THE COST-PRICE SQUEEZE ON AUSTRALIAN FARM INCOME

T. E. GLAU*

University of Sydney

Relative price movements for major agricultural commodity groups are reviewed. Estimates of the movement in real farm income per farmer are presented for Australian agriculture over the period 1949 to 1969, and for the sheep industry for the period 1953 to 1967. Increased productivity has offset the adverse price movements experienced by farmers over the period examined. The effect of the cost-price squeeze on farm investment and adjustment is discussed. The continuing cost-price squeeze has not prevented sustained investment by farmers.

Australian agriculture has faced a cost-price squeeze for the past twenty years. Increased productivity in agriculture has, to a large extent, offset the adverse price movements experienced by farmers. The purpose of this paper is to bring together the available information from which relative movements in real farm income for Australian agriculture as a whole and for the sheep industry, the major industry in this sector, can be assessed. The evidence available for the rural industries in aggregate for the period 1949 to 1969 suggests that: (1) average real farm income has recovered from the depressed levels of the late 'fifties; (2) farmers have not shared in the growth in gross national product per head, despite the importance placed by the Government on the role of agricultural export earnings in achieving this growth; and (3) a high level of farm investment has been possible. Maintenance of farm income by sustained net investment, however, implies that returns to capital have declined. For the sheep industry similar conclusions may be drawn for the period 1953 to 1967, except for the pastoral zone, where limited production alternatives, limited investment opportunities, adverse seasonal conditions and the cost-price squeeze have led to a substantial reduction in the level of farm income.

Price Trends

The classic symptoms of a cost-price squeeze have been evident in Australian agriculture for the past twenty years: rising input prices and static or falling commodity prices. The primary indicators of relative price movements for agricultural commodities in Australia are the

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various indices of prices received to prices paid, published by the Bureau of Agricultural Economics (BAE). Gruen and O'Donohue and Cox have discussed the use of these indices as a measure of the cost-price situation.[1] They are published quarterly and annually for all major agricultural commodities and for a 'typical' aggregate of all farm commodities.[2]

The terms of trade, as measured by these indices, have generally moved against the Australian farmer for most of the last two decades. In the immediate post World War II period the prices received for farm commodities rose rapidly and the index of prices received to prices paid for all commodities reached a peak during the wool boom of 1950-51. In 1950-51 the index stood at 150 as compared with a base value of 100 for the average of the five years ended 30 June, 1950.

TABLE 1

Rates of Change in Indices of Prices Received to Prices Paid for Selected Commodities

Indices	Annual Rate of Change %	Period
All products	—1·9	1952-1969
All products excluding wool	—1·1	1948-1969
Wool	—4·3	1952-1969
All meats	0·6	1952-1969
Dairy products	—1·9	1952-1969
Wheat	—1·9	1952-1969

Source: Calculated from the Bureau of Agricultural Economics indices published in the *Quarterly Review of Agricultural Economics* (various issues).

Table 1 summarizes the annual rate of change in the relative price indices for selected commodity groups. Since 1952, the all-commodities price ratio index has fallen at an annual rate of 1·9 per cent.[3] Currently the ratio of prices received to prices paid is some 30 per cent below its value for the base period 1945-50. Wool is the major commodity in the all-commodities index. The relative price index for wool has suffered the greatest price erosion over the past 18 years, falling at an annual rate of 4·3 per cent. In the current wool selling season the average price of wool for the six months ended 31 December 1969, has fallen by 14 per cent as compared with the average for the same period in 1968, while cost inflation has continued. This recent price change is not included in the above calculations of the annual rate of change. The price ratio index for all commodities excluding wool reached a peak in 1948 and has declined since then at an annual rate

[1] F. H. Gruen, 'Australian Agriculture and the Cost-Price Squeeze', in *The Australian Economy*, ed. by H. W. Arndt and W. M. Corden (Melbourne: Cheshire, 1963), pp. 320-49; R. F. O'Donohue and A. E. Cox, 'The Measurement and Interpretation of Trends in the Cost-Price Situation of the Farm Sector', *Quarterly Review of Agricultural Economics*, XIV (April, 1961), 88-100.

[2] For details of the construction of these indices see O'Donohue and Cox, *op. cit.*, and E. A. Saxon, 'The Measurement of Movement in Prices Received and Paid by Primary Producers', *Quarterly Review of Agricultural Economics*, VII (July, 1954), 107-14. For a discussion of their limitations see Gruen, *op. cit.*

[3] Exponential trend rates estimated by regression.

of 1·1 per cent. Of the four major commodity groups—wool, wheat, dairy products, and all meats—adverse price movements have been experienced by wool, wheat and dairy products. The prices received to prices paid indices for wheat and dairy products have declined by 1·9 per cent per annum. Only the price ratios of meat have increased over this period; the average annual rate of increase has been 0·6 per cent. This trend is not as well determined as the trends for the other commodities due to large swings in the ratio over the period in question.

Income Trends

Trends in relative prices of inputs and products in themselves do not indicate what has happened to net farm income. Changes in net farm income will depend on the economic efficiency of primary producers and their ability to adjust to changing market realities, as well as price movements. A good estimate of net farm income is perhaps one of the more difficult series to obtain. At the aggregate level, the most comprehensive source of information on net farm income is published by the Bureau of Census and Statistics in the *Australian National Accounts: National Income and Expenditure* (ANA).

The ANA estimate of net farm income is the residual between independent estimates of the gross value of farm production and of the total costs incurred by farmers. Included in the estimate of total costs is depreciation based on taxation allowances. Thus, total costs include a special initial depreciation allowance of 40 per cent for 1949-50 and 1950-51, and special depreciation at 20 per cent per annum for five years since 1 July 1951. Depreciation at accelerated rates will overstate costs in periods of net investment and understate them in periods of net disinvestment. During periods of zero net investment, accelerated depreciation will be approximately equal to 'normal' depreciation. For the period examined, the ANA over-estimate depreciation by virtue of the use of tax-based estimates of depreciation.

