SOME ASPECTS OF THE RURAL CREDIT MARKET

F. G. JARRETT and JOHN L. DILLON
University of Adelaide

It is argued in this article that over the period from 1948 to 1963, lending to the rural sector by both trading banks and pastoral houses was characterized by an unsatisfied fringe of potential borrowers. Estimates are presented of the effects on rural lending by these agencies of changes in interest rate, bank liquidity, the relative profitability of wool growing and certain other variables.

Perhaps heroically, this paper attempts to throw some quantitative light on the structure of the rural credit market. Our knowledge of this market is extremely meagre, despite the importance of the subject and the amount of discussion, frequently characterized by more heat than light, that has occurred on the matter. As a market for study we must emphasize that it is an extremely complex one, partly because of the imperfections in the market due to institutional rigidities and the imperfect knowledge of lenders and borrowers, partly because of the extent of governmental action in the market, and partly because of imperfections in the data. With all these provisos it is perhaps superfluous to add that the numerical results presented are necessarily speculative. The analysis is based on time series data subject to all of the statistical difficulties of highly intercorrelated and autocorrelated variables plus those associated with errors of measurement in the variables. Nonetheless, it is hoped that the analysis provides some guides for those authorities concerned with the provision of credit to the rural sector.

The Economic Model

External finance provided to the rural sector may, for our purposes, be conveniently classified as coming from four sources:

a. The major trading banks, comprising the eight principal commercial banks of Australia.
b. The pastoral finance companies.
c. Government agencies—both Commonwealth and State.
d. Other sources including hire-purchase companies, assurance societies and private lenders.

Our concern in this paper is with the first two of these sources. To this extent our treatment of the rural credit market is incomplete. However, lending from Government agencies may not be amenable to the sort of analysis contained in this paper since a substantial portion of such lending is associated with Government policy on closer settlement and irrigation schemes, and *ad hoc* Government decisions. With respect to borrowing from private sources, published information is virtually non-existent, although in particular areas these sources may constitute a substantial source of funds.[1]

[1] See, for example, "Australian Rural Credit Facilities", Reserve Bank of Australia (mimeo), 1964, where it is stated that "in some industries, outstanding balances due to non-institutional sources (plus hire purchase) have been as much as 50 per cent of those due to the main institutional sources".

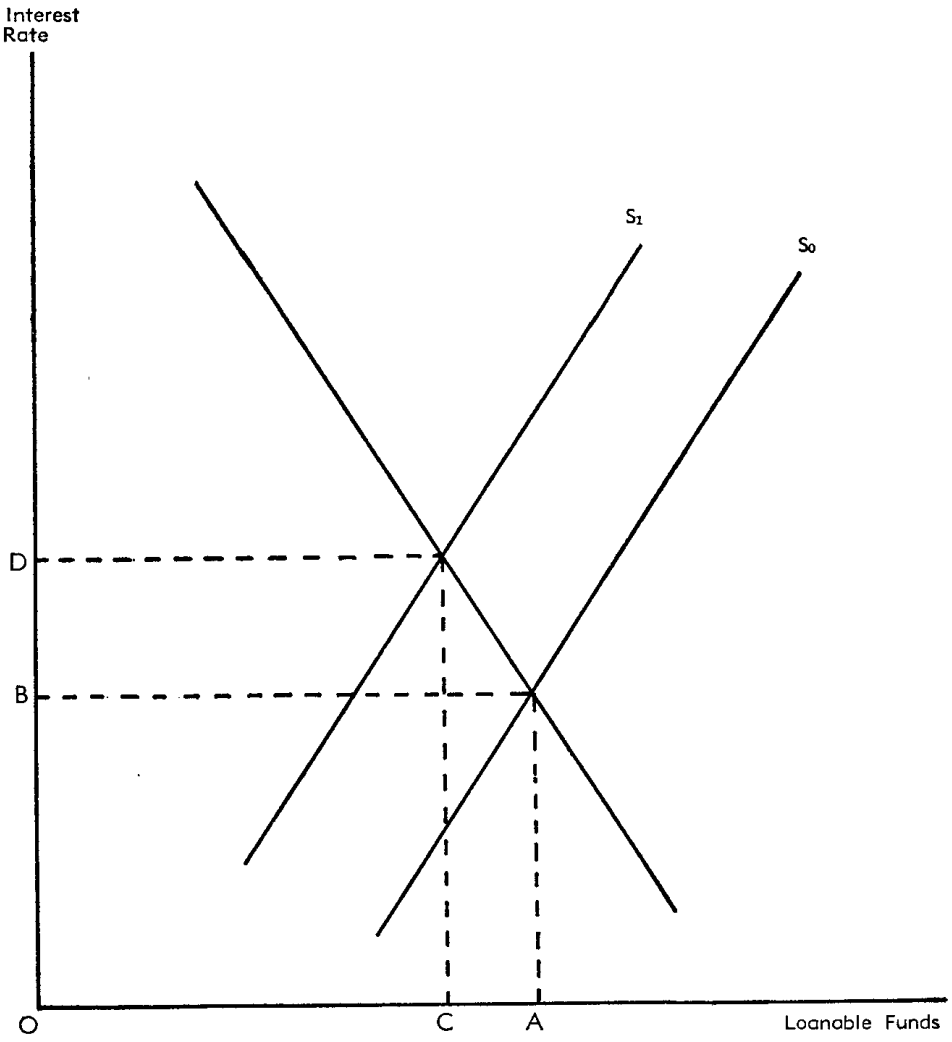

FIG. 1—Market for loanable funds with an elastic supply.

