Project 14343

ABARE conference
paper 91.6

35th Annual Conference of the
Australian Agricultural Economics Society
University of New England, Armidale, 11–14 February 1991

The Effects on the Macroeconomy of Underwriting

W.P. Males, L.P. O'Mara and J.A. Bakalor

Australian Bureau of Agricultural
and Resource Economics

GPO Box 1563 Canberra 2601

The effect on macroeconomic stability of a more extensive use of price underwriting in Australian agriculture is examined, using a model previously developed to study the macroeconomic influence of fluctuations in farm sector activity. It is concluded that, had an underwriting scheme such as that operating in recent years in the wheat industry also been operative in the other key cropping industries and in the sheep meat and beef industries over the period since the mid-1950s, it would have made little difference to the effects of the farm sector on macroeconomic stability. In some circumstances, however, an underwriting payout might have had an adverse effect on non-farm economic activity.

Introduction

Australia has generally provided a much lower level of assistance to its agricultural industries than have the EC countries, the United States and Japan. Where intervention does occur, it commonly takes the form of price underwriting. The government has recently announced its intention to reduce its own exposure to price underwriting schemes, but to support the voluntary establishment or extension of grower-funded underwriting schemes (Kerin and Cook 1988).

Much of the literature on underwriting to date has been concerned primarily with microeconomic considerations of resource allocation, risk management and income support (see, for example, Industries Assistance Commission 1978; Quiggin 1983). An issue not addressed significantly is the macroeconomic effects of underwriting schemes – in particular, the effects such schemes may have on the degree of short term variability in economic activity. The main purpose of this paper is to examine such effects.

The model employed was originally developed by O'Mara (1987) to investigate the contribution made by the Australian farm sector to annual variations in gross domestic product (GDP). The results suggested that the relative importance of short term variations in the gross value of rural production as a source of short term variability in non-farm GDP may have increased over the period from the early 1950s to the mid-1980s. A second objective of the present exercise, accordingly, is to assess whether this conclusion would still have been reached had more extensive use been made of price underwriting schemes over the period considered by O'Mara (mid-1950s to mid-1980s).

For the purpose of this study, one approach would be to repeat the O'Mara analysis after removing the effects of such underwriting arrangements as existed during the simulation period. Comparison of the two sets of results would give some indication of the significance of those underwriting arrangements in influencing short term economic activity. However, this approach would be complicated by the changes that have occurred in the nature of the underwriting schemes and in their industry coverage. Also, many of the industries which are or have been underwritten are relatively minor. An alternative counterfactual assumption was therefore adopted – namely, that underwriting schemes similar in operation to that currently operating in the wheat industry also existed in a range of broadacre industries (including wheat) over the entire period considered by O'Mara.

No change in price stabilisation arrangements was assumed for the wool industry. That industry has had some form of price stabilisation or underwriting arrangement in operation

since the early 1970s, and the effects of those arrangements on farm incomes and the economy more generally are incorporated, at least to some degree, into O'Mara's original results. It seemed unrealistic to superimpose hypothetical underwriting arrangements on these previous or existing schemes in the wool industry. Further, the effects of removing the existing arrangements would be complicated by the fact that those schemes have involved buffer stocks and that Australia possesses some market power in the world wool market.

This paper is organised as follows. First, a hypothetical price underwriting scheme is described, and estimates are presented of the total annual government payments under such a scheme had it been in operation over the past three decades in some major Australian rural industries. The modifications required to the O'Mara model in order to examine the macroeconomic effects of underwriting are outlined in the following section. Next, the effects of the underwriting payouts on non-farm GDP are discussed. Finally, some concluding comments are made about the influence of government funding of underwriting on macroeconomic stability.

The Hypothetical Underwriting Scheme

The underwriting schemes employed in various agricultural industries in Australia have generally been broadly similar in form to the Guaranteed Minimum Price (GMP) scheme that has operated in the wheat industry from 1984 to 1990. For the purposes of this study it is assumed that the government provided an underwriting scheme in the grain (including wheat), sheepmeat and beef industries taking the same general form as the current GMP scheme. A brief description of that scheme is provided in the Appendix. The calculation of GMP payments back to 1955-56 for each industry required a number of simplifying assumptions, and these too are given in the Appendix. The hypothetical underwriting payouts are summarised in Table 1.