Depreciation allowances for tax purposes bear little resemblance to the annual consumption of durable assets employed in agriculture. Estimates of depreciation have been made on the basis of historical costs and various assumptions detailed in Appendix A. Estimated depreciation has been used to adjust the ANA estimates of net farm income as shown in Table 2. A further adjustment is made for tax liability to obtain net farm income after tax. Tax liability is assigned to the year of income and does not reflect the timing of tax payments made by primary producers under provisional taxation. Net farm income after tax (line 6, Table 2) reflects the returns to farmers for their labour, management and capital.

The ability of farmers to finance the adjustments indicated by changing market conditions will depend primarily on the availability of internal funds. Net spending power after tax will depend on the timing of tax payments. Australian primary producers are subject to provisional taxation as a part of the pay-as-you-earn tax scheme. Estimates of the timing of tax payments are given in line 7 of Table 2. Details of the estimation are discussed in Appendix B. Estimates of net spending power after tax are given in line 8 of Table 2.

Farmers, as well as other self-employed individuals, must provide

TABLE 2

Estimates of Aggregate Australian Farm Income: 1948–49 to 1968–69
(millions of dollars)

Line No.	Item	1948 –49	1949 –50	1950 –51	1951 –52	1952 –53	1953 –54	1954 –55	1955 –56	1956 –57	1957 –58	1958 –59	1959 –60	1960 –61	1961 –62	1962 –63	1963 –64	1964 –65	1965 –66	1966 –67	1967 –68	1968 –69
	Australian National Accounts Based Estimates																					
1.	Farm income	606	865	1480	888	1115	968	858	892	1055	697	932	958	977	914	1095	1373	1272	1048	1332	785	1181
2.	Taxation depreciation	57	105	133	109	143	184	216	244	242	262	283	290	300	308	315	357	378	381	420	445	484[a]
3.	Straight-line depreciation	43	53	69	87	103	122	141	157	170	179	195	205	220	232	249	277	300	317	343	361	378
4.	Adjusted farm income	620	917	1544	910	1155	1030	933	979	1127	780	1020	1043	1057	990	1161	1453	1350	1112	1409	869	1287
5.	Tax liability	88	122	353	201	211	168	126	113	161	82	85	100	108	98	129	188	150	134	158	94[a]	130[a]
6.	Net income after tax	532	795	1191	709	944	862	807	866	966	698	935	943	949	892	1032	1265	1200	978	1251	775	1157
7.	Tax paid (provisional taxation)	90	106	375	213	201	177	126	113	113	130	82	87	115	107	98	161	209	134	134	117	94
8.	Net spending power after tax	573	864	1238	784	1057	975	948	1023	1184	829	1133	1161	1162	1115	1312	1569	1441	1295	1618	1113	1571
9.	Gross fixed capital expenditure	126	182	255	301	257	299	304	303	317	322	325	347	369	344	393	513	514	465	558	n.a.	n.a.
10.	Change in rural indebtedness	−5	71	48	103	42	14	109	60	−73	101	80	60	27	12	130	−16	262	44	373	n.a.	n.a.
11.	Apparent consumption	442	753	1031	586	842	690	753	780	794	608	888	874	820	783	1049	1040	1189	874	1433	n.a.	n.a.
	Taxation Statistics Based Estimates																					
12.	Actual income	n.a.	n.a.	n.a.	n.a.	896	835	783	760	921	615	712	828	880	852	1010	1260	1069	970	1133	n.a.	n.a.
13.	Adjusted actual income after tax	n.a.	n.a.	n.a.	n.a.	725	729	732	734	832	616	715	813	852	830	947	1152	997	900	1052	n.a.	n.a.

[a] Author's estimates.

Sources: Lines 1, 2, and 9. *Australian National Accounts: National Income and Expenditure;*
Line 3. See Appendix I;
Line 4 = line 1 + line 2 − line 3;
Lines 5 and 12. *Reports of the Commissioner of Taxation;*
Line 6 = line 4 − line 5;
Line 7. See Appendix II;
Line 8 = line 1 + line 2 − line 7;
Line 10. Reserve Bank of Australia, *Statistical Bulletin;*
Line 11 = line 8 − line 9 + line 10; and
Line 13 = line 12 + line 2 − line 3 − line 5.

capital for net investment if they are to increase their labour productivity by the adoption of new technology, by capital intensification, or by expanding farm size. For this reason net farm income after tax or net spending power may be poor indicators of changes in the standard of living of farmers. In an attempt to measure changes in the standard of living an estimate of apparent consumption has been made. Apparent consumption, as used in this paper, is net spending power plus changes in farm indebtedness less farm investment. The Commonwealth Statistician provides estimates of 'Gross Fixed Capital Expenditure' in primary production up to 1967 (see line 9, Table 2).[4] This estimate excludes land purchases. Land purchases are treated as transfers within the agricultural sector. The Reserve Bank of Australia publishes estimates of total rural indebtedness from institutional sources since 1948. From this series, changes in rural indebtedness have been estimated (see line 10, Table 2). No allowance has been made for non-institutional indebtedness which could amount to 50 per cent of total indebtedness.[5] Apparent consumption (line 11, Table 2) as defined here includes expenditures on non-farm investments, savings, purchases of land, durable and non-durable consumption goods and interest on undefined debts. These estimates must be used with caution as they may compound the deficiencies of the constituent parts.

A rough, independent check on the ANA estimates can be obtained from the annual reports of the Commissioner of Taxation. Since 1953 the Commissioner has published the *actual income* of individuals classified as primary producers. Actual income, as defined by the Commissioner, corresponds to the unadjusted estimate of net farm income in Table 2 which comes from the ANA statistics. It includes tax depreciation as a cost in deriving actual income. There are several deficiencies in any estimate based on taxation data. (1) Actual income is recorded only for those individuals whose taxable income is greater than the exemption level, currently equal to $412. Primary producers are granted several concessional allowances which make it possible for taxable income to be less than $412, when their actual income in substantially above this amount. The actual income of these taxpayers is not included in the tabulation of actual income. (2) The widespread and increasing use of family partnerships as a method of income splitting will cause a downward bias over time in estimates of the average actual incomes of primary producers. Income splitting will lead to a larger number of individuals having an actual income above $412 and a taxable income below this amount. (3) Primary production lends itself, in many

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[4] The estimate of gross fixed capital expenditure in primary production contained in the ANA is derived primarily from taxation statistics. It seems likely that this estimate understates the true level of agricultural investment. The statistician's estimate includes capital expenditure which is fully deductible from assessable income under Sections 75 and 76 of the Income Tax Assessment Act. It is often difficult to distinguish between current and capital expenditure on labour and fertilizer and many farmers may be including capital expenditures in their current expenses. The labour component of gross capital formation in farm development work may be considerable in relation to the capital outlay. For purchased capital inputs other than labour and fertilizer, it seems that the ANA estimate of capital expenditure is reasonably accurate.

