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Farming Sector Finance in Australia

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FARMING SECTOR FINANCE IN AUSTRALIA

by

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The University of Wollongong

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Abstract
This paper develops a model from an *ex-post* borrowers perspective and then tests it for all main providers of Australian rural finance. The regression results reveal that the hypothesised five-variables model is generally valid for the banking sector. The models for Finance Companies and Other Government reduced to a two-variables model each, while Total Sources reduced to a three-variables model. The five-variables model was not confirmed for Insurance Companies and was not further analysed as this source has declined to an insignificant level. The results of all models indicate that, irrespective of the source of finance, the rural industry is highly risk-averse and has a preference for equity finance rather than loans.

Keywords

Farming Sector Loans, Farming Sector Finance, Loan Determinants

1. Introduction

The rural industry has always occupied a unique place in Australia for at least two reasons. Agricultural products, such as wool and wheat, comprised for a long period of time the largest part of total Australian export. It is only recently that other commodities, such as iron ore and subsequently manufactured products, have become more significant in terms of Australian export, resulting in a decrease in the importance of rural export from 71% in 1965 to 29% in 1994.

The second reason relates to the rather volatile nature of the rural industry due to the harsh climatic conditions in Australia, together with a price structure largely determined by international market forces. It is not unusual for certain geographical regions to be declared "relief deserving" by either State or Federal governments. To somewhat ease the almost continuous financial problems of the rural industry, individual State governments have set up special rural assistance authorities, which also administer the Federal Government's Rural Adjustment Scheme. In other words, the rural sector had always to live with the problem of financial difficulties, often originating from the fixed interest rates commitments in times of depressed revenues due to either climatic conditions or low commodity prices on world markets and rising costs. It was, therefore, considered to be interesting to investigate the debt policy of the rural industry from the borrowers perspective. This paper develops and tests a model of the demand determinants of debt of the aggregate rural industry in Australia.

It is recognised that the area of risk, and attitude towards risk, for the Australian rural industry is covered in the economic literature, eg Bond et al, (1980), Lewis et al,

(1988), and Quiggin (1981), however, none of this literature focuses on risk in an applied loan finance setting. The annual Farm Survey Reports (eg ABARE, 1995) provide a wealth of financial and other information, including debt figures for the rural industry in Australia, but do not provide any information on loan demand determinants. This author is not aware of any empirical study which has focused on actual demand determinants of rural loan finance from a finance perspective.

Section two of this paper outlines the theoretical framework for the study by drawing on the *ex-ante* credit-risk analysis literature of the banking industry from which relevant *ex-post* demand variables are developed for inclusion in the model. Section three identifies the risk characteristics of the rural industry and the main providers of rural finance in Australia. Section four develops the hypotheses for the signs of the independent variables and derives the model. Section five discusses the data collection and the regression results of the model for the various providers of loan finance. Section six provides a summary of the results, states the conclusions and recommendations for further research.

2. The Theoretical Framework

It is generally accepted in the banking-finance literature (eg Sinkey, 1989, p 491) that credit-risk analysis , ie the evaluation of the factors that may lead to a default in loan service payments and/or final loan repayment, is a major determining factor in the final loan decision by lending institutions such as banks. Only loan applications which are believed not to fall into the "loan default risk" category progress to the actual loan decision.

Factors traditionally considered relevant in the credit-risk analysis literature are capacity, character, capital, collateral, and conditions (Greenbaum et al, 1995; Kidwell et al, 1993; Reed et al, 1976; Rose et al, 1993). These factors are generally discussed in the banking literature as *ex-ante* factors, ie factors which need to be taken into consideration by lending institutions in making loan decisions.

"Capacity" refers to both, a borrowers' legal capacity (ie authority) to apply for the loan, as well as the financial capacity to service and finally repay the debt. As this study focuses on actual loans made, it is reasonable to assume that legal capacity for the debt did exist when financial institutions provided finance. Legal capacity is thus irrelevant for the purpose of this study.

