further study. After all, a secondary market's volume is determined as much by the type of credit borrowers prefer as it is by a bank's incentive to sell.

Finally, there is a policy issue concerning the nature and role of government sponsored enterprises (GSEs). Farmer Mac could not continue to exist without exploiting its status as a GSE. Yet, Sallie Mae went private to avoid the restrictions placed on its authority by being a GSE. Should legislation restrict the GSE so that it folds if its core business is insufficient for survival? Or should legislators keep expand-

ing a GSE's authority so that a GSE can serve it purpose, even if its core business shrinks relative to its original mission? Although not germane to this study, the issue is paramount in a greater sense.

Concluding Remarks

The descriptive and empirical analyses included in this dissertation are an attempt to answer some of the questions of why commercial banks might choose to participate in the Farmer Mac II secondary market. Much has been learned. But much remains to be answered. This study is limited by its model, data, and empirical methodology. And certainly, removing these limitations would be an improvement. However, before any tinkering at the fringes of this work is undertaken, more thought and energy need to be expended to find out whether agricultural borrowers seek the type credit that is suitable for securitization. While this study [correctly] considered bankers a potential barrier to Farmer Mac II's development, it [wrongly] ignored the importance of borrowers as a barrier. Until a better understanding of how borrowers fit into the process is developed, the larger question of whether Farmer Mac II will thrive will remain only partially answered.

APPENDIX

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

November 26, 1997

Dear CEO:

The Federal Agricultural Mortgage Corporation (Farmer Mac) maintains a secondary market for guaranteed portions of United States Department of Agriculture (USDA) guaranteed loans administered by the Farm Service Agency (FSA). Farmer Mac purchases the guaranteed portions, assembles them into pools, and issues guaranteed securities backed by those pools. This program, referred to as "Farmer Mac II", offers benefits to ag lenders who, for various reasons, do not wish to hold the guaranteed portions in their asset portfolio.

We are conducting a research project in conjunction with Farmer Mac that hopes to better understand and improve the delivery of ag credit through its Farmer Mac II program. We understand your bank has originated USDA/FSA guaranteed loans. You may or may not sell the guaranteed portions. We would like to know what factors are important in making your decision to sell or not. We would also like some information about your USDA/FSA guaranteed lending activity.
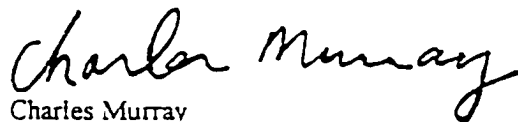
Your input is important because of your experience and expertise in financing agriculture. This research will be of use to ag bankers, ag policy makers, and Farmer Mac.

Please have a knowledgeable member of your staff complete the questionnaire and return it in the enclosed envelope. Any information provided on the questionnaire will be kept in strict confidence and ultimately destroyed once the data are aggregated.

We know that your time is very valuable. Thank you for your assistance. Please feel free to call Charles Murray at (816) 785-4324 if you have any questions regarding this survey instrument.

Thank you again.

Sincerely,

Charles Murray
Assistant Professor of Economics
MC 209 C
Truman State University
Kirksville, MO 63501

Phone: (816) 785-4324
Fax: (816) 785-4181

Dr. Robert Jolly
Professor of Economics
560 Heady Hall
Iowa State University
Ames, IA 50011-1070

Phone: (515) 294-6267
Fax: (515) 294-3838

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Department of Economics

Heady Hall

Ames. Iowa 50011-1070

515 294-6740

FAX 515 204-0221

January 30, 1998

Dear CEO:

Recently we mailed you a questionnaire regarding your bank's USDA/FSA guaranteed lending activity and your reasons for holding those loans or selling them in a secondary market. Each and every response is important to us, including yours.

Many lenders have been kind enough to help us with this important research project by responding. If you were one of them, this is our way of saying, "Thank you."