[5] Survey work carried out by the Bureau of Agricultural Economics indicates that non-institutional indebtedness may be approximately 50 per cent of rural indebtedness.

TABLE 3

Estimates of Australian Farm Income per Farmer: 1948–49 to 1968–69

(dollars)

Line No.	Item	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69
	Australian National Accounts Based Estimates																					
1.	Net income after tax	2375	3568	5298	3168	4124	3769	3533	3715	4171	3052	4115	4180	4235	4007	4668	5750	5472	4499	5710	3616	5399
2.	Real net income after tax	2262	3076	4075	1992	2343	2082	1931	1945	2075	1503	2007	1990	1934	1813	2112	2578	2379	1882	2321	1424	2069
3.	Index of line 2[a]	102	139	184	90	106	94	87	88	94	68	91	90	87	82	96	117	108	85	105	64	94
4.	Net spending power	2558	3878	5507	3503	4618	4263	4151	4389	5112	3625	4987	5146	5185	5009	5934	7132	6571	5957	7385	5194	7331
5.	Real net spending power	2436	3343	4236	2203	2624	2355	2268	2298	2543	1786	2433	2450	2368	2267	2685	3198	2857	2492	3002	2045	2809
6.	Index of line 5[a]	98	134	170	89	105	95	91	92	102	72	99	99	95	91	108	129	115	100	121	82	113
7.	Apparent consumption	1973	3380	4586	2618	3678	3293	3297	3346	3428	2659	3908	3874	3659	3518	4744	5427	4020	6540	n.a.	n.a.	n.a.
8.	Real apparent consumption	1879	2914	3528	1647	2090	1819	1802	1752	1705	1310	1906	1845	1671	1592	2147	2360	1682	2659	n.a.	n.a.	n.a.
9.	Index of line 8[a]	96	149	181	84	107	93	92	90	87	67	98	95	86	82	110	121	86	136	n.a.	n.a.	n.a.
	Taxation Statistics Based Estimates																					
10.	Net income after tax	n.a.	n.a.	n.a.	n.a.	2553	2564	2534	2570	2916	2517	2676	2988	3053	3030	3356	4094	3781	3617	4049	n.a.	n.a.
11.	Real net income after tax	n.a.	n.a.	n.a.	n.a.	1451	1417	1385	1346	1451	1240	1305	1423	1394	1371	1518	1836	1644	1514	1646	n.a.	n.a.
12.	Index of line 11[a]	n.a.	n.a.	n.a.	n.a.	101	99	97	94	101	87	91	99	97	96	106	128	115	106	115	n.a.	n.a.

[a] Base: 2 years ending 30 June 1954 = 100.

instances, to the actual evasion of taxes.[6] How prevalent this is in Australia is not known. (4) Provisions for the unlimited carrying forward of losses by primary producers will lead to a shifting of actual income between years. (5) The data are published by the Commissioner before all assessments are issued. The main tabulation is made by the Commissioner 15 months after the completion of the income year. The proportion of late assessments has varied, but with the advent of modern data processing the proportion of late assessments has been declining in recent years. This should lead to an upwards bias in actual income over the period considered.

Actual income was adjusted for estimated depreciation and tax liability to obtain an estimate of adjusted actual income after tax (see line 13, Table 2). This estimate provides a rough check on the adjusted ANA estimates of net farm income after tax.

The ANA based aggregate figures of Table 2 have been converted to estimates of net income per farmer after tax, net spending power after tax and apparent consumption (see Table 3, lines 1, 4, and 7 respectively). The number of farmers was obtained from the annual agricultural census. One of the problems associated with using this series is that it is not continuous. In 1958 a change in administrative procedures resulted in a significant drop in the number of 'male owners, operators, lessees and share-farmers'. The two segments of this series were joined by applying a constant adjustment to the early years equal to the difference between 1958 and estimated 1959 less the average rate of change from 1961 to 1968. The early series was adjusted to the latter, as it was believed that the latter provides a better estimate of the number of active farmers.

Estimates of actual income per taxpayer using taxation data have been made by Hoffman and Hume, Slattery, and Wells and Bates.[7] Wells and Bates adjusted the estimates of actual income per taxpayer to account for the rapid increase in the number of females involved in partnerships since 1953. My estimates of farm income from taxation data have been adjusted in a similar manner.

The series for net income after tax, net spending power and apparent consumption derived from ANA data and the net income after tax series derived from the tax data were deflated using the BAE's living expenses index. This index has a base of 100 for the average of the five years ended 30 June, 1950. Indices were constructed for each series using the average of the two years ending 30 June, 1954, as equal to 100.[8] See Table 3.

The estimates of net farm income after tax from taxation data are consistently below those estimated from the ANA data. Both series

[6] W. O. Gardner, 'Sources of Farm Income Underreporting: Gross Receipts or Deductions?' *National Tax Journal*, XII (December, 1959), 374-76.

[7] E. S. Hoffman and J. R. Hume, 'Farm and Non-Farm Incomes in Australia', *Quarterly Review of Agricultural Economics*, XVIII (July, 1965), 121-35; M. Slattery, 'Relative Incomes of Farmers: Some International Comparisons', *Quarterly Review of Agricultural Economics*, XIX (July, 1966), 115-27; J. M. Wells and W. R. Bates, 'A Note on Some Implications of Family Partnership Formation for Farm Income Comparisons', *Quarterly Review of Agricultural Economics*, XXII (July, 1969), 140-46.

[8] The years 1952-53 to 1953-54 were selected as a base to facilitate comparisons of movements in the aggregate estimates of farm income and the sheep industry estimates described below.

exhibit much the same behaviour over the time period considered. The estimates from the ANA data are preferred in the light of the deficiencies of the taxation data. The estimates from tax data, however, reinforce the ANA estimates of relative movements over time.