Figure 1 represents a partial equilibrium model of the supply of loanable funds by private lending agencies and the demand for these funds as a function of the interest rate. The initial equilibrium is given by the quantity OA of loanable funds and OB interest rate. Suppose the supply curve shifts to the left, for whatever reasons, from S_0 to S_1. The new equilibrium position is given by the quantity OC of loanable funds and OD interest rate. Clearly, the size of the fall in the quantity of loanable funds depends on the interest rate elasticity of demand. The smaller this elasticity, the smaller the fall in loanable funds. However, empirical studies,[2] particularly those directed at entrepreneurs, have indicated that

[2] T. Wilson and P. W. Andrews (eds.), *Oxford Studies in the Price Mechanism*, Clarendon Press, Oxford, 1951, pp. 274; J. F. Abersole, "The Influence of Interest Rates upon Entrepreneurial Decisions in Business—a Case Study", *Harvard Business Review*, Vol. 17, Autumn 1938, pp. 35-39; H. F. Lydall, "The Impact of the Credit Squeeze on Small and Medium-sized Manufacturing Firms", *Economic Journal*, Vol. 67, September 1957, pp. 415-431; and A. J. L. Catt, *Investment Decision Making in New Zealand*, Research Paper No. 5, New Zealand Institute of Economic Research, Wellington, 1964, pp. 77.

the interest rate does not appear to be an important variable in so far as investment decisions are concerned, that is, so far as *borrowers* are concerned.

Subsequently, emphasis shifted from the attitude of *borrowers* to that of *lenders*. This change in emphasis resulted in the development of the "availability doctrine" in which the supply schedule and its shiftability play the star's role in determining the level of loanable funds, while the demand schedule is relegated to the position of understudy.[3]

Figure 2 depicts the situation where the supply of loanable funds schedule is perfectly inelastic with respect to the interest rate. In the initial situation the equilibrium level of loanable funds is given by OE with an interest rate of OF. Suppose again, for whatever reasons, the supply curve shifts from S_0 to S_1, then the new equilibrium level of loanable funds is given by OG and the interest rate is OH. In this model the level of loanable funds is determined by the supply curve, the role of the demand curve being that of determining the rate of interest for the new level of loanable funds. So far as the *level* of loanable funds is concerned, the elasticity, or otherwise, of the demand schedule is irrelevant.

In both the models embodied in Figures 1 and 2 the interest rate is endogenously determined. However, in the Australian context, one could argue that the interest rate is administratively determined. In terms of both models, unless the administering authority happens to pick the equilibrium level of interest rate, the loanable funds market will be characterized by excess demand if the interest rate is set below the equilibrium rate or by excess supply if it is set above the equilibrium rate.

We will argue in this paper that both the major trading banks and the pastoral houses have, during the period considered, been confronted with excess demand for funds. That is, at the levels of interest rate that have prevailed over the 'fifties, both trading banks and pastoral houses —particularly the former—have had an unsatisfied fringe of potential

[3] There does not appear to be general agreement as to the exact content of the "availability doctrine". The interpretation we have given is that a change in the availability of credit means a shift in the credit supply curve. A similar interpretation is given in: R. A. Musgrave, "Credit Controls, Interest Rates and Management of Public Debt", in *Income, Employment and Public Policy: Essays in Honour of Alvin H. Hansen*, W. W. Norton, New York, 1948, pp. 229-232; J. H. Kareken, "Lenders' Preferences, Credit Rationing and the Effectiveness of Monetary Policy", *Review of Economics and Statistics*, Vol. 39, August 1957, pp. 292-302; I. O. Scott, "The Availability Doctrine: Development and Implications", *Canadian Journal of Economics and Political Science*, Vol. 23, No. 4, November 1957, pp. 532-539. A different interpretation of the availability doctrine, where a change in availability is represented by a change in the maturity of loans, is given by J. Guttentag, "Credit Availability, Interest Rates and Monetary Policy", *Southern Economic Journal*, Vol. 26, No. 2, October 1959, pp. 219-224. It is beyond the scope of this paper to discuss the relevance of the availability doctrine in the context of general monetary policy. Our concern with the doctrine is that it discusses the market for loanable funds in terms of the demand for, and the supply of, loanable funds; that it emphasizes the attitude of lenders rather than borrowers; and that it emphasizes the shiftability of the supply of loanable funds schedule.