The debt coverage ratio, or earnings available to pay interest (ie earnings before interest and tax divided by interest, EBIT/I), is generally accepted in the literature to indicate cash-flow capacity, ie the ability to pay interest from normal operating cash-flows

"Character" refers to the borrowers' reputation for past timely payments and thus the desire to service and repay future loan. Reputation is considered to increase with the length of time of a serviced loan (Diamond 1991), resulting in a decrease of credit-risk. The cost of defaulting is considered to be greater for a borrower with better reputation, arising from a possible loss of lower interest rates due to positive reputation for prompt payment. This means that the risk of defaulting is lower for a borrower with higher reputation (Diamond, 1989).

Due to the lack of publicly available information, it was not possible to include the length of time of a serviced loan as an explanatory variable in this study. Another proxy could have been "age of business", ie the time of successful operation. However no public information was available on this variable either.

"Capital" refers to the dollar amount available from owners equity, ie from internal sources and, therefore, provides an alternative source of finance to debt. From an *ex-ante* perspective, it is generally argued that high equity-funding will be considered favourable in a lending decision as it signals the owners confidence in the business by placing their own funds at risk. The debt/equity ratio, or leverage, is generally used in the literature to express the relative level of equity funding.

Return-on-assets (ROA) is generally accepted as a measure of profitability on total assets as it is a composite measure of the return on debt plus the return on equity. From a lender's perspective a higher return-on-assets (ROA) is seen as a higher increase in funds available to equity holders as debt holders do not participate in profits above fixed interest payments, which will thus result in a larger increase in "Capital".

"Collateral" refers to the security provided by borrowers' underlying assets and a higher collateral value is generally considered to provide a greater protection against credit-risk. Secured debt collateral is a pledge against specific assets, with any excess ranking as unsecured, while unsecured debt ranks before equity capital, which represents "last resort security" for debt holders in case of default. Collateral thus represents lenders security, secured and unsecured, in extreme cases of financial distress.

"Collateral" was considered inappropriate as this study focuses on demand for finance factors, rather than supply factors. Borrowers are concerned about ability to service debt, in terms of payment of interest and principal. In an extreme situation where the survival of the business depends on the borrowing of funds (eg the individual farm unit requires funds for spring time sowing which cannot be met from internal sources) a loan application will most likely be forthcoming irrespective of the existence of "collateral". In this case the servicing of the loan is expected to come from funds received from the harvest. The choice is thus between *certain* foreclosure (ie no sowing) and the probability of continuity (ie earning of sufficient funds to service the loan). "Security to the lender" in case of eventual payment default, and thus foreclosure, would in this case not be a consideration to the borrower. "Collateral", ie the "security to the lender *after* default", is thus a lending rather than a borrowing consideration. Although the "collateral" level must meet minimum lending requirements in terms of market values expressed debt/equity ratios, it is not important in the loan application itself.

"Conditions" refers to macro-economic conditions which affect borrowers' loan servicing and repayment abilities. Funds for loan servicing would normally come from borrowers' operating income. Funds for loan repayments, on the other hand, would come from one of three sources: accumulated earnings, sale of capital assets, and/or new borrowing.

3. Risk Characteristics and Sources of Finance of the Rural Sector

Based on the three size indicators of cash operating surplus, indebtedness and turnover, shown in Table 1, a large proportion of the rural industry could be considered as small business with family ownership rather than as widely held corporate ownership. It is, therefore, reasonable to assume that financing decisions by the rural industry in aggregate are made very much with an awareness of the personal risk of debt to the borrower, which means that the rural industry in aggregate is risk-averse, will not be overly influenced by the benefits of an optimal capital structure, and will only borrow if it is considered absolutely necessary. It must, however, be recognised that the rural industry frequently needs to borrow for short-term survival, eg in the case of insufficient funds for essential spring sowing.

The assumption of conservative borrowing is supported by the relatively low debt/equity and high interest cover ratios of the rural sector compared to other industries in the economy, as indicated in Table 2. It is maintained that the relatively low debt/equity ratio is due to the prudent borrowing practices of the rural industry and, as the debt/equity ratio of the rural sector is not based on market valuation, is not related to a risk evaluation by the market in the conventional way. Furthermore, the relatively high interest cover ratio, compared to the average of other industries, also indicates conservative borrowing practices by the rural industry. It is, however, recognised that the debt/equity and interest cover ratios will, to some extent, also be due to the lending policies and practices of financial institutions.