It is important to note that, although the totals column shows a payout in most years, this is simply a consequence of aggregation across all industries. For any individual commodity, payouts are unlikely to occur for more than two years in a row because the GMP, being based on a moving average of past prices, effectively tracks medium term price trends. The largest payouts under this simple GMP scheme would have occurred in the mid-1950s and the mid-1970s.

TABLE 1

Hypothetical Underwriting Scheme Payouts (Nominal Values)

Year	Wheat	Barley	Oats	Maize	Sorghum	Rice	Beef	Mutton	Lamb	Total
	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
1955-56		1.1					67.8			68.9
1956-57							30.6		0.7	31.4
1957-58								1.8		1.8
1958-59								8.8		8.8
1959-60				0.3		0.0			4.2	4.5
1960-61		1.3	1.2						0.2	2.7
1961-62						0.8	1.9		5.4	8.1
1962-63						0.2	14.6			14.8
1963-64									0.2	0.2
1964-65										
1965-66										
1966-67					0.1				0.0	0.2
1967-68									1.8	1.8
1968-69	10.3	4.5	8.8							23.5
1969-70		5.1	8.5							13.6
1970-71				0.1		1.5		20.9		22.5
1971-72								15.0		15.0
1972-73										
1973-74										
1974-75							324.6			324.6
1975-76							151.0	5.2		156.2
1976-77										
1977-78										
1978-79		2.7	8.1							10.8
1979-80										
1980-81										
1981-82						8.6				8.6
1982-83										
1983-84										

Modifications to the Basic Model

In order to incorporate the effects of a hypothetical underwriting scheme over the same period as that considered by O'Mara (1987), equation (10') in the O'Mara model is modified to form equation (10a) below.

$$\Delta Y_{NF} \| \Delta(p_F O_F) = \Delta\left(\frac{y_F^F + q}{p}\right)\sigma_F k + \Delta\left(y_F^{NF} / p_c\right)\sigma_{NF}^F k + \Delta J_{NT}$$
$$+\Delta\left(p_j J_{NT} / p_c\right)\sigma_j^{NT} k - \Delta\left(z^F / p_c\right)\sigma k - \left(q / p_c\right).\left[\sigma^{NF} / (1 - MPT)\right].k \qquad (10a)$$

where:

J = volume of non-primary inputs used in the farm sector,
J_{NT} = that part of J produced in the non-traded goods sector,
k = the induced non-farm multiplier,
O_F = volume of farm production,
p = the deflator for nominal expenditure originating from farm households,
p_c = the implicit consumption deflator,
p_F = price of farm commodities,
p_j = the implicit deflator for non-primary inputs,
Y_F = real gross farm product
Y_{NF} = real gross non-farm product,
y_F = nominal gross farm product,
y_F^F = farm household income,
y_F^{NF} = that part of y_F which accrues to non-farm households,
Z^F = volume of domestic expenditure on farm commodities,
z^F = nominal value of Z_F,
σ = conversion factor to transform the change in expenditure on farm commodities into an appropriate multiplicand,
σ_F = conversion factor to transform the change in farm household income into an appropriate multiplicand,
σ_{NF}^F = conversion factor to transform the change in farm value added not accruing to farm households into an appropriate multiplicand,
σ_j^{NT} = conversion factor to transform the change in non-traded inputs used in the farm sector into an appropriate multiplicand,
σ^{NF} = an assumed common value for σ_{NF}^F and σ_j^{NT},
q = total underwriting payout during year, and
MPT = marginal rate of taxation facing non-farm households.

The notation is identical to that used by O'Mara except for the last two variables listed, which appear in the first and last terms on the right hand side of the equation.

The dependent variable is the annual change in non-farm output which can be attributed to changes in the gross value of farm production. The first term on the right hand side captures the contribution made by changes in the income accruing to farm households. That term differs from the corresponding term in equation (10') only in that the hypothetical total underwriting payout each year (if any), q, is added to the measured change in farm income.