In case you received the questionnaire at an inopportune time and didn't have time to complete it before, may we ask you to do so now? We are enclosing copies of the materials sent to you this past November along with a business reply envelope.
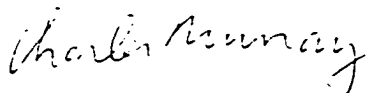
Your input is essential because of your expertise in financing agriculture and experience making USDA/FSA guaranteed loans. Without your help, we can't draw a clear picture of why USDA/FSA loans are held in portfolio as opposed to sold in a secondary market. We are especially interested in why you use or don't use the Farmer Mac II loan sale program.

Lenders report that the survey takes roughly 15 minutes to complete. We know that your time is very valuable. If you feel that some questions do not apply to your bank, please answer only those which do. We need your questionnaire even if not completely filled out.

We appreciate your earliest reply. Of course, any information you provide us will be kept in the strictest of confidence.
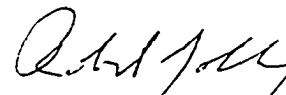
Again, thank you for your time and sharing your lending experience and expertise with us. Your response is very important to us.

Sincerely,

Charles Murray
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MC 209C
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Kirksville, MO 63501

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Professor of Economics
560 Heady Hall
Iowa State University
Ames, IA 50011-1070

Phone: (515) 294-6267
Fax: (515) 294-3838

Farmer Mac II Participation Survey

We are conducting a research project in conjunction with Farmer Mac that hopes to better understand and improve the delivery of ag credit through its Farmer Mac II program. We understand your bank has originated USDA/FSA guaranteed loans. You may or may not sell the guaranteed portions. We would like to know what factors are important in making your decision to sell or not. We would also like some information about your USDA/FSA guaranteed lending activity.

Your input is important because of your experience and expertise in funding agriculture. This research will be of use to ag bankers, ag policy makers, and Farmer Mac.

Thank you for your assistance. Please feel free to call Charles Murray at (816) 785-4324 if you have any questions regarding this survey instrument.

Please fill in the following information below as indicated. If your bank is a branch location, please fill in the name and address of your branch location as well as the name, address and FDIC Certificate Number of your branch's home office below the branch's information. If your bank is not a branch location, please skip the section on Branch Bank Information and fill in your bank's name, address, and FDIC Certificate Number in the space provided below it.

Branch Bank Information (for surveys reaching branch locations only)

Branch Name: _____

Address: _____

_____
City   .   State   Zip

☞ *Branch banks please fill out the information about your home office below.*

Home Bank Office Information

Home Office: _____

Address: _____

_____
City   State   Zip

FDIC Certificate Number   #_____

Respondent Information

Your Name: _____

Your Position: _____

Telephone Number: _____   Fax Number: _____

Section I.   Secondary Market Activity

In this section, we are interested in information concerning your bank's overall activity in secondary markets such as Farmer Mac, Freddie Mac, Sallie Mae, Fannie Mae and Ginnie Mae.

If your bank *does not sell* any type of loan in a secondary market, please answer question 1 and then skip to Section II. If your bank *does sell* loans in a secondary market, please skip question 1 and answer questions 2 and 3 on pages 3 & 4.

1.   Using a 5 point scale, please indicate the degree to which each of the following factors is relevant in your bank's decision to *not sell* any type of loans in the secondary market. A higher rating implies the factor is more relevant.

		Not Relevant			Very Relevant	
a.	Loan sales are not part of our management strategy	1	2	3	4	5
b.	Insufficient loan demand at our bank relative to desired portfolio holdings make loan sales unnecessary	1	2	3	4	5
c.	Underwriting standards for our bank's loans don't conform to those of secondary markets	1	2	3	4	5
d.	Prefer to hold loans in portfolio and keep entire interest rate "spread"	1	2	3	4	5
e.	Our bank has sufficient liquidity to fund desired loan portfolio	1	2	3	4	5
f.	Our bank is sufficiently capitalized to support desired loan portfolio	1	2	3	4	5
g.	We already sell loans to our affiliates or correspondent banks	1	2	3	4	5
h.	Other _____ *(indicate factor)*	1	2	3	4	5

☞ *Please skip to Section II, page 5.*

2. Using a 5 point scale, please indicate the degree to which each of the following factors is relevant in your bank's decision to _sell_ loans in the secondary market. A higher rating implies the factor is more relevant.