. Figure 1 illustrates movements in estimated real income after tax and real net spending power per farmer. For the three years ending June, 1961, the real income per farmer had fallen by approximately 10 per cent below its level in the base period 1952-53 to 1953-54.[9] The drought of 1957 led to a major drop of 32 per cent in farm incomes. Average real farm income has been above the levels of the base period for 1964, 1965 and 1967. The average for the three financial years 1965, 1967 and 1969 (thus excluding the drought years 1966 and 1968) is approximately 2 per cent higher than the average for 1953 to 1954. For the four years ending 1969, the real net spending power of farmers averaged some 7 per cent above the base period.
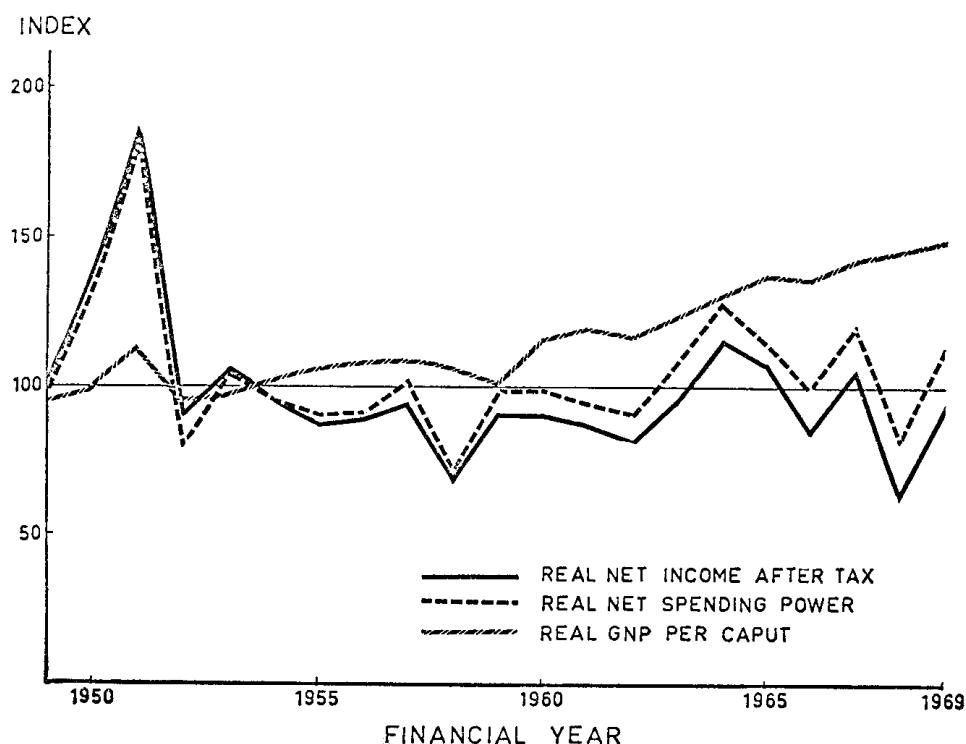

FIG. 1—Estimated movements in real net income after tax and real net spending power per farmer compared with movements in real GNP per caput. (Base: 1952-53 to 1953-54 = 100.)

At the aggregate level, the cost-price squeeze on farm incomes has been overcome, except for periods of drought. This does not imply, however, that the full equity problem of farm incomes has been overcome. Since the early 'fifties successive governments have stressed the

[9] It should not be inferred that the income levels of 1952-53 to 1953-54 form a parity base which 'ought to be' maintained. Rather, this paper is concerned with describing the relative movements in farm income which have occurred over the past 20 years.

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importance of export earnings from the agricultural sector to aid the general economic growth of Australia. The primary producer has been exhorted and, in some instances, assisted to expand the level of agricultural production. Real investment by primary producers has been substantial over this period (see line 9, Table 2). The rate of growth in real gross national product per caput has been 2·8 per cent per annum since 1953, and it is currently 48 per cent higher than in 1953. If the importance of export earnings in economic growth is accepted, it would appear that the agricultural sector—with an approximate 2 per cent increase in real income—has not gained a proportionate share of the real national growth. The trend in real gross national product per caput is also shown in Figure 1.

Trends in aggregate farm income may be misleading. Analysis at the aggregate level disregards two important points. Firstly, income trends in individual industries within the agricultural sector may be moving in opposite directions. I would expect this to be especially true if comparisons over time were possible between the wheat and the dairy industries. Both of these industries have experienced similarly adverse price trends, but the wheat industry has witnessed a tremendous expansion in production in recent years, while dairying seems to be in the doldrums.[10] Secondly, the aggregate estimate does not indicate what is happening to the distribution of farm income. Are the gains in net farm income being realized by the large or small farmer? The distribution of farm income appears to be an area for fruitful research.[11]

In the sheep industry it is possible to make income comparisons over a number of years. Since 1953 the Bureau of Agricultural Economics has carried out a continuing survey of the sheep industry, and the results of these surveys have been published at various times. The sheep industry survey covers all states of Australia and is stratified into three zones: the pastoral zone containing the arid regions; the wheat-sheep zone containing the arable regions; and the high rainfall zone consisting of the coastal regions with greater than 40 inches of rainfall. To be included in the sheep industry survey, a property must carry more than 200 head of sheep.[12]

Net farm income, as defined in the sheep industry survey, makes no allowance for a normal return to capital or operator's labour. Depreciation is calculated at straight line rates. The average net farm income for the three zones has been deflated by the BAE living expenses index. Table 4 presents the average real net farm income per property for the the period 1953 to 1967. Estimates of gross real spending power per property in the sheep industry were obtained by adjustment for depreciation (see Table 5). It was not possible to make an adjustment for tax paid from the survey data. To place the sheep industry survey estimates of net farm income on a comparable basis with my aggregate estimates, they have been converted to index form using the average

[10] Expansion in the Australian wheat industry has been so rapid that, in 1969, delivery quotas were enacted to restrict wheat production.

[11] For a discussion on the possible extent of the 'low income' problem in Australian agriculture see D. H. McKay, 'The Small-Farm Problem in Australia', *Australian Journal of Agricultural Economics*, XI (December, 1967), 115-32.