In other words, farm households are assumed to react to the change in their incomes which would have occurred under the hypothetical underwriting arrangements. For simplicity, it is assumed that the underwriting arrangements have no effect on short term production decisions, and hence that the impact on farm household incomes is limited to the impact on prices received. In reality, underwriting may on occasion result in some supply response. For example, in the beef industry underwriting may provide an added incentive to slaughter when prices are low, facilitating lower cost adjustments to enterprise mix. Other supply responses may occur in the sheep industry where the underwriting of mutton and lamb may affect the production of wool. However, these effects have not been considered in this paper and may be the focus of future research.

The next four terms on the right hand side are identical to the corresponding terms in equation (10'). The second term captures the effect of changes in that part of farm value added which accrues to non-farm households, such as the households of hired farm employees. The third and fourth refer to changes in the usage of intermediate inputs in the farm sector, and the fifth captures the effect of switches in expenditure between farm and non-farm commodities as the relative prices of those commodities change.

The other difference between equation (10a) and equation (10') is the inclusion of an additional term – the last term of equation (10a). On the assumption that the underwriting payout is financed by an active increase in taxation of the same amount, it is necessary to capture the impact of that higher taxation on economic activity. For simplicity, it is assumed that all of the additional taxation is paid by non-farm households. The conversion factor, σ_{NF}, and the induced multiplier, k, which are applied to changes in non-farm household income elsewhere in equations (10') and (10a) are assumed also to be relevant here. However, as σ_{NF} and k are applied to post-tax income in the present case, rather than to pre-tax income as is the case in the other terms, the necessary adjustment is made by dividing through by $1-MPT$ where MPT is the marginal rate of taxation facing non-farm households.

It is also instructive to consider the case of bond financing of the underwriting payout. In that case, it could be argued that as no additional taxes are levied in the current period, the above additional term of equation (10a) would become redundant. This representation rests on the assumption that bond financing is not recognised by economic agents to be a future tax liability, and hence that they do not adjust their perception of their *permanent* disposable income to take account of it.

Alternatively, following Barro (1974; 1979), it could be argued that, in a rational expectations framework, bond financing would be recognised to generate a future tax liability, equal in present-value terms to the additional tax that would have been raised in the current period under tax financing. Hence, economic agents would adjust their consumption behaviour in a manner identical to that under tax financing. For present purposes, if the 'Barro effect' were assumed to be operative, bond financing would be identical to tax financing, so that equation (10a) would be applicable to both.

By running the model both without and with the last term, both views of bond financing were taken into account. In the discussion below, 'bond financing' refers to the case where the Barro effect is assumed to be inoperative.

The case of a grower-funded underwriting scheme was not considered explicitly in the analysis. If, following Barro (1974; 1979), growers were assumed to be forward looking and rational, the existence of a grower funded underwriting scheme would have little impact on growers' perceptions of their *permanent* income, and hence would have little effect on their consumption and investment decisions. In that sense, the original results reported by O'Mara (1987) would be little affected by such an underwriting arrangement.

Simulation Results

Equation (10a) was simulated over the period 1955-56 to 1983-84, using the data set detailed by O'Mara (1985) and applying the two alternative methods of funding the underwriting scheme. Except for the qualifications noted above, the 24 combinations of parameter values documented by O'Mara (1987) were used. The 'best-bet' combination of parameters discussed by O'Mara was again chosen as the focal point in the analysis of the results.

The main features of the results are summarised in Table 2. The values obtained for the dependent variable using the best-bet combination of parameters are reported for the cases where there is no underwriting (that is, the original results reported by O'Mara), where underwriting is financed by taxation (or by a bond issue, if the 'Barro effect' is operative), and where it is financed by a bond issue with the Barro effect inoperative. These results are reproduced in ratio form in Table 3, to indicate the farm sector's relative contribution to the changes in non-farm GDP.

