Returns to Incremental Promotion Expenditure in the Australian Fibre, Meat and Dairy Industries: A Review of Some Recent Research[1]

Roley Piggott
Department of Agricultural and Resource Economics
University of New England

Introduction

Australian farmers contribute significant sums of money through taxes (levies) on output to support expenditure on generic promotion of their commodities and research and development (R&D) of various kinds which is aimed ultimately at shifting either primary-level supply or derived demand to the right. Recent expenditures for these purposes in the case of the Australian wool, red meat and dairy industries are shown in Table 1. The bulk of expenditure has been for promotion.

Some recent research aimed at measuring benefits to producers from incremental promotion expenditure is reviewed in this paper. At the outset, the lack of attention given to evaluation of promotion programs for Australian agricultural commodities is highlighted and contrasted with the United States where recent events have thrown the spotlight on commodity promotion programs. An overview of methods follows with the focus of attention being on methods used in recent Australian studies. Selected results relating to the effectiveness of promotion expenditure in enhancing producers' profits are presented for the Australian meat, fibre and dairy industries. The need to consider cross-commodity relationships in deriving results is highlighted. The paper is concluded with a discussion of limitations, future research needs and data requirements.

Lack of Evaluation: A Cause for Concern

Consider the case of wool promotion. Currently Australian wool producers contribute 3.5 per cent of gross wool receipts to promotion by the International Wool Secretariat (IWS) through a compulsory levy. According to Watson (1996), for many specialist wool producers, this has probably translated into about 10 per cent of net wool receipts in recent years. Promotion expenditure by Australia has averaged about $150M/year over the period 1989/90 to 1994/95. In contrast, expenditure on R&D has averaged about $43M/year. About 78 per cent of total levy dollars has gone to promotion and 22 per cent to R&D.

Watson (1996) points out that wool promotion has always been a controversial issue. It has been the subject of much debate within both the wool industry and, to a lesser extent, the research community. However, despite the debate in the professional literature during the 1970s, there is still scant evidence available on the profitability of wool promotion. Empirical studies have been rare (Hill, Piggott and Griffith 1996b) provide a brief review of the literature). To quote Watson (1996, p.7-8):

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> Unfortunately, wool promotion has not had much critical investigation. This is partly because the Commonwealth Government made significant contributions to the cost of promotion over many years. The desire to maintain Government contributions turned the International Wool Secretariat and its Australian sponsors into good news organisations.
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> ...
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> Of (great) concern is the cursory way wool promotion is justified. Invalid performance indicators like an alleged 'premium' of wool over synthetics have been proclaimed as evidence of successful promotion. Apart from measurement problems, the premium is explained by falls in synthetic costs which wool cannot match.
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> ...
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> Unfortunately wool promotion is not treated as an empirical question requiring generation of information for evaluation.

As evidence of the cursory way wool promotion is evaluated, consider a recent account of the effectiveness of IWS European campaigns (Anon.1996, p.1):

> The advertising campaigns have been independently assessed in all the major markets, and the results for the Autumn/Winter 1995/96 promotion showed that positive attitudes to wool increased by 5% and the likelihood of purchasing wool increased by 4% after only one season. The advertising assessment appears to be answering calls from woolgrowers for the IWS to be more accountable, and will be used in an ongoing manner to improve future campaigns.

Australian wool producers are becoming more vocal on the issue of effectiveness of wool promotion. Recently there has been a call by the IWS for an extra $70M to be spent on wool promotion in order to build market share (Carson 1996). The concept of 'market share' is of some importance in 'business school'-type thinking about promotion which, unfortunately, seems to have captured the attention of industry politicians more so than is warranted given that profits are what really matter. But Victorian producers have been calling for a thorough evaluation of wool promotion and the matter also received attention at a Ministerial roundtable on wool marketing held recently in Canberra. These are welcome developments. Based on his recent addresses in Armidale, Jack Lewis, a long-time employee of the IWS and critical thinker on the *economics* of wool promotion, would also think these developments are not before their time (see Lewis 1996a; 1996b).

The effectiveness of promotion expenditure on Australian meats has received some recent attention (Piggott, Piggott and Wright, 1995; Piggott, Chalfant, Alston and Griffith 1996) and this work is discussed later. Little attention has been given to promotion expenditure on other Australian commodities. On the other hand, Australian researchers have been at the forefront in developing methods to evaluate payoffs to R&D and some would argue that the high degree of competition involved in winning research grants helps ensure that R&D dollars are well spent.