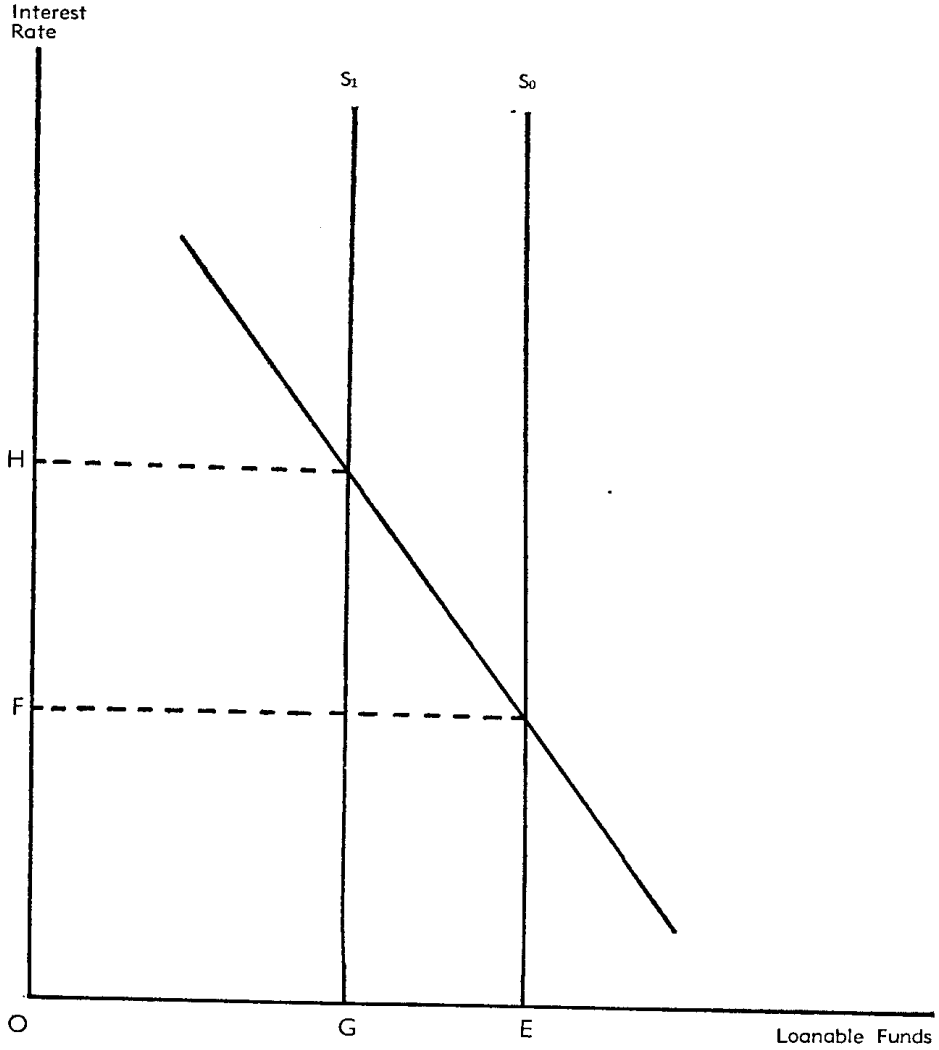

FIG. 2—Market for loanable funds with an inelastic supply.

borrowers so that credit rationing was the norm during the period under review.[4]

With respect to the major trading banks in Australia, loans are made by way of overdraft up to an approved maximum limit. In principle, the overdrafts are repayable on demand so that, in form, the credit involved is short term. In practice, however, overdrafts are extended for long periods with the banks requiring periodic reductions in overdraft levels. Interest is paid on the daily balance owing to the bank and there exists a maximum rate of interest on overdrafts, although an individual bank may charge less than the maximum on any particular advance. Interest rates are regulated by the Reserve Bank and there have been periods during the 'fifties when, usually for balance of payments reasons,

[4] For a theoretical justification of the existence of credit rationing see: D. R. Hodgman, "Credit Risk and Capital Rationing", *Quarterly Journal of Economics*, Vol. 74, May 1960, pp. 258-278; and A. J. L. Catt, "Credit Risk and Credit Rationing: Comment", *Quarterly Journal of Economics*, Vol. 77, August 1963, pp. 505-510.

official policy was to grant preferential interest rates below the maximum to primary producers. The time period considered in this paper precedes, apart from the last twelve months, the introduction of term lending by the trading banks in April 1962 so that the existence of an alternative loan form, other than overdraft, was not an important consideration.

Interest rates charged by the pastoral companies are usually in excess —one half per cent above the bank overdraft rate seems typical—of those charged by the trading banks. The effective rates of interest charged by hire-purchase companies and the rates paid on loans from private sources (other than from relatives) would usually be in excess of those paid to the pastoral companies. Loans from the trading banks to the rural sector normally require formal security, most often in the form of a first mortgage over land or buildings. Whether the banks are prepared to relax the security standards for a loan in periods of excess liquidity in the banking system is an open question. However, given that interest rates are administratively determined, that the form of loan is an overdraft and that formal security is required, all this would seem to indicate that the banks have little flexibility in substituting between the various conditions attaching to a loan. That is, the banks essentially make a "yes" or "no" decision in deciding to grant a loan, with a favourable decision being made if the "risk" attached to the loan meets the banks' requirements. There is little, if any, attempt by the banks to assess the extra interest which would be required to permit a loan being made where the banks' standards are not met. If a bank says "no" to all or part of a loan application, the unsuccessful borrower becomes part of the frustrated fringe and must have recourse to other sources of satisfaction where interest rates are higher.

Ideally, a measure of the excess demand for funds could be obtained by the extent of loan rejections. This is, however, by no means an easy task, partly because the criteria for a loan rejection are not simple and partly because no such published data are available. Still, we can get some measure of the extent of the excess demand for bank funds by observing the growth in advances from non-bank sources. With respect to rural lending, the pastoral houses are, after the trading banks, the major source of funds. Outstanding advances from the pastoral houses —where interest rates are usually higher than those on bank overdrafts and where the loans often require the marketing of wool and livestock through the pastoral house—have grown from £33m. at June 30, 1950 to £107m. at June 30, 1963. During a similar period outstanding advances from the major trading banks to the rural sector have grown from £118m. to £247m. The rapidity with which the term lending fund of £55m. set up by the trading banks in April 1962 has been committed and the growth in advances from the Commonwealth Development Bank, which in its first two full years of operation approved *new* loans of £8·1m. in 1960-61 and £10m. in 1961-62, would also appear to support the existence of excess demand for funds from the major trading banks during the period analysed.

It is more difficult to argue that excess demand for funds from the pastoral houses existed during the same period. Again we have no information on the extent of loan rejections and no strong supporting evidence on the growth in advances from other higher interest rate

sources such as the hire-purchase companies and private sources.[5] However, discussion with executives in the pastoral houses suggests that the demand for funds usually exceeded the supply. In the subsequent statistical analysis the assumption is made that excess demand characterized the position of the pastoral companies during the period considered.

In assessing the banks' willingness to lend to the rural sector, the following variables are believed to be relevant:

a. The interest rate on loans, the banks presumably preferring to make loans at higher, rather than lower, rates of interest.
b. The banks' liquidity position, with the banks being prepared to increase lending as their liquidity position improves and particularly when excess liquidity exists over and above that required by the monetary authorities.
c. The distribution of the banks' loans between various sectors with the banks attempting to avoid becoming "overcommitted" to any particular sector.
d. The banks' observance, or non-observance, of requests by the monetary authorities to curb new lending or to reduce the level of outstanding loans.
e. The banks' expectations of the profitability of loans to a particular sector and the ability of the borrower to service the loan.
f. The banks' willingness to meet seasonal demands on their funds, even though excess demand still exists and not all requests for funds are met.