Table 1
Size Indicators of Australian Farm Businesses

	Farm Businesses		
	% 1991	% 1992	% 1993
Cash Operating Surplus			
$			
< 0	24	26	20
0 - 9,999	14	15	14
10,000 - 19,999	12	13	12
20,000 - 29,999	10	12	12
30,000 - 39,999	10	7	9
40,000 - 49,999	6	6	6
50,000 - 99,999	16	14	16
100,000 and over	8	7	11
Indebtedness			
$			
0	28	25	25
1 - 4,999	6	5	6
5,000 - 9,999	4	4	3
10,000 - 24,999	9	8	9
25,000 - 49,999	10	10	9
50,000 - 99,999	11	13	13
100,000 - 199,999	14	16	14
100,000 - 199,999	18	19	21
Turnover			
$			
< 50,000	25	24	22
50,000 - 99,999	24	27	24
100,000 - 149,999	18	17	17
150,000 - 199,999	10	10	10
200,999 - 249,999	7	6	8
250,000 - 299,999	4	5	5
300,000 and over	12	11	14

Table 2
Debt/Equity and Interest Cover of Australian Industries

Industry	Debt/Equity ratio 1993 %	1991 %	1988 %	Interest Cover 1993 times	1991 times	1988 times
Oil and Gas	95.99	73.11	111.08	2.39	2.03	2.04
Diversified Resources	88.62	86.26	126.61	3.55	3.20	4.01
Developers and Contractors	66.31	54.97	55.14	2.97	2.42	2.93
Building Materials	60.79	68.35	61.95	3.61	3.10	4.19
Alcohol and Tobacco	117.33	107.91	62.46	2.25	2.13	2.30
Food and Household	99.57	77.94	78.20	3.35	2.18	2.45
Chemicals	30.28	37.33	44.31	5.15	2.70	7.78
Engineering	67.78	63.44	34.91	2.83	1.99	3.48
Paper and Packaging	116.66	129.12	137.39	1.85	1.90	2.59
Retail	178.67	105.00	70.05	1.92	-0.40	3.21
Transport	112.86	138.87	123.68	2.57	1.82	4.22
Media	92.56	154.66	207.96	2.43	0.80	1.86
Rural (1)	**17.22**	**16.18**	**13.03**	**3.89**	**1.89**	**5.13**

Source: ASX, various issues
(1) ABS: 7507.0; 75.005

Based on Reserve Bank information (RBA, 1994), the main providers of rural finance can be separated into four main lender categories: Banks, Pastoral and Other Finance Companies, Other Government, and Life Insurance Companies. Other Government includes advances made under the "War Service Land Settlement Act", the "Agricultural Re-establishment Act" and those made from State funds.

Banks have traditionally always been the main providers of rural finance and their relative importance has increased from 50.8% in 1965 to 81.0% in 1994. The relative importance of the other three providers has declined over the same period, with the traditionally least important one, ie Life Insurance Companies, falling from 5.0% in 1965 to 0.4% in 1994, (see Table 3).

The actual lending decisions of all four rural loan provider categories will be used as the dependent variables in this study.

Table 3
Percentages held of Rural Debt

YEAR 30 Jun	Banks/Total	FinCo/Total	Govt/Total	LifeIns/Total
	%	%	%	%
1965	50.8527	20.0775	24.0310	5.0388
1970	56.3881	16.7627	20.7012	6.1479
1975	59.3380	11.4017	25.0102	4.2501
1980	64.0488	8.6230	25.5505	1.7777
1985	73.3389	8.3892	17.1692	1.1027
1990	70.8143	12.6674	15.8862	0.6404
1994	81.0427	7.0844	11.5283	0.3508