[12] For a comprehensive description of the sheep industry survey see *The Australian Sheep Industry Survey 1964-65 to 1966-67*, Bureau of Agricutural Economics, Canberra, 1969.

TABLE 4

Mean Real Net Farm Income per Property in the
Sheep Industry[a]
(dollars)

Year ending 30 June	High Rainfall Zone	Wheat–Sheep Zone	Pastoral Zone
1953	3,198	4,023	12,820
1954	2,724	3,387	11,215
1955	2,275	2,863	9,123
1956	2,170	2,871	10,386
1957	3,637	3,670	12,867
1958[b]	1,499	1,316	2,669
1959	1,035	2,029	3,943
1960	1,803	2,217	6,219
1961	1,671	2,648	4,557
1962	1,647	2,570	5,055
1963	2,175	3,222	6,782
1964	3,309	3,344	9,997
1965	2,404	3,477	3,180
1966	2,433	2,149	—1,390
1967	2,753	3,724	4,370

[a] Deflated by the BAE living expenses index (base: average 5 years ended 30 June, 1950 = 100).
[b] A change in survey design and sample size for the years subsequent to 1957 led to a slight discontinuity in these series. No adjustment has been made for this.

Source: Bureau of Agricultural Economics, Canberra.

TABLE 5

Estimated Real Gross Spending Power per Property
in the Sheep Industry[a]
(dollars)

Year ending 30 June	High Rainfall Zone	Wheat–Sheep Zone	Pastoral Zone
1953	3,681	4,609	13,622
1954	3,204	3,980	12,138
1955	2,798	3,510	10,101
1956	2,690	3,545	11,376
1957	4,146	4,362	13,872
1958[b]	1,965	2,306	3,718
1959	1,519	2,745	4,914
1960	2,328	2,929	6,994
1961	2,150	3,309	5,858
1962	2,124	3,276	6,352
1963	2,665	3,956	8,065
1964	3,814	4,120	11,313
1965	2,960	4,288	4,436
1966	2,986	2,985	—122
1967	3,311	4,552	5,669

[a] Deflated by the BAE living expenses index (base: average 5 years ended 30 June, 1950 = 100).
[b] A change in survey design and sample size for the years subsequent to 1957 led to a slight discontinuity in these series. No adjustment has been made for this.

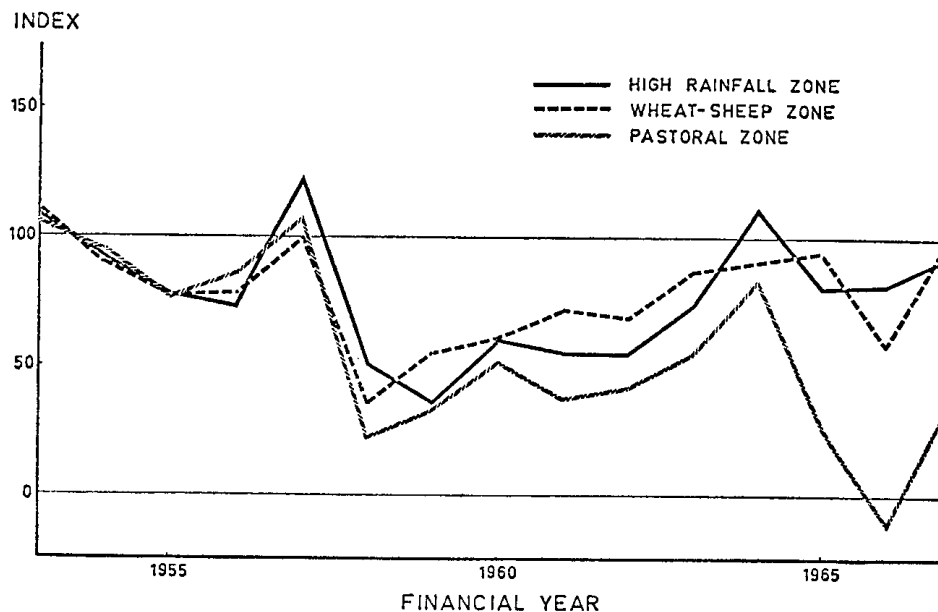Source: Bureau of Agricultural Economics, Canberra.

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FIG. 2—Estimated movements in real net farm income per farm for the sheep industry. (Base: 1952-53 to 1953-54 = 100.)

of the two years ending 30 June, 1954, as a base equal to 100. Figure 2 illustrates the movements in estimated net farm income.

Figure 2 indicates that the sheep industry has not fully adjusted to the cost-price squeeze. Net farm incomes have increased since the late 'fifties in the high rainfall and wheat-sheep zones, but there was a substantial fall in farm income from 1953 until the drought of 1957 which has not been wholly offset. For the pastoral zone, net farm income rose from the low of the 1957 drought until 1964 when it reached 80 per cent of its level during the base period. The pastoral zone was badly hit by the drought of 1965-66, when it reached the lowest level recorded by the survey. While there was a recovery in 1967, this was followed by another drought. From the aggregate estimates of real income for 1968, it is expected that net farm incomes in the pastoral zone will again decline. This succession of bad years may well have prejudiced the ability of graziers in the pastoral zone to survive a continuing cost-price squeeze. The villain in this case is seasonal variability, but the cost-price squeeze is sapping the vigour and ability of graziers in the pastoral zone to resist adverse seasonal conditions.

Growth and Adjustment

Growth of output is the primary method whereby the individual farmer can overcome the reduced profit margins in a cost-price squeeze. It provides the individual farmer with a solution to the cost-price squeeze only if his average labour productivity increases. In theory, the primary producer has several options. He may respond to changing product price ratios by product substitution, to changing factor prices by altering the combination of inputs. He may increase his size of operation to

obtain economies of size, or he may realize a shift in the production possibilities curve due to the adoption of technological progress.

In practice, the range of options facing an individual primary producer is truncated by physical and financial limitations. Of particular interest is the effect of the cost-price squeeze on the ability of primary producers to finance the adjustments indicated by changing price ratios and improved technology.