TABLE 2

Summary of Simulation Results (Using Best-Bet Parameter Combination)

Year	ΔY_{NF}	$\Delta Y_{NF} \| \Delta(p_F O_F)$			ΔY_{NF}
		No underwriting	Underwriting financed by		
	(1)	(2)	Taxation (3)	Bond issue (4)	(5)
	$m	$m	$m	$m	$m
1955-56	455	35	17	75	101
1956-57	168	10	2	27	56
1957-58	384	-119	-119	-118	-130
1958-59	997	406	404	411	-95
1959-60	816	34	33	37	-102
1960-61	494	85	84	87	64
1961-62	116	137	135	142	84
1962-63	990	135	131	144	189
1963-64	1 274	423	423	423	33
1964-65	1 279	41	41	41	94
1965-66	740	-199	-199	-199	-290
1966-67	1 003	284	284	284	409
1967-68	2 366	-502	-503	-500	-844
1968-69	2 942	850	842	871	1 257
1969-70	3 139	21	16	33	-443
1970-71	2 623	145	138	163	-62
1971-72	2 215	27	23	38	295
1972-73	2 751	756	756	756	-682
1973-74	2 309	324	324	324	544
1974-75	654	299	226	469	281
1975-76	1 382	-288	-319	-217	247
1976-77	1 899	445	445	445	10
1977-78	475	-624	-624	-624	-243
1978-79	1 664	288	286	292	1 244
1979-80	1 679	99	99	99	-404
1980-81	2 599	-26	-26	-26	-562
1981-82	2 171	-102	-104	-98	1 091
1982-83	405	-1 119	-1 119	-1 119	-1 416
1983-84	4 127	774	774	774	2 279

(1) The change in the level of real non-farm output relative to the previous year. (2) The estimated contribution made by the farm sector to the change in non-farm output, in the absence of the hypothetical underwriting schemes. (3) The estimated contribution made by the farm sector to the change in non-farm output, with the hypothetical underwriting scheme financed by taxation. (4) As (3), with the underwriting scheme financed by a bond issue. (5) The change in the level of real gross farm product relative to the previous year. Underline indicates a change in the base year for the various implicit deflators.

TABLE 2

Summary of Simulation Results (Using Best-Bet Parameter Combination)

Year	ΔY_{NF} (1)	$\Delta Y_{NF} \mid \Delta(p_F O_F)$			ΔY_{NF} (5)
		No underwriting (2)	Underwriting financed by		
			Taxation (3)	Bond issue (4)	
	$m	$m	$m	$m	$m
1955-56	455	35	17	75	101
1956-57	168	10	2	27	56
1957-58	384	–119	–119	–118	–130
1958-59	997	406	404	411	-95
1959-60	816	34	33	37	–102
1960-61	494	85	84	87	64
1961-62	116	137	135	142	84
1962-63	990	135	131	144	189
1963-64	1 274	423	423	423	33
1964-65	1 279	41	41	41	94
1965-66	740	–199	–199	–199	–290
1966-67	1 003	284	284	284	409
1967-68	2 366	–502	–503	–500	–844
1968-69	2 942	850	842	871	1 257
1969-70	3 139	21	16	33	–443
1970-71	2 623	145	138	163	–62
1971-72	2 215	27	23	38	295
1972-73	2 751	756	756	756	–682
1973-74	2 309	324	324	324	544
1974-75	654	299	226	459	281
1975-76	1 382	–288	–319	–217	247
1976-77	1 899	445	445	445	10
1977-78	475	–624	–624	–624	–243
1978-79	1 664	288	286	292	1 244
1979-80	1 679	99	99	99	–404
1980-81	2 599	–26	–26	–26	–562
1981-82	2 171	–102	–104	–98	1 091
1982-83	405	–1 119	–1 119	–1 119	–1 416
1983-84	4 127	774	774	774	2 279

(1) The change in the level of real non-farm output relative to the previous year. (2) The estimated contribution made by the farm sector to the change in non-farm output, in the absence of the hypothetical underwriting schemes. (3) The estimated contribution made by the farm sector to the change in non-farm output, with the hypothetical underwriting scheme financed by taxation. (4) As (3), with the underwriting scheme financed by a bond issue. (5) The change in the level of real gross farm product relative to the previous year. Underline indicates a change in the base year for the various implicit deflators.