It is a concern that so little attention is being given to the evaluation of promotion expenditure on Australian commodities. Wohlgenant (1993) has demonstrated that farmers should not be indifferent to how their marginal levy dollars are allocated between promotion on the one hand and R&D on the other. Alston, Carman and Chalfant (1994) draw attention to the public policy dimension of commodity promotion programs which arises because they are usually financed through legislated levies on output, the cost of which is ultimately shared between producers and consumers.

The lack of attention to promotion in Australia contrasts with the United States where empirical studies on the effectiveness of promotion have been published since at least the early 1970s. There is an institutional structure to foster and support research on commodity promotion programs. For example, the Regional Research Committee on

Commodity Promotion, or 'NEC-63', a committee of the Co-operative State Research Service of the United States Department of Agriculture, was established in 1985 as a network and forum for communication among individuals interested in commodity promotion programs. It meets twice yearly and include members from government, industry and academia. An 'offshoot' of this organisation is the National Institute for Commodity Promotion Research and Evaluation, founded in 1994 and located at Cornell University, which undertakes and sponsors research using funding from government and industry as well as publishing a quarterly newsletter.

In the United States research on the effectiveness of commodity promotion programs, which are typically funded under compulsory marketing order provisions, has been much in demand of late and is likely to continue as such. Farmers have been issuing challenges to the compulsory 'check-offs' on constitutional grounds. Eleven cases are currently pending before US courts. Significantly, the US Supreme Court has chosen to review a challenge against compulsory check-offs for promotion commenced by a group of Californian fruit growers in 1988, one of 35 cases chosen by the Court from approximately 7,500 cases which were petitioned for review in the current 'oral argument annual term' (Cline 1996).

Also significant is the provision in the 1996 US Farm Bill requiring promotion and research programs financed through check-offs to be evaluated at least once in every five years. Kenneth Clayton, Deputy Administrator of the USDA's Agricultural Marketing Service, had the following to say about this requirement (Clayton 1996, p.2):

> From the research and promotion boards' point of view, evaluation will be an opportunity to bring greater analytical strength to business planning, offer insight to those paying assessments as to their return on their investment, and provide a line of defense when programs come under legal challenge as to their effectiveness. For the research community, this new evaluation requirement represents both an opportunity and a responsibility. Methodological and data development issues must be addressed. Approaches to evaluation will have to be tailored to fit a diversity of programs.... And, of course, results of econometric or statistical analyses must be put into usable form for industry boards.

The recent litigation in the US must be driven at least in part by scepticism about the benefits of generic promotion. While the Constitutional validity of the Australian system of levies to support promotion does not seem to be in question, Australian farmers--and, for that matter, consumers and government--ought to be questioning of the benefits from generic promotion and one would hope that they become increasingly vocal in calling for exante and periodic evaluations of promotion programs. To date, they have been relatively silent on the issue compared with their US counterparts. If this occurs, researchers will need to assist in the evaluations. This raises the issue of evaluation methods to which attention now turns.

Methods

Overview

To the extent that those responsible for commodity promotion programs evaluate the effectiveness of those programs, little is known about the way the evaluations are done. Based on the quotation from Anon. above, it seems that changes in consumers' attitudes following a promotion program are used as one indicator of success. Given the public policy dimension of promotion expenditure, the procedures used in evaluation ought to be made available for scrutiny.

The general procedure that has been widely used by researchers in government agencies and universities to evaluate the effectiveness of generic promotion programs has involved

estimating (generally) a single-equation regression model relating quantity demanded or sales to a set of variables which includes a measure of promotion effort such as promotion expenditure. A statistically-significant regression coefficient associated with the promotion variable has been used as an indicator of success. In recent literature (e.g., Piggott et al 1995) attention has been drawn to the limitations of this approach. In short, a statistically-significant regression coefficient associated with the promotion variable is a necessary but not a sufficient condition for promotion expenditure to be *profitable* to producers.

There are some key features of agricultural commodity markets which must be accommodated in any procedure for evaluating the effectiveness of promotion programs. First, the commodity being promoted may have close substitutes in demand and/ or supply. This being the case, a shift in demand for the promoted commodity is only the first event in a chain of events leading to a new market equilibrium following an increment of promotion expenditure. The chain of events might include increased promotion expenditure by producers of products which are substitutes in demand. Australian meats and fibres are examples of commodities where these cross-commodity relationships are important.

Second, commodities are generally sold on more than one market and promotional effort in one market cannot be evaluated without taking account of spillover effects to other markets. In the Australian case, the domestic-export market dichotomy is clearly important. This point can be demonstrated as follows (Piggott et al 1995, p. 497):

> ...suppose that a product is sold in two markets, the domestic market having a negatively sloped demand and the export market having a perfectly elastic demand. Assuming the two markets cannot be separated, there is a common price determined by the export price. Suppose that advertising of the product on the domestic market has a statistically-significant and positive influence on domestic demand. This does not mean that domestic advertising is profitable. In fact it will be unprofitable. The expansion in domestic demand merely results in product being diverted from the export to the domestic market. price (and hence revenue) does not increase and pre-advertising profits are decreased by the amount of the advertising expenditure. This is so irrespective of whether or not the advertising was undertaken to offset advertising expenditure by a competitor.