Table 6 summarizes the growth in the agricultural sector over the last 21 years. The quantum of agricultural goods produced has increased by 91 per cent. The use of non-labour inputs has increased substantially over this period. The area of agricultural crop land has increased by 86 per cent. The area of sown pasture and the quantity of fertilizer used have increased by 360 and 578 per cent respectively. The number of farmers, on the other other hand, has declined by approximately 5 per cent.

TABLE 6

Measures of Growth in Australian Agriculture

Item	Per Cent Change	Period
Physical Indicators		
Quantum of output	91	1949 to 1969
Area under crop	86	1949 to 1969
Quantity of fertilizer applied	578	1947 to 1967
Area of sown pastures		
Number of farmers	—5	1949 to 1969
Financial Indicators		
(In constant dollars)		
Value of output	20	1949 to 1969
Total costs	74	1949 to 1969
Total costs excluding depreciation	64	1949 to 1969
Aggregate farm income	—16	1949 to 1969
Average farm income	—5	1949 to 1969

The growth in physical output and in the use of inputs is translated into financial terms by using constant real prices (see Table 6). The value of output has increased by 20 per cent while total costs have increased by 70 per cent. Total costs excluding depreciation have increased by 64 per cent. The result has been a 16 per cent decline in aggregate real farm income. The gradual decline in the number of farmers has offset a portion of this decline in the estimates of real net income per farmer. Since 1949 avereage real net farm income has declined by approximately 5 per cent. During the last 21 years increases in agricultural labour productivity has largely offset the effects of the cost-price squeeze on average farm income. For the current fiscal year, 1969-70, with a 14 per cent decline in the price of wool, it seems inevitable that farm income will be severely depressed.

Internal liquidity has long been held to be the major source of investment funds in Australian agriculture. Thus the major indicator of the ability of farmers to finance adjustments is the estimate of net spending power derived in Tables 2 and 3 and illustrated in Figure 1. Gross fixed capital expenditure has been consistently above estimated straight line depreciation (see Table 2, lines 3 and 9), indicating that net investment has been considerable over the period considered. This

introduces an added dimension of the cost-price squeeze on farm incomes, which cannot be fully examined in this paper. Incomes have been maintained, in part, by capital intensification. It is not sufficient for primary producers to offset adverse price movements by capital intensification if this only serves to keep incomes where they were before. In this case the cost-price squeeze shows up as declining returns to capital or as an erosion in the value of capital stock owned by farmers.

In the sheep industry an increase in total real gross investment can be observed except for the pastoral zone (see Table 7). Comparing the first and last four years of the period, total real gross investment increased by 3·8 per cent in the high rainfall zone and by 14·5 per cent in the wheat-sheep zone, while in the pastoral zone it fell by 19·4 per cent. The components of gross investment have shown different trends.

TABLE 7

Estimated Real Gross Investment Per Property in the Sheep Industry
(dollars)

Year ending 30 June	High Rainfall Zone		Wheat-Sheep Zone		Pastoral Zone	
	Plant[a]	Improv.[b]	Plant[a]	Improv.[b]	Plant[a]	Improv.[b]
1953	362	194	524	225	613	823
1954	699	275	829	303	681	964
1955	470	224	851	264	790	694
1956	528	175	802	233	801	851
1957	665	257	678	249	1131	979
1958[c]	448	280	602	307	1182	1384
1959	324	143	481	199	664	724
1960	370	165	570	232	820	664
1961	335	129	703	199	646	553
1962	358	173	669	185	398	638
1963	398	130	815	277	641	423
1964	519	144	1169	172	920	361
1965	592	256	956	303	1105	518
1966	530	227	624	232	612	414
1967	579	192	890	271	757	325

[a] Deflated by BAE machinery and equipment index (base: average 5 years ended 30 June, 1950 = 100).
[b] Deflated by BAE building materials index (base: average 5 years ended 30 June, 1950 = 100).
[c] A change in survey design and sample size for the years subsequent to 1957 leads to a slight discontinuity in these series.
Source: Bureau of Agricultural Economics, Canberra.

Real gross investment in plant in the three zones has increased while real gross investment in improvements has declined. In the pastoral zone the decline in investment in improvements has been quite severe. From the available data, it is not readily apparent that the cost-price squeeze has been detrimental to the ability of primary producers to accumulate capital to date.

Conclusion

It is hoped that the presentation of trends in prices, net farm income and farm investment will provide a basis for enlightened discussion

of policy measures relating to the cost-price squeeze. In a recent report on the Australian wool-growing industry, the Committee for Economic Development of Australia made far-ranging recommendations for the restructuring of the sheep industry on the premise that 'net earnings have not kept pace with rising costs and the terms of trade have moved against it'.[13] While it is undeniable that the terms of trade have moved against the sheep industry, especially in the current year, the conclusion that farm incomes have not kept pace with rising costs is not supported by the above data, except for the pastoral zone. The pastoral zone contains 9 per cent of the total number of wool growers and 30 per cent of the Australian sheep population. If properties in this zone are to remain economically viable units, some adjustments will be necessary. For the high rainfall and wheat-sheep zones, the need for structural adjustment will depend on the distribution of farm incomes within these regions.

If we accept the traditional definition of a cost-price squeeze, referring only to adverse price movements, then the agricultural sector has been in the grip of a cost-price squeeze for the last two decades. Taking a slightly broader view that something, namely income, must be squeezed by price movements, then the evidence is not so clear. Incomes were squeezed in the mid and late 'fifties. During the 'sixties productivity increases were sufficient to offset the adverse price movements experienced, except for seasonal conditions.

APPENDIX A

Estimates of Farm Depreciation Based on Historical Costs: 1948-49 to 1968-69

The estimate of farm depreciation provided by the ANA is based on depreciation allowed for taxation purposes. In 1948-49 a special initial depreciation allowance of 20 per cent was allowed for purchases of new plant and equipment for all taxpayers. In 1949-50 and 1950-51 this was increased, at the option of the taxpayer, to 40 per cent in the year of purchase. In 1951 special initial depreciation was repealed. Since 1 July, 1951, new plant and equipment and certain structural improvements purchased for use in primary production have been depreciable at 20 per cent per annum for five years. These allowances have been a major part of the Government's policy to encourage primary production and they do not reflect the annual consumption of capital assets.