4. Hypotheses and Model Development

In order to develop a model of aggregate *ex-post* lending decisions, the focus of the independent variables was changed from the *ex-ante* focus of the banking/finance literature of credit-risk analysis to an *ex-post* focus. *Ex-post* situations also need to incorporate borrowers requests for loans and not only lenders decision criteria, ie willingness to make loans. Although it is recognised that actual loans are supply/demand equilibrium situations, actual lending to the rural industry will not occur without rural industry demand in the first place. Changes in the aggregate demand for loans will inevitable lead to changes in aggregate loans made. From the lender's perspective the demand of the rural industry is considered within an overall lending/investment portfolio, thus acting as a moderating, rather than as an initiating, force in aggregate lending. To develop the model for the purpose of this study, the independent variables had to be modified for borrowers attitude and behaviour towards risk.

Gross Farm Product (GFP) and Rural Export (EXP) are used as proxies for prevailing macro-economic conditions. Although it is recognised that both variables are to some extent related phenomena, they nevertheless measure different phenomena. Gross Farm

Product (GFP) which measures the rural component of Gross Domestic Product (GDP) represents approximately 2.7% of GDP for the period 1991/2 to 1993/4. In addition to indicating revenue figures for the rural sector, GFP is a measure which also includes allowances for subsidies, production costs, and indirect taxes. It must also be pointed out that GFP covers revenue of the **total** rural industry, ie domestic plus export. On the other hand, rural export (EXP) is a strictly "revenue only" measure from one source only, ie export. Rural export is an important part of Australian overall export (approximately 28.5% for the period 1991/2 to 1993/4), which is, however, heavily weighted towards individual rural sectors, eg meat, wool, and wheat.

It is maintained that it would be easier to borrow in times of higher levels of Gross Farm Product (GFP) and Export (EXP) since applications for loans would look relatively healthier, resulting in higher debt levels, which leads to the following two hypotheses.

Hypothesis 1: The rural loan amount is **positively** correlated with the level of Gross Farm Product (GFP).

Hypothesis 2: The rural loan amount is **positively** correlated with the level of Rural Export (EXP).

This study uses the Equity/Assets (E/A) ratio (which is a variation of the debt/equity ratio) as a proxy for "Capital", indicating the owners' relative financial interest in the business. In *ex-post* situations, a change in the (E/A) ratio thus indicates the change of

relative significance of equity (compared to debt) as a source of funds used for investments which the borrower considered essential/desirable and the lender considered acceptable. The past debt/equity ratios of the rural sector (which are the lowest for any industry, see Table 2), was thus a joint assessment of the rural and financial sectors to be at an appropriate/acceptable level.

The incentive for borrowing/leverage, within acceptable risk limits, is generally described in the finance literature in terms of the benefits derived from higher returns to borrowers as a loan provider's share of profits is limited by the stated interest rate. Two basic assumptions in this line of reasoning are that the returns on borrowed funds exceeds the cost of these funds, ie funds are borrowed to increase returns, and that the borrower has a choice between these two sources, ie internal funds are available if so desired. Although this reasoning will to some extent also be true in the case of the rural industry, it nevertheless overlooks the frequent need by the rural industry to borrow in order to survive. Depressed product prices and constant/increasing costs, together with adverse climatic conditions make "survival borrowing" by the rural industry often more important than borrowing for the purpose of an increase in returns. The extent to which the rural industry will borrow will, therefore, often be subject to a trade-off between a risk-averse attitude and the extent of the determination to survive.

Accepting the risk-averse nature of the rural industry, it is expected that the rural industry will use equity, rather than debt, as a source of finance whenever possible. Equity finance will also be used to reduce debt levels whenever possible. Debt finance

on the other hand will be used only if insufficient equity finance is available and the investment is considered either essential or critical for short-term survival.

The fundamental risk-averse nature of the industry together with the high volatility of the availability of internal funds, and thus the need for debt finance, will require a frequent readjustment of the E/A ratio, which will, however, be maintained by the surviving farm units within its established range in the longer term. A relatively static E/A ratio is not expected as it would indicate the availability of internal funds whenever required and "survival borrowing " would largely not exist, a situation which is contrary to the nature of the industry. This reasoning leads to hypothesis 3.