The variables thought to influence the pastoral companies' willingness to lend are largely the same as those for the banks. The exceptions are those variables associated with monetary policy, the pastoral companies not being subject to the same control by the monetary authorities as are the banks. Furthermore, pastoral company lending is overwhelmingly to wool growers so that the pastoral houses will not be as concerned as the banks about the level of advances to rural sectors other than wool growing.

The Data

A verbal description of the variables thought to be relevant has already been given. The problem is to match up the theoretical variables with actually available data. The purpose of this section is to describe the variables actually used and to suggest possible improvements in the measurement of some variables.

The sample period used consisted of 30 six-monthly observations, beginning December 1948 and ending June 1963. The actual observations used are given in the Appendix. We are concerned with the impact of a number of variables on the supply of loanable funds to the rural sector by the trading banks and the pastoral houses. Ideally, the supply of loanable funds in any time period should be measured by the actual new and increased lending commitments undertaken by the lending

[5] There is some evidence that hire-purchase finance has become an increasingly important source of finance for certain types of capital formation, particularly plant and equipment. See D. B. Williams and F. H. Bollman, "Capital Expenditure on Queensland Dairy Farms", *Quarterly Review of Agricultural Economics,* Vol. 9, No. 4, October 1956, p. 173.

agencies during the period. The Reserve Bank has in the last few years in its *Statistical Bulletin* begun the publication of a series on gross new lending commitments. However, the series does not take account of cancellations and reductions of existing overdraft limits. In consequence, to the extent that such cancellations and reductions occur, the series overstates the actual supply of loanable funds from the trading banks. The series, moreover, does not give a break-down by sectors so that one cannot identify the distribution of new lending. In the absence of such information we are forced back to the six-monthly series on outstanding advances to the various sectors of the economy by the trading banks and the pastoral companies.

Outstanding advances by the trading banks to the rural sector are given for four categories: "mainly sheep grazing, mainly wheat growing, mainly dairying, and miscellaneous rural". Because of the widespread existence of the wheat-sheep combination on Australian farms we have consolidated the sheep and wheat categories, and because of the difficulty of identifying the specific types of farming in the miscellaneous category we have combined the dairying and miscellaneous categories. These series are an imperfect measure of the supply of loanable funds to the various rural sectors since outstanding advances are functions of both new lending actually taken up by borrowers and repayments of previous lending.

As already noted, the interest rate on rural loans from the trading banks is exogenously determined and the rate charged by the pastoral houses is approximately one half of one per cent above this rate. Again, perhaps as a counsel of perfection, we require the interest rate appropriate for new lending during the period. No such published information exists. We do have information, again in the Reserve Bank *Statistical Bulletin*, on the maximum overdraft rate chargeable by the trading banks; and the Treasury *Information Bulletins* do, from time to time, publish the percentage distribution of loans made at various interest rates. Up to 1954-55 we have used the maximum overdraft rate. From April 1956 to April 1962, the trading banks were permitted a range of interest rates with an allowable maximum average rate over all advances, with rates at the lower end of the range being urged for exporters. The maximum average rate was 5·5 per cent from April 1956 and 6 per cent from November 1960. We have assumed that official policy was effective with respect to loans to exporters and that loans to the rural sector were made at the average rate. Needless to say, there may be, and probably is, an error of measurement associated with this assumption.

We have already conjectured that the banks' willingness to lend will be affected by their liquidity position. Since 1952 the trading banks have been requested by the central bank to follow various liquidity ratios in deciding on their advances policy. The original ratio of holdings of cash plus government securities to deposits, the L.G.S. ratio, was suggested as "25 per cent, subject only to seasonal and other short-term variations".[6] It is probably the existence of excess liquidity which influences the banks' willingness to lend but the liquidity convention did not exist prior to 1952. We have therefore used the L.G.S. ratio itself

[6] See H. C. Coombs, *Conditions of Monetary Policy in Australia*, R. C. Mills Memorial Lecture, University of Sydney, 1958, p. 30.

as a measure of liquidity. The actual L.G.S. series given in the Appendix was calculated from quarterly data on the assets and liabilities of the Commonwealth Trading Bank and the other private trading banks published in the *Quarterly Summary of Australian Statistics*. The assets included the holdings of cash and cash balances plus the holdings of Treasury Bills and seasonal securities, together with holdings of other Commonwealth and State Government securities. Liabilities included deposits, both current and fixed, together with balances due to other banks and other bills payable. Half-yearly observations were obtained by averaging over the appropriate quarterly observations. The liquidity ratio is introduced as a shift variable so far as the loanable funds schedule from the banks is concerned. That is, the liquidity ratio is classified as an exogenous variable.

It was not possible to construct a liquidity ratio for the pastoral companies since no published information on their assets and liabilities structure at half-yearly periods exists. The Reserve Bank in its *Statistical Bulletin* does now publish, on a quarterly basis, the assets and liabilities structure of the pastoral finance companies, but this data only begins in 1962-3. Apart from the non-availability of data, yearly changes in the liquidity position of the pastoral houses would seem to suggest that it was only towards the end of the sample period that the pastoral firms became concerned with their liquidity position and adjusted their advances policy.[7]

Table 1 shows that the proportion of bank advances going to the rural sector fluctuated between 19 per cent and 27 per cent of total advances during the period from December 1948 to June 1963. The proportion, however, has been remarkably stable since December 1953. Of total rural advances, the proportion going to wool and wheat growers has increased and the proportion going to dairying and other types of farming has decreased, particularly since December 1954. In the subsequent statistical analysis it is assumed that the trading banks' willingness to lend to wool and wheat growers is not influenced by the loans outstanding to dairy and other types of farmers. However, the banks' willingness to lend to dairy and other types of farmers is hypothesized as influenced by the loans made to wool and wheat growers. Similarly, we hypothesize that the willingness to lend by the pastoral companies is influenced by the extent of loans made available by the trading banks to wool and wheat growers.