TABLE 3

Impact Ratios (Using Best-Bet Parameter Combination)

$$\frac{\Delta Y_{NF} \mid \Delta(p_F O_F)}{\mid \Delta Y_{NF} \mid}$$

Year	No underwriting (1)	Underwriting financed by: Taxation (2)	Underwriting financed by: Bond issue (3)
1955-56	0.08	0.04	0.17
1956-57	0.06	0.01	0.16
1957-58	0.31	0.31	0.31
1958-59	0.41	0.41	0.41
1959-60	0.04	0.04	0.04
1960-61	0.17	0.17	0.18
1961-62	1.18	1.16	1.22
1962-63	0.14	0.13	0.15
1963-64	0.33	0.33	0.33
1964-65	0.03	0.03	0.03
1965-66	0.27	0.27	0.27
1966-67	0.28	0.28	0.28
1967-68	0.21	0.21	0.21
1968-69	0.29	0.29	0.30
1969-70	0.01	0.01	0.01
1970-71	0.06	0.05	0.06
1971-72	0.01	0.01	0.02
1972-73	0.27	0.27	0.27
1973-74	0.14	0.14	0.14
1974-75	0.46	0.35	0.72
1975-76	0.21	0.23	0.16
1976-77	0.23	0.23	0.23
1977-78	1.31	1.31	1.31
1978-79	0.17	0.17	0.18
1979-80	0.06	0.06	0.06
1980-81	0.01	0.01	0.01
1981-82	0.05	0.05	0.05
1982-83	2.76	2.76	2.76
1983-84	0.19	0.19	0.19

(1) The ratio formed by the modulus of column (2)/column (1) in Table 2.
(2) The ratio formed by the modulus of column (3)/column (1) in Table 2.
(3) The ratio formed by the modulus of column (4)/column (1) in Table 2.

It is clear that, in most years, the presence of the hypothetical underwriting arrangements, however financed, makes little difference to the original results reported by O'Mara: substantial differences are evident only in 1955-56, 1956-57 and 1974-75. In other words, the existence of such underwriting schemes would not have significantly altered the impact which farm sector shocks are estimated to have had on output in the non-farm sector. O'Mara's earlier conclusion that the farm sector may have increased in relative importance as a source of instability in non-farm output would remain intact.

It is important to note, however, that a *tax*-financed underwriting payout (or a *bond*-financed one, if the Barro effect is operative) has the effect of making the farm sector's impact on non-farm output either less positive (as in 1974-75) or more negative (as in 1975-76). For example, for each extra dollar of *tax*-financed underwriting payout, non-farm output would fall by 27 cents on average. Increased tax payments by non-farm households to finance the underwriting payments to farm households have an overall negative effect on aggregate demand in the Australian economy, and therefore on output in the non-farm sector. This result is obtained because, under the *best-bet parameter set*, farmers' marginal propensity to spend (on consumption and investment items combined) is less than non-farm households' marginal propensity to consume (see O'Mara 1985; Mullen, O'Mara, Powell and Reece, 1988). In other words, the underwriting arrangements, if financed by tax, could aggravate the possible adverse macroeconomic consequences of a fall in farm commodity prices and farm incomes.

Using some of the other parameter combinations considered by O'Mara, which imply a somewhat greater marginal propensity to spend by farmers, this result is reversed. However, the best-bet parameter combination is considered to be the one most consistent with the theoretical and empirical literature on farm consumption and investment behaviour.

A *bond*-financed underwriting payout – provided that the Barro effect is not operative – has a beneficial effect on non-farm output: in other words, the contribution made by the farm sector to the change in non-farm output becomes more positive or less negative than in the absence of underwriting. For example, for each extra dollar of *bond*-financed underwriting payout, non-farm output would rise by 64 cents on average. On the other hand, as noted above, if the Barro effect is operative, bond financing becomes formally equivalent to tax financing in this model, and the above conclusions for the case of tax financing also apply to bond financing.

It is evident that, in most of the years in which the farm sector is estimated to have made a substantial negative contribution to growth in non-farm output, the hypothetical

underwriting arrangements have no effect on the results (see, for example, the results for 1957-58, 1967-68, 1977-78 and 1982-83 in Table 2). In most such years it is unfavourable seasonal conditions, rather than low commodity prices, which provide the driving force behind the decline in farm incomes, and in consequence there would be little if any underwriting payout despite the sharp fall in farm incomes. (The correlation coefficient between the underwriting payout and changes in farm income is 0.088.)

In most years in which the farm sector is estimated to have made a substantial positive contribution to the growth in non-farm output, the existence of underwriting arrangements again makes little if any difference to the results. This is as would be expected: underwriting schemes are largely irrelevant during periods when commodity prices rise sharply. Favourable seasonal conditions may result in some downward pressure on commodity prices, but this is unlikely to be sufficient to activate an underwriting payout, given the export orientation of most of Australia's broadacre industries and the relatively high price elasticities of demand facing Australia for most of its rural exports.