Hypothesis 3: The rural loan amount is **negatively** correlated with the Equity/Assets (E/A) ratio.

Return-on-Assets (ROA) is used as a second proxy for "Capital" which indicates return to both, equity and debt. As the lender does not share in any profits above stated interest rates, any increase in profitability will, therefore, result in a larger inflow to equity with some of it being retained, and vice versa. An increased equity, in the form of retained earnings, means that less debt finance will be needed for investments. It is, therefore, expected that a higher ROA will lead to a lower demand for debt finance and, despite a greater willingness by lenders to provide loans, to a lower level of debt, which leads to hypothesis 4.

Hypothesis 4: The rural loan amount is **negatively** correlated with return-on assets (ROA).

The debt coverage ratio, ie earnings available to pay interest (earnings before interest and tax divided by interest, or EBIT/I) is used in this study as a proxy for "Capacity". The ability to pay interest as it falls due is an important risk consideration not only for lenders but also for borrowers. Rural borrowers, being risk-averse, will apply for loans if they believe that they will have the ability to service the loans. The fact that investment loans, as distinct from working capital loans, are generally long term arrangements, a sufficiently high margin of safety of current earnings available to cover required interest payment will provide borrowers with the confidence to apply for loans and lenders with the confidence to provide the loans.

Based on this reasoning, it is expected that a higher EBIT/I ratio will result in a higher level of borrowers' confidence and higher lenders' willingness to lend, which in turn will result in a higher level of debt.

Hypothesis 5: The rural loan amount is **positively** correlated with the earnings-before-interest-and-tax to interest (EBIT/I) ratio.

The following model has been developed to test the above five hypotheses:

$$\ln Y_{it} = a_o + a_1 \ln (GFP)_t + a_2 \ln (EXP)_t - a_3 \ln (E/A)_t + a_4 \ln (EBIT/I)_t - a_5 \ln (ROA)_t + e_t$$

where:

$X_1 = GFP_t$ = Gross Farm Product in period t

$X_2 = EXP_t$ = Rural Export in period t

$X_3 = E/A_t$ = Equity to Assets ratio of the rural sector in period t

$X_4 = EBIT/I_t$ = Times Interest Earned by the rural sector in period t

$X_5 = ROA_t$ = Return on Assets of the rural sector in period t

e_t = error term in period t.

Although this model was developed on the basis of the banking-finance literature (ie the literature on depository institutions such as banks), it was considered appropriate to test it for each of the main providers of rural finance $Y_{i\,t}$ (as dependent variables), as reported by the Reserve Bank of Australia (RBA, 1994), where Y_{it} represents:

Y_1 = Loans by Banks in period t (Banks)

Y_2 = Loans by Finance Companies in period t (FinCo)

Y_3 = Loans by Other Government in period t (Govt)

Y_4 = Loans by Life Insurance Companies in period t (LifeIns)

Y_5 = Loans by Total of all Sources (ie the sum of Y_1 to Y_4) in period t (Total).

5. Data Sources and Regression Results

Data for the independent variables of this study was taken from various issues of the Australian Bureau of Statistics (ABS) publications, which are indicated in the relevant places. However, the three major sources were: (1) ABS 5206.0 (National Income and Expenditure Accounts) for GFP, (2) ABS 5303.0 (Balance of Payments) for EXP, and (3) ABS 7507.0 (Agricultural Industries, Financial Statistics) for the figures required to calculate the ratios of E/A, EBIT/I, and ROA.

Data from ABS 7507.0 were unfortunately not available for the total period of Rural Debt statistics (1965 to 1994) given in Reserve Bank Bulletin, December 1994. As it was not possible to construct proxies for these statistics for the missing years, analysis had to be limited to the 16 annual periods for which such data is available.

Data for the dependent variables, Rural Debt, were taken from the December, 1994 Reserve Bank of Australia Bulletin (RBA, 1994), which uses information provided by the lending institutions to the Reserve Bank. The data were available on an annual basis (as at 30 June) for the period 1965 to 1994 and separated into four main lender categories: All Banks (Banks), Pastoral and Other Finance Companies (FinCo), Other Government (Govt) and Life Insurance Companies (LifeIns).