The central bank may operate its monetary policy through special account procedures, through open market operations, through changes in the interest rate, through liquidity ratio requirements, and through requests to the trading banks to curb new lending or reduce the level of outstanding loans. It is difficult to encompass these latter qualitative controls in a measurable variable. We have attempted to do so by using a dummy variable which has the value of 1 when credit restraint is being urged and 0 otherwise. This is a somewhat crude indicator since only two positions of the credit switch are possible so that the dummy variable does not incorporate the degree of restraint being urged other than the "on" or "off" position. However, in the absence of a scale to

[7] F. G. Jarrett, "Agricultural Credit—Pastoral Finance Houses", in R. R. Hirst and R. H. Wallace (eds.), *Studies in the Australian Capital Market*, Cheshire, Melbourne, 1964, p. 215.

TABLE 1

Percentage Distribution of Outstanding Advances by the Trading Banks to Various Sectors

	Rural advances as % of total advances	Advances to wool and wheat growers as % of total rural advances	Advances to dairy and other farmers as % of total rural advances
1948 II[a]	27	52	48
1949 I	25	51	49
II	24	48	52
1950 I	24	48	52
II	22	45	55
1951 I	21	45	55
II	19	45	55
1952 I	19	46	54
II	21	49	51
1953 I	22	47	53
II	23	47	53
1954 I	24	49	51
II	25	52	48
1955 I	24	53	47
II	24	55	45
1956 I	24	55	45
II	23	54	46
1957 I	23	54	46
II	23	54	46
1958 I	24	57	43
II	25	59	41
1959 I	24	58	42
II	24	57	43
1960 I	22	57	43
II	22	57	43
1961 I	22	57	43
II	22	56	44
1962 I	22	57	43
II	23	55	45
1963 I	22	56	44

Source: Derived from deseasonalized data in F. G. Jarrett, *op. cit.*, p. 227.

[a] I refers to advances outstanding at the end of June.
II refers to advances outstanding at the end of December.

measure the degree of credit restraint being urged, we have used the dummy values indicated. Since the request for credit restraint is an administrative decision by the Reserve Bank this variable is treated as exogenous, the value of 0 or 1 being based on statements about monetary policy appearing in the *Annual Reports* of the Reserve Bank. A dummy variable is also used with respect to loans by the pastoral houses since outstanding advances by these firms exhibit a pronounced seasonal pattern with a seasonal low in the period ending July and a seasonal high in the period ending December. The seasonal dummy takes the value 0 in the period ending July and 1 in the period ending December.

We have hypothesized that the willingness of the lending agencies to supply funds to the rural sector will be influenced by the lenders' expectations of the ability of farmers to service the loans. We have no knowledge of the way in which lenders formulate expectations. As a simple expectations variable we have used "real" prices, that is, the ratio of prices received by wool growers to prices paid by farmers and the

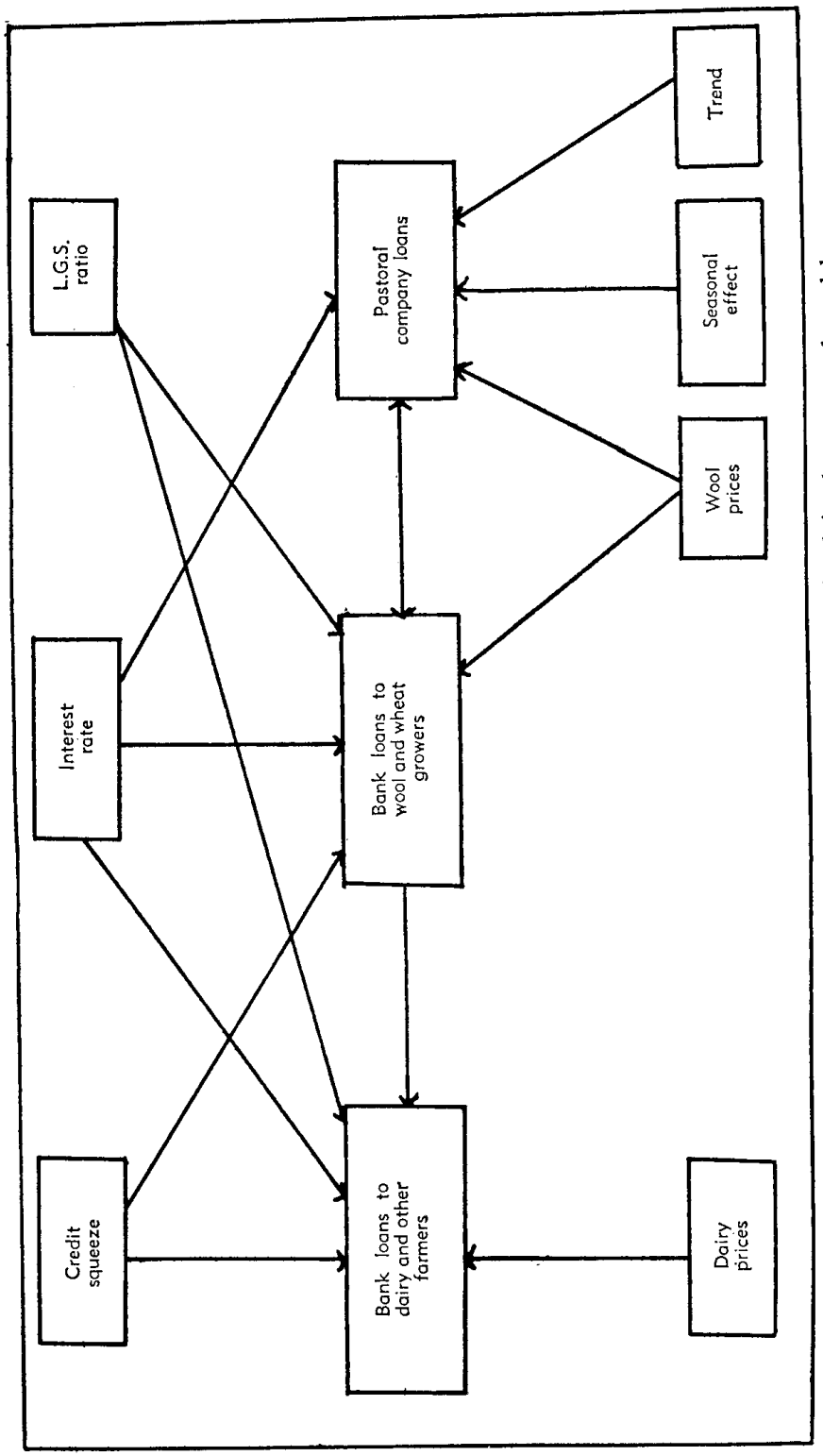

FIG. 3—Diagrammatic illustration of relationships postulated in the structural model.