	Not Relevant			Very Relevant	
a. Loan sales enhance our portfolio liquidity	1	2	3	4	5
b. Loan sales reduce need to attract retail deposits to fund desired loan portfolio	1	2	3	4	5
c. Loan sales reduce need to purchase funds to fund desired loan portfolio	1	2	3	4	5
d. Loan sales allow our bank to satisfy heavy loan demand	1	2	3	4	5
e. Loan sales reduce loan monitoring costs	1	2	3	4	5
f. Loan sales offset insufficient capital resources on hand at our bank to fund desired loan portfolio	1	2	3	4	5
g. Loan sales offset insufficient capital resources on hand at our bank to fund large individual borrowers	1	2	3	4	5
h. Loan sales offset declining deposit base at our bank relative to demand for funds	1	2	3	4	5
i. Loan sales enhance our return on assets	1	2	3	4	5
j. Loan sales allow us to invest proceeds from sale into loans of similar type	1	2	3	4	5
k. Loan sales allow us to invest proceeds from sale elsewhere in portfolio	1	2	3	4	5
l. Loan sales allow our bank to originate a loan it ordinarily would not if forced to hold the loan in portfolio	1	2	3	4	5
m. Loan sales reduce interest rate risk	1	2	3	4	5
n. Loan sales allow for better rates to our borrowers	1	2	3	4	5
o. Loan sales allow for better terms to our borrowers	1	2	3	4	5
p. Part of management strategy to sell all loans of this type _____ (indicate type)	1	2	3	4	5
q. Other _____ (indicate factor)	1	2	3	4	5

☞ _Please answer question 3, page 4._

3. For each type of loan originated and subsequently sold over the past 12 months, please indicate the total dollar volume (in millions) of loans sold and the percentage of the total dollar volume of loans originated that were sold (e.g. 100% if all loans originated were sold).

	Total $ Volume Sold	% of $ Volume Originated Sold
a. Home mortgage (e.g. Freddie Mac)	$_____ M	_____ %
b. SBA loans (SBAs Secondary Market)	$_____ M	_____ %
c. Student loans (e.g. Sallie Mae)	$_____ M	_____ %
d. Other_____ *(indicate type)*	$_____ M	_____ %

☛ *Please go to Section II, page 5.*

Section II.   Market and Bank Characteristics of USDA/FSA Guaranteed Lending

In this section, we are interested in information concerning your bank's USDA/FSA lending activity.

The USDA guarantees portions of various loans through its agricultural lending programs now administered by the Farm Service Agency (FSA). These loans will collectively be referred to as USDA guaranteed loans. The USDA/FSA loan programs of interest in this survey are as follows:

FO - Farm Ownership   OL - Operating Loans

4.   In your bank's relevant market area, rank the *demand* for the following types of USDA guaranteed loans relative to historical levels using a 5 point scale. A higher rating implies stronger demand.

	Very Weak			Very Strong	
a. Farm Ownership	1	2	3	4	5
b. Operating Loans	1	2	3	4	5

5.   In your bank's relevant market area, rank the *degree of competition* for the following types of USDA guaranteed loans relative to historical levels using a 5 point scale. A higher rating implies stronger competition.

	Very Weak			Very Strong	
a. Farm Ownership	1	2	3	4	5
b. Operating Loans	1	2	3	4	5

6.   What is your total dollar volume (in millions) of USDA
guaranteed loans outstanding? $_____M

7.   What fraction of your USDA guaranteed loans were previously
booked as conventional (not backed by federal guarantee) loans?   _____%

8. Please complete the following table detailing your bank's current and projected USDA guaranteed loan activity. Indicate the total dollar volume (in millions) your bank has generated in guaranteed lending over the last 12 months for each type of loan. Also project the dollar volume your bank would hold under the "most likely" scenario, an "optimistic scenario" (strong demand with mostly high quality borrowers), and a "pessimistic scenario" (weak demand with mostly low quality borrowers) for each type of loan over the next 12 months. Please mark "NONE" if your bank does not plan on making a particular type of loan in the coming year.