The summary results of the analysis for the five-variables regression model for each of the providers of rural loans (Banks, Finance Companies, Other Government, Life Insurance Companies, and Total of all Sources) are shown in the Appendix.

5.1. Banks

The regression results for Banks were as follows:

Loans by Banks = 35.4764 + 0.7894 ln GFP + 0.5553 ln EXP - 8.5998 ln E/A

(t-values) (5.82) (3.05)** (2.55)** (-6.11)*

+ 0.3692 ln EBIT/I - 0.7076 ln ROA.

(t-values) (2.55)** (-3.49)*

$R^2 = 99.2$, R^2adj. = 98.8, F statistic = 248.19*

Levels of significance: * = 1%, ** = 5%.

The results show that all five variables carry the correct signs which suggests acceptance of the above mentioned hypotheses in the case of banks. The results also indicate that the independent variable E/A has the highest elasticity with -8.6% and thus the highest explanatory power in the model. EBIT/I, has the lowest elasticity (0.4%).

A test for first order autocorrelation (ie H_0: p = 0), using the Durbin-Watson statistic, suggests that the null hypothesis (H_0: p = 0) should not be rejected at the 1% level, ie there are no serious problems with serial correlation.

5.2. Finance Companies

The data in the Appendix, suggests that the variables EXP, EBIT/I and ROA do not carry the correct sign in the case of finance companies. A stepwise deletion of these variables resulted in the following regression model:

Loans by FinCo = 43.7927 + 1.1449 ln GFP - 10.5981 ln E/A.

(t-values) (4.26) (12.39)* (-4.70)*

R^2 = 94.0, R^2 adj = 93.1, F-value of 102.370*

Levels of significance: * = 1%.

Unlike the situation with Banks, Gross Farm Product (GFP), rather than E/A, has the larger explanatory power of the two variables in the model, with an elasticity of 12.39%.

The Durbin-Watson autocorrelation test, using the Maximum-Likelihood technique, revealed a statistical value of 1.527 which indicates no significant autocorrelation at the 1% level.

5.3. Other Government

The results in the Appendix indicate that the variables EBIT/I and ROA do not carry the correct sign and the variable GFP is not significant. A sequential deletion of these variables from the original five-variables model resulted in the following equation:

Loans by Govt = 14.7343 + 0.7106 ln EXP - 3.1603 ln E/A.

(t-values) (3.61) (22.20)* (-3.53)*

R^2 = 97.7, R^2 adj = 97.4, F-statistic = 280.775*.

Levels of significance: * = 1%.

Export (EXP) has a higher elasticity (22.20%) than the Equity/Assets ratio and thus the higher explanatory power of the two variables in the model.

The autocorrelation test shows a Durbin-Watson d^* value of 1.705, which falls into the "no autocorrelation" region at the 5% level.

5.4. Life Insurance Companies

As can be seen from the data in the Appendix the results indicate that none of five independent variables carry the correct sign. As Life Insurance Companies have reduced to the level of being an insignificant provider of rural finance, (0.35% of total rural finance in 1994 as shown in Table 3), the results for this sector were no further analysed.

5.5. Total of all Sources

The data in the Appendix indicates that all independent variables carried the correct signs but EBIT/I was insignificant. The deletion of this variable also required the deletion of ROA due to insignificance. The remaining three-variables model with GFP, EXP and E/A resulted in the following model:

Loans by all Sources = 26.1508 + 0.4488 ln GFP + 0.6405 ln EXP - 6.0850 ln E/A

(t-values) (5.71) (2.10)** (3.42)* (-6.04)*

R^2 98.8, R^2adj = 98.5, F statistic = 322.272*

Levels of significance: * = 1%, ** = 5%.

Due the dominance of banks as a source of rural loan finance, it is not surprising that, similar to the results of bank loans, the Equity/Assets (E/A) ratio has the highest elasticity, and thus explanatory power in the model.

The Durbin-Watson test indicates no serious autocorrelation for the model ($d^* = 1.443$) at the 1% level.