ratio of prices received by dairy farmers to prices paid by farmers. All of these series are published by the Bureau of Agricultural Economics in its *Quarterly Review of Agricultural Economics*. These parity ratios are treated as exogenous, since the prices received by Australian wool growers are determined by overseas demand, the prices received by dairy farmers are either administratively determined or determined by overseas demand, and farmers are largely "price takers" so far as the prices they pay for farm inputs.

All of the advances series have been deflated by the index of prices paid by farmers in an attempt to reduce multicollinearity in the data.

The Statistical Method and the Empirical Results

The relations encompassed in the model are represented in the block diagram of Figure 3 with the arrows showing the assumed direction of influence of the relevant variables. Corresponding to Figure 3, we have the following system of equations, all of which were assumed to be linear in the observed variables.

$$(1)\quad Y_{1t} + \gamma_{11}Z_{1t} + \gamma_{12}Z_{2t} + \gamma_{13}Z_{3t} + \gamma_{14}Z_{4t} + \gamma_{10} = u_{1t}$$

$$(2)\quad Y_{2t} + \beta_{21}Y_{1t} + \gamma_{21}Z_{1t} + \gamma_{22}Z_{2t} + \gamma_{24}Z_{4t} + \gamma_{25}Z_{5t} + \gamma_{20} = u_{2t}$$

$$(3)\quad Y_{3t} + \beta_{31}Y_{1t} + \gamma_{31}Z_{1t} + \gamma_{33}Z_{3t} + \gamma_{36}Z_{6t} + \gamma_{37}Z_{7t} + \gamma_{30} = u_{3t}$$

Equation 1 is the supply of advances by the major trading banks to wool and wheat growers. Equation 2 is the supply of advances by the major trading banks to dairy and other farmers. Equation 3 is the supply of advances—predominantly to wool growers—by the pastoral houses. The variables are:

Y_{1t} = deflated outstanding advances by the trading banks to wool and wheat growers at the end of June and the end of December.

Y_{2t} = deflated outstanding advances by the trading banks to dairy and other farmers at the end of June and the end of December.

Y_{3t} = deflated outstanding advances by the pastoral companies at the end of June and the end of December.

Z_{1t} = overdraft rate on rural loans by the trading banks.

Z_{2t} = credit squeeze dummy, taken as 1 if credit restraint was being urged in the prior six months and 0 otherwise.

Z_{3t} = ratio of prices received by wool growers to prices paid by farmers during each six month period.

Z_{4t} = L.G.S. ratio of the trading banks during each six month period.

Z_{5t} = ratio of prices received by dairy farmers to prices paid by farmers during each six month period.

Z_{6t} = seasonal dummy, taken as 1 for advances outstanding at the end of December and 0 otherwise.

Z_{7t} = time, introduced principally to encompass the very strong trend apparent in the deflated pastoral company advances.[8]

u_{it} = a random error term.

[8] The use of a "catch-all" variable, such as time, is not very satisfactory from an analytical point of view. The pastoral houses were obviously prepared to run down their liquidity by rapid expansion of advances during the period 1949-50 to 1958-9. This shift in their supply of advances schedule was in part the consequence of the wool-broking houses using advances policy as a form of non-price competition. The use of time is an admission of the difficulty of incorporating this non-price competition in a measurable variable. See F. G. Jarrett, *ibid.*, p. 216.

Three estimation procedures have been used. These are single-equation least squares (SELS), limited information (LI) and two-stage least squares (TSLS). Equation 1, since it contains only a single endogenous variable, has been estimated only by SELS.

Using the "counting" rule for identification, both equations 2 and 3 are overidentified. A statistical test for identification in overidentified equations is provided by the quantity $[T \log (1/L_1)]$ where T is the number of observations and L_1 is the largest characteristic root associated with the moment matrix of all the exogenous variables in the model. This quantity is compared with a chi-square distribution with degrees of freedom equal to the excess of the number of zero coefficients specified over the minimum number needed for identification. If the calculated value exceeds the critical value at the level of significance chosen, the equation is significantly overidentified. The calculated value of $[T \log (1/L_1)]$ for equation 2 is 5·01, while with two degrees of freedom the critical value at the five per cent level of significance is 5·99 so that the inference about overidentification of equation 2 is not as clear as one would like. A second test for identification is given by the quantity $[T \log (1/L_1L_2)]$, where L_2 is the second-largest characteristic root. This quantity is also compared with the chi-square distribution with one degree of freedom more than the first test, that is three in this case. If the calculated value is less than the critical value, this indicates underidentification, while a significant result indicates just identification. This test applied to equation 2 indicates a significant result. The same tests applied to equation 3 yielded a significant result with overidentification of this equation.[9] The estimates of the coefficients are presented in Table 2 and elasticities, evaluated at mean values of the variables, are given in Table 3.