The debate on what is the appropriate method of determining depreciation has not been satisfactorily concluded, and any estimate of depreciation will contain some arbitrary elements. It is assumed that straightline depreciation over the asset's useful life provides a reasonable approximation of the annual consumption of durable assets used by farmers.

Gruen has esimated the depreciation of farm machinery and structures for the period 1948-49 to 1960-61, based on historial cost data from the ANA.[14] For the period 1951-52 to 1956-57 Sir Arthur Fadden,

[13] Committee for Economic Development of Australia, *The Wool Industry*, P Series No. 9, December, 1969, p. 1.

[14] F. H. Gruen, 'An Estimate of Depreciation of Farm Machinery and Structures Based on Historical Cost', *The Australian Journal of Agricultural Economics*, VII (December, 1963), 180-83.

the Federal Treasurer for that period, estimated that the additional depreciation allowed primary producers by special depreciation was approximately 496 million dollars.[15] Using Gruen's estimates of depreciation for the same period, the additional depreciation allowed amounts to approximately 308 million dollars. The difference between these estimates is substantial. Presumably Fadden, as Treasurer, had access to and utilized data not available to Gruen. Since then the Treasurer has not provided annual estimates of the additional deductions allowed for special depreciation.

Estimates of depreciation for the period 1948-49 to 1968-69 based below which remove two possible biases from Gruen's estimates. First, Gruen did not allow for changes in the composition of gross investment through time. Second, Gruen failed to correct for special initial depreciation allowed on investment in 1948-49.

Estimates of depreciation for the period 1948-49 to 1968-69 based on historical costs were obtained from the following model:

(1)
$$D_t = \sum_{s=1}^{t} \sum_{i=1}^{4} w_{is} d_i I_s + \sum_{i=1}^{4} w_{i1} g_i D_i^*,$$

$$d_i = \begin{cases} 1/L_i \text{ when } (L_i - t + s) > 0 \\ 0 \text{ elsewhere} \end{cases}$$

$$g_i = \begin{cases} \dfrac{(L_i - t - 1)}{L_i} \text{ when } (L_i - t - 1) > 0 \\ 0 \text{ elsewhere}, \end{cases}$$

where D_t is the total straightline depreciation in year t;

w_{is} is the proportion of investment in year s with a useful life of L_i years;

I_s is the adjusted capital expenditure in year s;

L_i is the useful life of the i-th class of asset;

D_i^* is the depreciation in 1948–49 for assets purchased prior to 1948–49; and

$s = 1$ corresponds to 1948–49.

The first expression on the right side of equation (1) is the straight-line depreciation resulting from gross fixed capital expenditure in 1948-49 and subsequent years. The second term is an arbitrary distribution of the depreciation on investment prior to 1948-49.

The essential feature of the first term in equation (1) is that it allows the composition of investment to vary over time. Investment in year s will generate depreciation in any year $t > s$ for each of the i classes of assets, provided the useful life of the i-th class of asset has not been exceeded. When this occurs no further depreciation is allowed.

The major source of information used to estimate the composition of investment was the sheep industry survey. Properties covered by the sheep industry survey account for three-fifths of aggregate investment in agriculture and contain most wheat farms. There is insufficient data to calculate annual estimates of the composition of investment in

[15] Sir Arthur Fadden, 'Taxation Achievements', Speech by the Commonwealth Treasurer (Sir Arthur Fadden) at the Annual Conference of the Australian Country Party, Toowoomba, April 10, 1958.

other industries. It is assumed that the composition of investment for the sheep industry is representatative of all agricultural investment for the period examined. To the extent that this is not true, my estimates of straightline depreciation will be biased.

Over the period 1952-53 to 1966-67 the composition of investment reported for farms included in the sheep industry survey has changed, with an increasing proportion of gross investment in plant and equipment. Estimates of the composition of investment in the sheep industry were made on the basis of data contained in published and mimeographed reports released by the BAE. These estimates are tabulated by rate of depreciation in Table 1A. It was not possible to break down the composition beyond the four rates of depreciation shown. The proportion of gross investment which depreciates 10 per cent per annum has increased from 23 per cent to 36 per cent of total investment, while the proportion of investment in assets depreciating at 3 per cent per annum declined from 30 per cent to 19 per cent of total investment.

The ANA estimate of gross capital expenditure must be adjusted for sales of second-hand plant and equipment. Is is assumed that this represents 15 per cent of gross expenditure, based on data from the sheep industry survey and from taxation data. The adjusted gross investment values used in equation (1) equalled 85 per cent of the gross capital expenditure reported in the ANA.

The arbitrary distribution of depreciation for investment in years prior to 1948-49 was derived in the following manner. Taxation

TABLE 1A

Estimated Composition of Agricultural Investment by Depreciation Allowed under Straightline Guidelines

(expressed as percentages)

Year	Depreciation rate			
	3%	5%	10%	15%
1948-49	30	16	23	31
1949-50	30	16	23	31
1950-51	30	16	23	31
1951-52	30	16	23	31
1952-53	30	16	23	31
1953-54	25	18	29	28
1954-55	24	17	31	28
1955-56	25	16	31	28
1956-57	27	16	28	29
1957-58	28	20	23	29
1958-59	28	10	30	32
1959-60	28	10	30	32
1960-61	20	6	36	38
1961-62	22	7	34	37
1962-63	20	6	36	38
1963-64	14	4	40	42
1964-65	20	7	35	38
1965-66	22	7	34	37
1966-67	19	6	36	39
1967-68	19	6	36	39
1968-69	19	6	36	39

depreciation for 1948-49 included special initial depreciation at the rate of 20 per cent for purchases of plant and equipment. In the early 'fifties investment in plant and equipment in the sheep industry accounted for 60 per cent of total investment. It is assumed that 60 per cent of gross capital expenditure in 1948-49 qualified for special initial depreciation. The value of special initial depreciation is estimated to be 15 million dollars (0·60 × 0·20 × 126 million dollars). Depreciation on non-qualifying investment is estimated at 1·8 million dollars. The balance of 40 million dollars is assumed to represent the depreciation resulting from a constant level of investment in the preceding years.