6. Summary

The sign hypotheses of the five-variables model was confirmed only for rural loan finance supplied by banks. The Equity/Assets ratio provides the greatest explanatory power for bank loan finance, indicating the fundamental risk-averse nature of the industry with a relative preference for the use of equity finance over debt finance. The high volatility of the availability of internal funds and the need for "survival borrowing" makes a frequent readjustment of the Equity/Assets ratio necessary to reduce increased debt levels whenever internal funds make it possible.

The five-variables model was not confirmed for loans by Finance Companies due to the incorrect signs of the variables EXP, EBIT/I and ROA. Correct signs were obtained after the model was reduced to two variables, Gross Farm Product (GFP) and Equity/Assets (E/A). Contrary to the results of the bank loan model, GFP, rather than E/A, was the variable with the relatively greater explanatory power. This result indicates that, in the case of finance companies, the demand for rural loans is predominantly based on the level of Gross Farm Product.

The test of the model for loans from Other Government sources indicated similar results to those for finance companies. The test of the five-variables model indicated the wrong signs for the variables EBIT/I and ROA and insignificant results for GFP

(81% level) and E/A (17% level). The subsequent contraction of the model resulted a two-variables model, consisting of Export and Equity/Assets. Of these two variables, Export had the greater explanatory power indicating its relative importance in the demand for Other Government rural finance.

The test of the five-variables model for life insurance companies indicated a wrong sign for all five variables. As life insurance companies have become an insignificant source of rural loans (0.35% in 1994) the results were not analysed any further.

Due to the insignificance of the variables EBIT/I and ROA, the model for loan finance from All Sources reduced to three variables, Gross Farm Product, Export and Equity/Assets. As banks are the main providers of rural loan finance (81% in 1994) it was not surprising that, similar to the results from banks, Equity/Assets was the variable with the highest explanatory power.

All loan determinants models identified in this study did show a high degree of correlation, based on R^2 calculations, and a 1% level of significance, based on F-statistics. Furthermore, as measured by the Durbin-Watson statistic, none of the models suffered from an interpretation complication due to serial correlation (at least at the 5% level).

A possible interpretation of the poor regression results of the five-variables model for providers of finance other than banks (ie finance companies and other government) (which is a possible area for further research) suggests that banks are the main financial

institution for the rural industry not only as providers of loan finance, but also in terms of providing the most comprehensive range of services to the industry. Under these circumstances the rural industry would only turn to alternative institutions if it was refused by banks, or if other institutions provided specialised services, for example provide loans on special terms. For example, the rural industry may turn to finance companies (which do include pastoral companies) as a second choice if it needs funds which are not provided by banks. This argument is supported by the greater explanatory power of Gross Farm Product in the identified model of finance companies, as well as the declining importance of finance companies, and the increasing importance of banks, as a source of rural finance. Loan applications to finance companies will, however, only be forthcoming in conjunction with a shortfall of internal sources.

A similar reasoning can be applied for Other Government as a supplier of rural loan finance. Furthermore, this sector does also include special rural finance arrangements under the *War Service Land Settlement* and *Agricultural Re-establishment Acts.* Applicants, applying under the special arrangements of these Acts, do not fall into the normal characteristics of the conventional rural industry and thus represent a different "clientele group".

Life insurance companies are different in that they are not depository institutions or financial intermediaries, and thus are not lenders in the same sense as the other suppliers of finance covered in this study and would attract different applicants.

Based on the results of this study several other avenues open up for further investigation. For example, this study can be extended by focusing on lenders assessment processes to identify the determinants of individual actual loan applications and thus identify and quantify the extent to which lenders credit-risk analyses have the moderating influence on the loan demand referred to in this paper.

Demand determinants could be investigated on the basis of individual applications to lenders. This would require investigating actual loan applications, received by lenders, in terms of the underlying determinants identified in this study. Through this method of triangulation the results of this study could be corroborated.

A third area of research could be to identify rural borrowers attitude towards risk and its effect on the decision criteria for placing a loan application.