Interpretation of Results

A change of one per cent, from four per cent to five per cent for example, in the rural interest rate, other variables being constant, has been associated with an increase in outstanding advances to wool and wheat growers of £7·6m. This may reflect the banks' willingness to lend at higher, rather than lower, rates of interest. It may also reflect the banks' willingness to carry out official policy and lend to export industries, since interest rate changes in an upward direction have been, during the period considered, usually associated with balance of payments difficulties. However, with respect to lending to dairy and other farmers, a one per cent change in the rural interest rate has been associated with a decrease of £2m. to £4m., depending on the estimation procedure used. The interest rate elasticity of supply of advances by banks to wool and wheat growers is 0·78, while the comparable elasticity for dairy and other farmers is —0·24 to —0·46, depending on the estimation procedure used. It might be suggested that these differences between types of agriculture are a reflection of the banks' concern with the ability of the different types of agriculture to service loans at higher interest rates and with the relative contribution of dairying and other types of farming to export earnings. The preference by the banks for loans to wool and wheat growers implied by these different elasticities raises questions

[9] These tests are given in H. Eisenpress, *Forecasting by Generalised Regression Methods*, I.B.M., New York, 1961.

TABLE 2

Estimates of Coefficients in the Model

Equation and estimation procedure	Constant	Bank advances to wool and wheat growers Y_1 £m.	Rural interest rate Z_1 %	Credit squeeze dummy Z_2 0, 1	Wool parity Z_3 Base = 1	L.G.S. ratio Z_4 % by 10^{-1}	Dairy parity Z_5 Base = 100	Seasonal dummy Z_6 0, 1	Time Z_7 1 to 30	R^2
Bank advances to wool and wheat growers										
SELS, Y_1 dependent	15·31		7·59*	6·02*	—9·11*	0·77				0·63
			(2·95)	(2·82)	(3·32)	(4·18)				
Bank advances to dairy and other farmers										
SELS, Y_2 dependent	29·79	0·33*	—4·01*	2·41*		2·41	0·14			0·68
		(0·07)	(1·56)	(1·06)		(1·64)	(0·10)			
LI		0·20*	—2·08	3·20*		2·11	0·16			
		(0·09)	(1·90)	(1·18)		(1·78)	(0·11)			
TSLS		0·23	—2·57	2·87		2·18	0·15			
Pastoral company advances										
SELS, Y_3 dependent	7·61	0·25*	—1·98		7·26*			3·51*	1·15*	0·91
		(0·09)	(3·90)		(1·71)			(1·08)	(0·25)	
LI	—3·87	0·45*	—1·81		8·86*			3·73*	1·05*	
		(0·14)	(4·31)		(2·02)			(1·20)	(0·28)	
TSLS	2·17	0·34	—1·90		8·02			3·61	1·10	

* Significant at 5 per cent level. No tests of significance on TSLS.

TABLE 3

Estimates of Supply Elasticities Derived from the Model

Type of advance	Bank advances to wool and wheat growers	Rural interest rate	Wool parity	Dairy parity	L.G.S. ratio
Bank advances to wool and wheat growers					
SELS		0·78	—0·18		0·03
Bank advances to dairy and other farms					
SELS	0·37	—0·46		0·29	0·12
LI	0·22	—0·24		0·31	0·11
TSLS	0·26	—0·29		0·34	0·11
Pastoral-house advances					
SELS	0·35	—0·28	0·20		
LI	0·63	—0·26	0·24		
TSLS	0·47	—0·27	0·22		

about the access to the credit market of dairy and other farmers within the existing institutional framework. This implied lending policy by the trading banks may be rational from the point of view of protecting their depositors and at the same time making the greatest contribution to the balance of payments. Still, it may retard farm consolidation and hinder capital formation and the rate of adoption of new technologies on dairy and other farms.

The interpretation of the interest rate coefficient in the supply of advances by the pastoral companies is difficult. Accepting the estimates given in Table 2 would imply an interest rate elasticity of supply of advances by the pastoral houses of the order of —0·3. However, the coefficient on the interest rate variable is not significant so that interest rate changes may not be strong determinants of the level of advances by the pastoral companies.[10] This interpretation would be consistent with the argument that, in contrast to the trading banks, the pastoral firms do not exist primarily for the purpose of lending and are less sensitive to interest rate changes.

The urging of restraint in lending by the central bank does not appear to have resulted in a reduction of outstanding advances to either wool and wheat growers or to dairy and other farmers. The results in Table 2 suggest that when credit restraint is being urged ($Z_2 = 1$), advances to wool and wheat growers have gone up by about £6m., while advances to dairy and other farmers have gone up by about £2·5m. to £3m. This may indicate that there are extensive unused overdraft limits in these sectors—a pipeline effect—or the response may need to be lagged more than six months. Certainly there is nothing in these results to indicate that qualitative controls embodied in requests for restraint in lending have caused a cutback in the short run in the level of rural advances by

[10] Time and the rural interest rate were highly correlated ($r = 0·96$) so that despite the goodness of fit in equation 3, the coefficient on the interest rate variable is not well determined.

the trading banks. Rather, such qualitative controls seem to be one of the best short-term ways available for stimulating rural investment!

Table 2 indicates that as the wool parity index increases by 10 per cent, outstanding advances to wool and wheat growers fall by about £0·9m. and that the associated elasticity of supply is —0·18. At first these results appear odd in that one would expect *a priori* that the banks would be more willing to lend when wool was increasing in profitability. The negative coefficient might suggest, however, that banks require reductions in overdrafts as wool-growing becomes more profitable.

Lending by the pastoral houses is positively related to the profitability of wool growing, a 10 per cent improvement in the wool parity index being associated with an increase of about £0·7m. to £0·9m. in pastoral-company advances. The associated elasticity of supply is about 0·2 to 0·25. This result is consistent with the lending policy of the pastoral firms where the preferred type of loan is short term with wool in store as collateral.