		Coming Year			
Type	Last Year	Most Likely	Optimistic Scenario	Pessimistic Scenario	NONE
a. FO	S____ M	S____ M	S____ M	S____ M	_____
b. OL	S____ M	S____ M	S____ M	S____ M	_____

9. Please complete the following table. Indicate the average number of man-hours historically required for the various activities associated with each type of USDA guaranteed loan. Please mark "NONE" if your bank does not make a particular type of loan.

Type	Origination	Supervision	Liquidation	NONE
a. FO	_____ hrs.	_____ hrs.	_____ hrs.	_____
b. OL	_____ hrs.	_____ hrs.	_____ hrs.	_____

10. Please complete the following table. Indicate the rates your bank experiences on average with respect to the following USDA guaranteed loans. Please mark "NONE" if your bank does not make a particular type of loan.

Type	Interest Rate Spread*	Recovery Rate**	Loan to Value	Guarantee Rate	NONE
FO	_____ %	_____ %	_____ %	_____ %	_____
OL	_____ %	_____ %	_____ %	_____ %	_____

* The spread here is the difference between the loan rate and the funding rate.

** The recovery rate here is the percentage of principal and interest (net of all foreclosure costs) recovered in the event of default.

Please go to question 11, page 7.

11. Please complete the following table. Indicate the default rate* you most likely expect for each type of USDA guaranteed loan, the highest default rate you have experienced (adverse conditions), and the lowest default rate you have experienced (favorable conditions). Please mark "NONE" if your bank does not make a particular type of loan.

Type	Most Likely Default Rate	Highest Default Rate	Lowest Default Rate	NONE
a. FO	_____ %	_____ %	_____ %	_____
b. OL	_____ %	_____ %	_____ %	_____

* The default rate here is the percentage of the total dollar volume of the particular loan type that go into default.

☛ Please go to Section III, page 8.

Section III. Farmer Mac II Secondary Market Loan Sale Program Activity

In this section, we are interested in information concerning your bank's decision to sell or not to sell guaranteed portions of USDA/FSA guaranteed loans to Farmer Mac.

The following questions refer to your bank's loan sale activity in the Farmer Mac II secondary market loan sale program. If your bank *does not sell* guaranteed portions of USDA loans to Farmer Mac please answer question 12. If your bank *does sell* loans to Farmer Mac, please skip question 12 and respond to questions 13, 14, and 15 of this section, starting on page 9.

12   Using a 5 point scale, indicate the degree to which each of the following factors is relevant in your bank's decision to *not sell* guaranteed portions of USDA loans to Farmer Mac. A higher score indicates the factor is more relevant than a lower score.

		Not Relevant				Very Relevant
a.	Loan sales of any type are not part of management strategy	1	2	3	4	5
b.	USDA loan sales are not part of management strategy	1	2	3	4	5
c.	Insufficient USDA loan demand at our bank relative to desired portfolio holdings make loan sales unnecessary	1	2	3	4	5
d	Insufficient overall loan demand at our bank relative to desired portfolio holdings make loans sales unnecessary	1	2	3	4	5
e.	Prefer to hold USDA loans in portfolio and keep entire interest rate "spread"	1	2	3	4	5
f.	Our bank has sufficient liquidity to fund USDA loans	1	2	3	4	5
g	Our bank is sufficiently capitalized to fund USDA loans	1	2	3	4	5
h	We already sell USDA loans to our affiliates or correspondent banks	1	2	3	4	5
i	We sell USDA loans to buyers other than Farmer Mac II _____ *(indicate other buyer)*	1	2	3	4	5
j	Not familiar with Farmer Mac II program	1	2	3	4	5
k	Too much paperwork with Farmer Mac II	1	2	3	4	5
l	Other _____ *(indicate factor)*	1	2	3	4	5

✱ You have completed the survey. Thank you! ✱

13. Using a 5 point scale, indicate the degree to which each of the following factors is relevant in your bank's decision to *sell* guaranteed portions of USDA loans to Farmer Mac. A higher score implies the factor is more relevant than a lower score.