Appendix
Regression Results of Five-Variables Model

Source of Debt		Constant $\hat{a}_0$	LnX1 LnGFP $\hat{a}_1$	LnX2 LnEXP $\hat{a}_2$	LnX3 LnE/A $\hat{a}_3$	LnX4 LnEBIT/I $\hat{a}_4$	LnX5 LnROA $\hat{a}_5$	R^2	R^2 (adj)	F
LnBanks	(Coef)	35.4764	0.7894	0.5553	-8.5998	0.3692	-0.7076	99.2	98.8	248.19
	(t)	5.82	3.05	2.55	-6.11	2.55	-3.49			
	(p-value)	0.0002	0.0122	0.0287	0.0001	0.0288	0.0059			0.0001
LnFinCO	(Coef)	35.7074	1.8829	-0.7501	-8.7927	-0.3473	0.4562	96.9	95.4	63.35
	(t)	3.20	3.97	-1.88	-3.41	-1.31	1.23			
	(p-value)	0.0095	0.0026	0.0891	0.0067	0.2194	0.2478			0.0001
LnGovt	(Coef)	8.4325	0.0482	0.5855	-1.5638	-0.2568	0.1519	98.8	98.2	161.21
	(t)	1.86	0.25	3.62	-1.49	-2.38	1.01			
	(p-value)	0.0929	0.8075	0.0047	0.1666	0.0384	0.3384			(0.0001)
LnLifeIns	(Coef)	-9.1922	-0.2251	-0.2026	3.6048	-0.3167	0.9176	90.9	86.4	20.02
	(t)	-1.21	-0.70	-0.75	2.05	-1.75	3.63			
	(p-value)	0.2546	0.5012	0.4722	0.0671	0.1098	0.0046			(0.0001)
LnTotal	(Coef)	32.7005	0.7483	0.4084	-7.5634	0.2008	-0.4297	99.2	98.9	246.56
	(t)	6.29	3.39	2.20	-6.30	1.63	-2.48			
	(p-value)	0.0001	0.0069	0.0523	0.0001	0.1348	0.0324			(0.0001)

References

ABARE, (1995), **Farm Survey Report 1995**, Australian Bureau of Agricultural and Resource Economics, Canberra.

ASX, (various issues), **The Stock Exchange Financial and Profitability Study**, Australian Stock Exchange.

Bond G. and B. Wonder, (1980), "Risk Attitudes amongst Australian Farmers", **Australian Journal of Agricultural Economics**, Vol 24, No 1, pp 16-34.

Diamond Douglas, (1989), "Reputation Acquisition in Debt Markets", **Journal of Political Economy**, Vol 97, pp 828-862.

Diamond Douglas, (1991), "Monitoring and Reputation: the Choice Between Bank Loans and Directly Placed Debt", **Journal of Political Economy**, Vol 99, pp 688-721.

Greenbaum Stuart I. and Ajan V. Thakor, (1995), **Contemporary Financial Intermediation**, The Dryden Press.

Kiddwell David S., Peterson Richard L., and David W. Blackwell, (1993), **Financial Institutions, Markets, and Money**, 5th ed., The Dryden Press.

Lewis P. E. T., Hall N H., Savage C. R., and A. G. Kingston, (1988), "Taxation, Cost of Capital and Investment in Australian Agriculture", **Australian Journal of Agricultural Economics**, Vol 32, No 1.

Quiggin John, (1981), "Risk Perception and the Analysis of Risk Attitudes", **Australian Journal of Agricultural Economics**, Vol. 25, No. 2.

Reed Edward W., Cotter Richard V., Gill Edward K., and Richard K Smith, (1976), **Commercial Banking**, Prentice Hall.

Reserve Bank of Australia, (1994), "Table C18", **Bulletin**, Dec.

Rose Peter S., Kolari James W., and Donald R. Fraser, (1993), **Financial Institutions: Understanding and Managing Financial Services**, 4th ed., Irwin Homewood.

Sinkey Joseph F. Jr, (1989), **Commercial Bank Financial Management in the Financial Services Industry**, 3rd ed., Macmillan Publishing Company.