The estimates of depreciation for the period 1948-49 to 1968-69 are shown in Table 2A. For this 21-year period special depreciation policies increased the ANA estimates by approximately 1,455 million dollars, or a 35 per cent increase over estimated depreciation. This is equivalent to approximately a 7 per cent understatement of net farm income for the period.

TABLE 2A

Estimated Straightline Depreciation

(millions of dollars)

Year	Taxation depreciation	Estimated depreciation
1949	57	43
1950	105	53
1951	133	69
1952	109	87
1953	143	103
1954	184	122
1955	216	141
1956	244	157
1957	242	170
1958	262	179
1959	283	195
1960	290	205
1961	300	220
1962	308	232
1963	315	249
1964	357	277
1965	378	300
1966	381	317
1967	420	343
1968	445	361
1969	484	378
TOTAL 1949 to 1969	5,656	4,201

To check my estimates of straightline depreciation, the additional deductions allowed due to special depreciation for the period 1951-52 to 1956-57 are compared with the estimate by Fadden (see Table 3A). My estimates of depreciation include depreciation on items which were fully deductible for taxation purposes in the year of purchase under Sections 75 and 76 of the Income Tax Assessment Act. Depreciation as estimated by the ANA does not include these allowances. Fadden treats these items separately, and provides the amounts allowed for the

B

TABLE 3A

Estimates of Additional Deductions from Special Depreciation
(millions of dollars)

Year	Author's estimates	Fadden's estimates
1951-52	33	36
1952-53	53	n.a.
1953-54	77	n.a.
1954-55	91	n.a.
1955-56	94	120
1956-57	89	108
TOTAL	437	496

years 1942 to 1957. To obtain an estimate of the additional deductions from special depreciation for 1951-52 to 1956-57 which are comparable with Fadden's estimate, it was necessary to adjust for depreciation allowed expenditures under Sections 75 and 76. In 1951-52 estimated straightline depreciation on this class of capital expenditure amounted to 11·6 million dollars. Additional deductions allowed for special depreciation in Table 3A, are adjusted for depreciation from this source. I estimate the total additional allowance for 1951-52 to 1956-57 to be 437 million dollars as compared with Fadden's estimate of 496 million dollars.

APPENDIX B

Estimated Timing of Tax Payments Under Provisional Taxation: 1948-49 to 1968-69

Australian primary producers pay provisional tax under the pay-as-you-earn tax scheme. In March of each fiscal year, provisional tax is paid equal to the tax liability of the previous year; and a final payment on the previous year's tax liability is made which equals total tax liability less provisional tax paid in the previous year. Since 1952 primary producers have been allowed to alter their provisional tax, if they expect a significant change in taxable income. Self-assessment must be within 20 per cent of the actual tax liability or the primary producer is liable to a fine. Self-assessment works to the advantage of the primary producer when his income falls by allowing him to lower his provisional tax payment. The standard assessment works to his advantage when his income rises, as payment of the additional tax liability is delayed for a year. A significant number of primary producer taxpayers elect self-assessment in each year.[16] To estimate the actual timing of tax payments, it is assumed that primary producers elect self-assessment when it is to their advantage.

16 In assessment year 1965-66, there were 78,694 individuals who reduced their provisional tax assessments by 65·6 million dollars. Approximately one-third of provisional taxpayers are primary producers. In the same year the total tax assessment of primary producers fell by 17·1 million dollars, while total tax assessments for all provisional taxpayers rose by 14·6 million dollars. Changes in assessments are not broken down into classes of taxpayers, but the above figures indicate that a significant number of primary producers do adjust their provisional tax payments when it is in their favour. The number of provisional taxpayers electing to increase their tax assessment is negligible for all years.

TABLE 1B

Calculation of Payment of Tax Assuming Primary Producers Always Elect Self-Assessment when it Operates in Their Favour (thousands of dollars)

Income year ending 30 June	Tax liability	Provisional Tax			Other adjust-ments	Total payments
		Debit	Credit	Final assess-ment		
1947	38,034	32,806				
1948	69,578	38,034	−32,806	38,034		43,262
1949	87,780	69,578	−38,034	69,578		90,588
1950	122,020	87,780	−69,578	87,780		105,982
1951	352,582	122,020	−87,780	122,020	218,800[b]	375,060
1952	200,968	200,968	−122,020	200,968	−218,800[b]	212,730
1953	210,803	200,968	−200,968	200,968		200,968
1954	168,056	168,056	−201,601	210,803		177,258
1955	126,412	126,412	−168,056	168,056		126,412
1956	113,095	113,095	−126,412	126,412		113,095
1957	160,976	113,095	−113,095	113,095		113,095
1958	81,826	81,826	−113,095	160,976		129,707
1959	84,622	81,826	−81,826	81,826		81,826
1960	99,653	84,622	−81,826	84,622		87,418
1961	108,430	99,653	−84,622	99,653		114,684
1962	98,323	98,323	−99,653	108,430		107,100
1963	129,420	98,323	−98,323	98,323		98,323
1964	187,714	129,420	−98,323	129,420		160,517
1965	150,480	150,480	−129,420	187,714		208,774
1966	134,414	134,414	−150,480	150,480		134,414
1967	157,739	134,414	−134,414	134,414		134,414
1968	94,000[a]	94,000	−134,414	157,739		117,325
1969	130,000[a]	94,000	−94,000	94,000		94,000

[a] Author's estimates.
[b] Wool sale deductions from *Thirty-first Report of Commissioner of Taxation*, 1952, p. 76.

An additional adjustment is necessary in 1950-51 and 1951-52 for the 20 per cent wool sales deduction instituted during the wool boom. In 1950-51 an additional payment equal to the reported wool sales deduction was added to provisional tax paid. Estimates of the timing of tax payments are given in Table 1B. The second column is the actual tax liability for each income year which was obtained from the Annual Reports to Parliament of the Commissioner of Taxation. The third column is the provisional tax paid based on the previous year's tax liability, or the current year's tax liability if it is lower. The fourth column is the provisional tax paid in the preceding year which is credited against the total tax liability shown in column 5. The sixth column contains the adjustment for the wool sales deduction in 1950-51 and 1951-52. The final column is the estimated tax paid in each year. For the last two years, I have used my own estimates of tax liability.