The simulations were repeated using all of the combinations of parameter values used by O'Mara (1987). The largest and smallest estimates of the impact of underwriting using either method of financing are set out in Table 4. It is evident that, in the majority of years, the range of results obtained with underwriting in place is very similar to, or identical to, that obtained without underwriting. The main exceptions seem to be 1955-56 and 1956-57. While this result is consistent with the best-bet results in Table 3, it may be noted that the effect of underwriting in 1974-75 is less striking in Table 4 than in Table 3.

Concluding Comments

The central conclusion of this paper is that a more extensive use of price underwriting schemes in Australia's farm sector, over the period from the mid-1950s to the mid-1980s, would have made little difference to the short term impact of farm sector shocks on non-farm GDP. Further, the conclusion reached by O'Mara (1987) that the farm sector may have increased in relative importance as a source of short term instability in non-farm GDP would have remained intact. In other words, it seems unlikely that a strong case could be mounted for a continuation or extension of government funded underwriting schemes on the grounds of macroeconomic stabilisation. Indeed, in some circumstances, government-funded underwriting could be destabilising at the macroeconomic level. Of course, this analysis omits the possible beneficial or adverse effects which underwriting may have at a microeconomic or industry level.

TABLE 4[9]

Summary of Simulation Results

Year	ΔY_{NF}	$\Delta Y_{NF} \| \Delta(p_F O_F)$				ΔY_{NF}
		Most positive (Least negative)[b]		Most negative (Least positive)		
		No underwriting	Underwriting	No underwriting	Underwriting	
	(1)	(2)	(3)	(4)	(5)	(6)
	$m	$m	$m	$m	$m	$m
1955-56	455	48	125	22	–14	101
1956-57	168	72	105	–65	–96	56
1957-58	384	118	118	–305	–305	–130
1958-59	997	502	511	259	251	–95
1959-60	816	63	67	11	6	–102
1960-61	494	104	104	41	42	64
1961-62	116	200	200	90	92	84
1962-63	990	230	246	30	22	189
1963-64	1 274	604	604	193	193	33
1964-65	1 279	136	136	–26	–26	94
1965-66	740	–13	–13	–352	–352	–290
1966-67	1 003	452	452	67	67	409
1967-68	2 366	43	43	–979	–979	–844
1968-69	2 942	1 216	1 255	365	346	1 257
1969-70	3 139	241	241	–154	–153	–443
1970-71	2 623	379	379	–38	-39	-62
1971-72	2 215	161	182	–168	–188	295
1972-73	2 751	1 235	1 235	244	244	–682
1973-74	2 309	725	725	–149	–149	544
1974-75	654	1 346	1 346	–402	–387	281
1975-76	1 382	–70	–70	–483	–477	247
1976-77	1 899	501	501	315	315	10
1977-78	475	–383	–383	–773	–773	–243
1978-79	1 664	938	945	–550	–557	1 244
1979-80	1 679	137	137	57	57	–404
1980-81	2 599	371	371	–298	–298	–562
1981-82	2 171	211	211	–312	–312	1 091
1982-83	405	–139	–139	–2 001	–2 001	–1 416
1983-84	4 127	1 855	1 855	–534	–534	2 279

(1) The change in the level of real non-farm GDP relative to the previous year. (2) The most positive or least negative estimate of the contribution by the farm sector to the change in non-farm output, across all parameter combinations, in the absence of the hypothetical underwriting schemes. (3) The most positive or least negative estimate of the contribution by the farm sector to the change in non-farm output, across all parameter combinations, with the hypothetical underwriting schemes (under either assumption as to funding). (4) The most negative or least positive estimate of the contribution by the farm sector to the change in non-farm output, across all parameter combinations, in the absence of the hypothetical underwriting schemes. (5) The most negative or least positive estimate of the contribution by the farm sector to the change in non-farm output, across all parameter combination, with the hypothetical underwriting schemes in use. (6) The change in the level of real gross farm product relative to the previous year.