		Not Relevant			Very Relevant	
a.	Loan sales enhance portfolio liquidity	1	2	3	4	5
b.	Loan sales reduce need to attract retail deposits to fund desired loan portfolio	1	2	3	4	5
c.	Loan sales reduce need to purchase funds to fund desired loan portfolio	1	2	3	4	5
d.	Loan sales allow our bank to satisfy heavy loan demand for USDA loans	1	2	3	4	5
e.	Loan sales reduce monitoring costs	1	2	3	4	5
f.	Loan sales offset insufficient capital resources on hand at our bank to fund desired loan portfolio	1	2	3	4	5
g.	Loan sales offset insufficient capital resources on hand at our bank to fund large individual borrowers	1	2	3	4	5
h.	Loan sales offset declining deposit base at our bank relative to demand for funds	1	2	3	4	5
i.	Loan sales enhance return on assets	1	2	3	4	5
j.	Loan sales allow our bank to invest proceeds from sale into more USDA loans	1	2	3	4	5
k.	Loan sales allow our bank to invest proceeds from sale elsewhere in portfolio	1	2	3	4	5
l.	Loan sales allow our bank to originate a USDA loan it ordinarily would not if forced to hold the loan in portfolio	1	2	3	4	5
m.	Loan sales reduce interest rate risk	1	2	3	4	5
n.	Loan sales would allow for better rates to our borrowers on USDA loans	1	2	3	4	5
o.	Loan sales would allow for better terms to our borrowers on USDA loans	1	2	3	4	5
p.	Part of management strategy to sell all USDA loans	1	2	3	4	5
q.	Other _____ *(indicate factor)*	1	2	3	4	5

9

14. For each type of USDA guaranteed loan originated over the past 12 months, please indicate the total number of loans sold to Farmer Mac II, the total dollar volume of loans sold to Farmer Mac II (in millions), and the percentage of the total dollar volume of loans originated that were sold to Farmer Mac II (e.g. 100% if all loans originated were sold to Farmer Mac II). Also indicate the desired "spread" your bank retains on the guaranteed portion after selling a USDA loan to Farmer Mac. Please mark "NONE" if your bank did not originate a particular type of USDA loan.

	Total # Sold to Farmer Mac	Total $ Volume Sold to Farmer Mac II	% of Total $ Volume Originated Sold to Farmer Mac II	Desired "Spread" After Sale*	NONE
a. FO	_____	$_____ M	_____ %	_____ %	_____
b. OL	_____	$_____ M	_____ %	_____ %	_____

* The desired "spread" after sale is the servicing fee Farmer Mac requires (.25%) plus what Farmer Mac calls the "management premium". The desired spread then is the gross loan rate less the "net yield" (the rate which must be passed on to Farmer Mac).

15. For each type of USDA guaranteed loan that is "seasoned" (booked previous to the past year), please indicate the total number of loans sold to Farmer Mac II and the total dollar volume of loans sold to Farmer Mac II. If no seasoned loans were sold to Farmer Mac II, please mark "NONE".

	Total # Sold to Farmer Mac II	Total $ Volume Sold to Farmer Mac II	NONE
a. FO	_____	$_____ M	_____
b. OL	_____	$_____ M	_____