The banks are apparently more willing to lend to dairy farmers when the profitability of dairying increases, Table 2 indicating that a 10 per cent increase in the dairy parity index is associated with an increase of about £0·015m. in outstanding advances. The dairy parity elasticity of supply of bank advances to dairy and other farmers is about 0·3, but the regression coefficient is not significant at usually accepted levels. There is no suggestion in Table 2 of an inverse relationship between the level of advances to wool and wheat growers and the level of advances to dairy and other farmers. As outstanding advances to wool and wheat growers have increased by £1m., advances to dairy and other farmers have also increased by about £0·2m. to £0·3m. The elasticity of supply of bank advances to dairy farmers with respect to the level of advances to wool growers is from 0·2 to 0·4. These results do not support the proposition that the trading banks have reduced advances to dairy and other farmers as they increased advances to wool and wheat growers.

Similarly there is no suggestion in Table 2 of an inverse relationship between bank advances to wool and wheat growers and pastoral-company advances. As bank advances outstanding to wool and wheat growers have increased by £1m., outstanding advances by the pastoral firms have gone up by about £0·25m. to £0·45m. The elasticity of supply of pastoral-company advances with respect to the level of trading bank advances to wool and wheat growers is around 0·4 to 0·6. These results provide no evidence that as banks increased their advances to wool and wheat growers the level of advances by the pastoral companies declined.

Improvements in bank liquidity as measured by the L.G.S. ratio do not appear to have had a significant impact on outstanding advances to either wool and wheat growers or to dairy and other farmers. However, the elasticity of supply of bank advances to dairy farmers with respect to the L.G.S. ratio is about 0·11 as against the comparable elasticity of 0·03 for bank advances to wool and wheat growers. It might be suggested that dairy farmers are better able to borrow when bank liquidity improves, but for neither type of agriculture is the coefficient on the L.G.S. ratio significant at usually accepted levels. However, being positive, the coefficient of the L.G.S. ratio is at least in line with the argument that banks are more willing to lend when their liquidity improves.

Concluding Comments

This study, directed at short-term changes in the volume of outstanding rural advances by the trading banks and pastoral companies, represents a start on understanding the structure of the rural credit market. Because of data limitations we have used the stock of debt outstanding at a point of time as our concept of credit, but for some policy purposes the volume of new loans completed—a gross flow concept—may be more relevant. For other policy purposes the volume of loans less repayments—a net flow concept—may be more pertinent. We have not distinguished between advances for long-term purposes and advances for intermediate and short-term objectives.

Although we have disaggregated by types of agriculture and by the two types of lending institutions, further disaggregation in terms of the purposes for which loans are made would throw more light on the factors affecting the supply of loanable funds for particular purposes. For example, has bank lending tended to move more into the short-term and intermediate field at the expense of long-term lending for property purchase and development? To what extent has the substantial increase in pastoral company lending been a substitution of what were intended to be short-term loans for any short fall in bank lending for development purposes? To answer these sorts of questions would require a more detailed analysis of the components of the rural credit market, and this in turn would entail a greater degree of disaggregation and an improvement in the data position.

APPENDIX
Data Series

Period ended June or December		Deflated advances: Banks to dairy and other	Deflated advances: Banks to wool and wheat	Deflated advances: Pastoral companies	Rural interest rate	Credit squeeze dummy	Wool parity ratio	Dairy parity ratio	L.G.S. ratio	Seasonal dummy	Time
June = I		£m.	£m.	£m.	%	0, 1	Base = 1	Base = 100	% by 0·1	June = 0	
1948	II	47·72	52·73	20·75	4·5	1	1·19	101	2·30	1	1
1949	I	48·30	49·37	18·75	4·5	1	1·12	102	2·16	0	2
1949	II	48·71	44·82	29·31	4·5	1	1·23	101	2·40	1	3
1950	I	49·76	45·24	26·61	4·5	1	1·54	99	2·26	0	4
1950	II	48·10	38·68	38·68	4·5	1	2·43	95	2·14	1	5
1951	I	44·14	35·54	32·48	4·5	1	2·68	91	2·17	0	6
1951	II	40·45	32·84	28·49	4·5	1	1·17	96	1·82	1	7
1952	I	41·89	35·89	26·48	4·5	0	0·95	103	1·80	0	8
1952	II	39·21	37·56	25·92	5·0	0	1·10	106	2·61	1	9
1953	I	41·90	36·56	24·86	5·0	0	1·16	107	3·21	0	10
1953	II	45·97	40·73	29·84	5·0	0	1·15	106	2·67	1	11
1954	I	52·00	49·21	28·94	5·0	1	1·07	106	2·65	0	12
1954	II	53·04	57·22	35·60	5·0	1	0·99	103	2·05	1	13
1955	I	53·81	60·05	34·02	5·0	1	0·94	102	2·26	0	14
1955	II	48·54	58·73	38·88	5·0	1	0·77	98	1·92	1	15
1956	I	47·92	57·52	36·78	5·5	1	0·83	97	2·23	0	16
1956	II	43·46	52·21	42·01	5·5	1	0·96	90	2·10	1	17
1957	I	44·12	50·66	37·96	5·5	1	1·01	91	2·35	0	18
1957	II	43·13	50·51	41·68	5·5	0	0·85	91	2·14	1	19
1958	I	46·34	60·60	43·00	5·5	0	0·67	91	2·34	0	20
1958	II	44·53	63·64	45·70	5·5	0	0·57	94	2·15	1	21
1959	I	45·00	62·28	42·66	5·5	0	0·62	93	2·62	0	22
1959	II	43·68	58·94	44·33	5·5	1	0·71	91	2·36	1	23
1960	I	46·53	60·13	45·90	5·5	1	0·65	90	2·26	0	24
1960	II	43·14	57·87	51·81	6·0	1	0·56	89	1·81	1	25
1961	I	42·32	56·06	46·46	6·0	1	0·62	89	1·93	0	26
1961	II	41·40	53·49	46·28	6·0	0	0·62	86	2·47	1	27
1962	I	45·48	58·69	45·21	6·0	0	0·62	87	2·79	0	28
1962	II	45·41	56·58	46·36	6·0	0	0·62	87	2·41	1	29
1963	I	43·23	59·14	46·08	6·0	0	0·71	87	2·60	0	30