Underline indicates a change in the base year for the various implicit deflators.

The above result stems partly from the nature of the hypothetical underwriting scheme itself – a scheme based on that operating in recent years in the wheat industry – and partly from macroeconomic considerations. Such scheme do little if anything to dampen the effects of changes in seasonal conditions and sharp rises in commodity prices. It was found that, though an underwriting payout would have occurred in some industry in most years over the period, the payout would generally be very small relative to the overall size of the farm sector. It was however observed that, under certain plausible assumptions, an underwriting payout could actually reduce non-farm GDP, thus aggravating the possible adverse macroeconomic effects of a sharp fall in farm prices and farm incomes. This result, while perhaps counterintuitive, stems from the differences which are likely to exist between the marginal propensities to spend of farm and non-farm households, and from the fact that the latter group bears most of the burden of financing the underwriting schemes.

There are several areas where further research could be of value. One is to assess the supply responses of farmers to underwriting schemes. Another is to assess the effects of producer-funded as distinct from tax-funded underwriting arrangements, since these could become increasingly important. In this analysis it was assumed that farmers' consumption and investment decisions were based on a rational long term view of their income flows, which would be little affected by a grower-funded underwriting scheme. An area of further work would be to relax this assumption, and to address the question whether farmers, in making their consumption and investment decisions, react to changes in their measured income in the current period (which may be affected by an underwriting scheme) or to changes in their permanent income or wealth (which may not be affected significantly by grower-funded underwriting). It would also be useful to incorporate the wool industry explicitly into the analysis; and to consider schemes which address overall industry incomes rather than simply commodity prices. Some obvious extensions at the macroeconomic level would be to allow for a floating exchange rate and for flexible rather than sticky non-traded goods prices in the short run

APPENDIX

Guaranteed Minimum Price (GMP) Schemes

The GMP for wheat was introduced in 1979 and replaced the pricing arrangements of earlier wheat marketing schemes which were based on price stabilisation. From its introduction to 1984, the GMP for a particular year's wheat pool was 95 per cent of the average of the net pool returns per tonne of all sales of wheat by the Australian Wheat Board for the previous two pools and the current pool, with the constraint that the GMP could not change by more than 15 per cent from the GMP of the previous year. These conditions were amended following an IAC enquiry (IAC 1983). The GMP then became 95 per cent of the average of the estimated net returns of the current pool and the lowest two of the previous three pools. The constraint that the current GMP may not vary by more than 15 per cent from that of the previous year was retained.

In applying a hypothetical GMP scheme to other industries, the calculation of underwriting payments back to 1955-56 for each of the selected industries involved several simplifying assumptions. The required estimates of unit returns for the previous three years and for the current year were all assumed equal to the actual unit returns in those years. Unit returns in any year were estimated by dividing the gross value of output in the given year by production in that year. This procedure implies the assumption that all output for a given year is disposed of in the same year, and therefore ignores stock holding. It also ignores the existence of different prices for different varieties/grades and uses of the commodity.

References

Barro, R.J. (1974), 'Are government bonds net wealth?', *Journal of Political Economy* 82(6), 1095–117.

—— (1979), 'Determination of public debt', *Journal of Political Economy* 87(5), 940–71.

Industries Assistance Commission (1978), *Wheat Stabilisation*, IAC Report No. 175, AGPS, Canberra.

—— (1983), *The Wheat Industry*, IAC Report No. 329, AGPS, Canberra.

Kerin, J. and Cook, P. (1988), *Primary Industries and Resources: Policies for Growth —A Government Policy Statement*, AGPS, Canberra, May.

Mullen, J.D., O'Mara, L.P., Powell, R.A. and Reece, B.F. (1988), 'The consumption behaviour of farmers: a review of the evidence', *Review of Marketing and Agricultural Economies* 56(2) 179–93.

O'Mara, L.P. (1985), Linkages from the farm sector to the Australian macroeconomy: towards a theoretical and empirical analysis. PhD thesis, Australian National University, Canberra.

—— (1987), 'The contribution of the farm sector to annual variations in gross domestic product in Australia', *Economic Record* 63(182), 255–69.

Quiggin, J. (1983), 'Underwriting agricultural commodity prices', *Australian Journal of Agricultural Economics* 27(3), 200–11.