✳ You have completed the survey. Thank you! ✳

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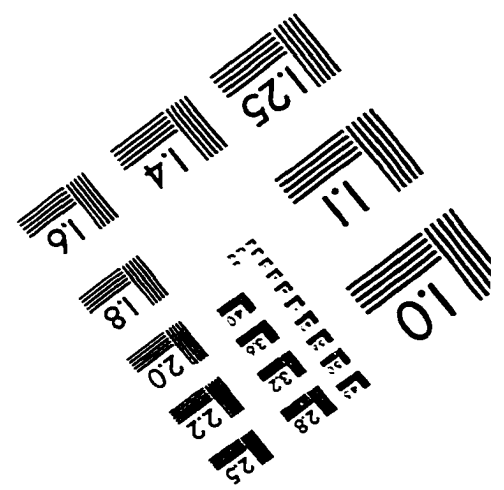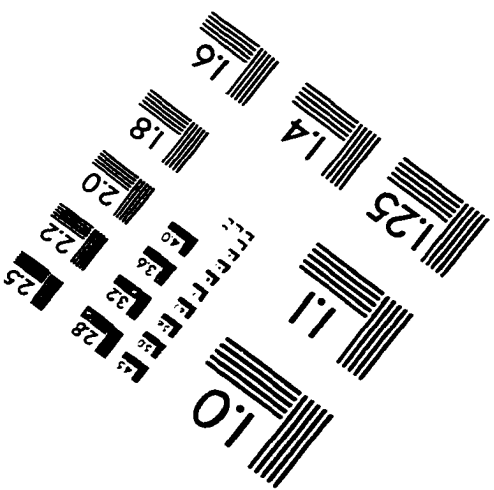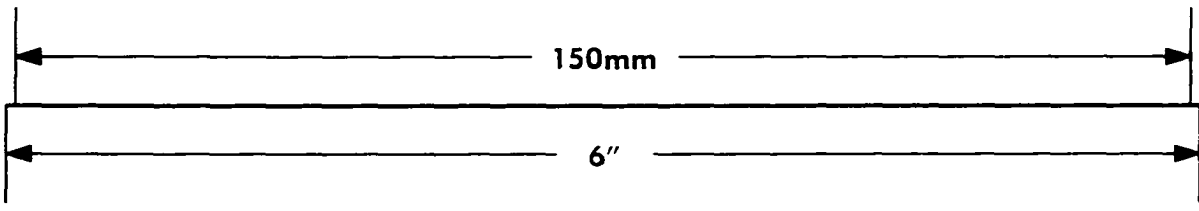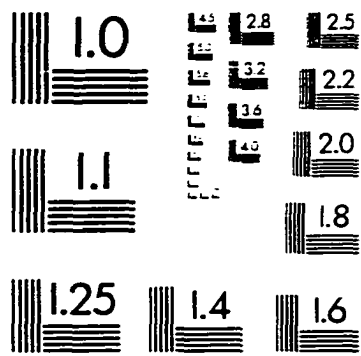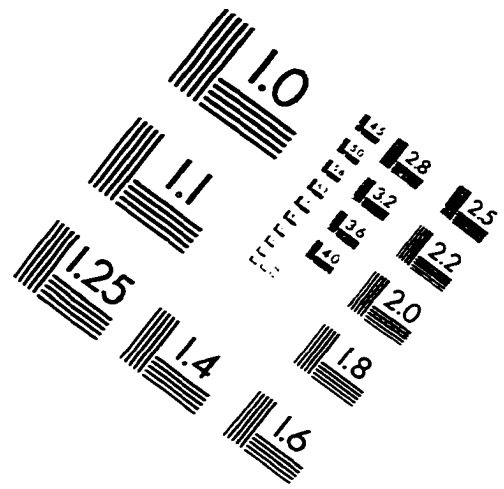
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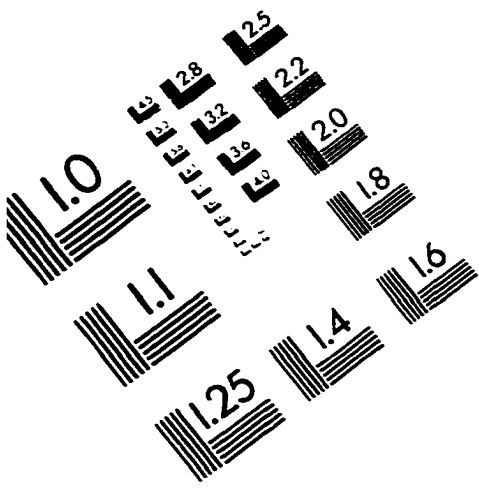
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