Data permitting, these features of commodity markets can be accommodated in a structural econometric model which includes promotion variables and supply-side relationships. The model can then be used to simulate the effects of promotion. A team of researchers at the University of California-Davis has been devoting much attention recently to procedures for econometric modelling of commodity promotion programs (see, for example, Alston, Chalfant and Piggott 1995; Piggott, Chalfant, Alston and Griffith 1996).

In a sense one might regard the availability of a 'correct' structural econometric model as 'the ultimate' among the procedures one might use to evaluate the effectiveness of commodity promotion programs. However, data availability has often been a severe limiting factor for those adopting this approach. It may be that appropriate data are not collected or time series may be too short. Too, the structural econometric approach to evaluation of commodity promotion programs is time-consuming even when data availability is not a problem. There would seem to be a place for a procedure which can be implemented using simple spreadsheet methods and which is capable of producing answers quickly.

The Equilibrium Displacement Modelling Approach

Recent research by the author and his colleagues has been directed at accommodating the important features of commodity markets outlined above. It has a focus on evaluating the *profitability* of incremental promotion expenditure to producers. It uses a procedure--equilibrium displacement modelling-- which can provide results quickly provided the researcher is prepared to use informed judgement about key parameters where estimates of those parameters are missing. Uncertainty about parameter values can be accommodated through sensitivity analysis.

The procedure is outlined in detail in Piggott et al (1995). It can be summarised as follows. A structural market model (demand functions incorporating promotion variables, supply functions and market clearing identities) is specified. The model is manipulated to derive general equilibrium elasticities showing the percentage changes in prices associated with a one per cent change in any promotion variable allowing for all cross-commodity impacts to occur. General equilibrium elasticities for other variables of interest (quantities, revenues, producer surplus and profits net of promotion expenditure) are derived from the general equilibrium elasticities for prices.

Various experiments can be conducted using the general equilibrium elasticities. For example, one can examine 'own promotion' effects showing the impact on, say, beef producers' profits of an increment in promotion expenditure on beef assuming promotion expenditure on other competitor meats remains constant, 'cross promotion' effects showing the impact on beef producers' profits of an increment in promotion expenditure on lamb assuming promotion expenditure on beef and other competitor meats remains constant, or 'catch-up promotion' showing by how much beef producers need to increase their promotion expenditure to preserve existing profit levels in the face of an increment of promotion expenditure by lamb producers. The general equilibrium elasticities can also be used to derive benefit-cost ratios (ratios of increased producer surplus to incremental promotion expenditure) for either 'own promotion' or an increment in promotion expenditure which occurs simultaneously with an increment of promotion expenditure on one or more competing products.

Implementation of the procedure requires a set of base data on prices, quantities sold in various markets, promotion expenditure and Marshallian supply and demand elasticities. The latter include 'own- and cross-promotion elasticities' showing the percentage change in quantity demanded in response to a one per cent increase in promotion expenditure. Clearly, the data requirements are substantial. However, they are dictated by the facts about how commodity markets operate, namely, cross-commodity relationships in demand and/or supply. In the studies undertaken to date covering the Australian meat, fibre and dairy industries, the Marshallian elasticities have been chosen using published estimates as a guide wherever possible. However, many elasticities had to be chosen based solely on judgement.

Example: Australian Fibres

A brief description of the structural modelling and data used in recent research on the effectiveness of promotion of Australian fibres (Hill et al. 1996) is provided here as an example of what is involved in the equilibrium displacement modelling approach. Similar modelling and data were needed in evaluating the effectiveness of promotion in the Australian meat and dairy industries

With respect to the structural model, the following represent the key features.

- The fibres included are apparel wool, non-apparel wool, cotton and synthetics.

- The model is intended to be representative of the 'farm-level' in the case of wool and cotton and the 'factory door' in the case of synthetics.
- A time period in the model is three years to avoid complexities caused by lagged responses.
- Both domestic and export demand functions are defined for each commodity except for non-apparel wool which is assumed to be sold only domestically.
- A single supply function is defined for each commodity.
- Eight promotion expenditure variables were included covering domestic and export promotion for each of the four commodities (expenditure on export promotion of non-apparel wool, cotton and synthetics comes from non-Australian sources).
- The pattern in which price and promotion variables enter each equation is determined by the authors' judgement about cross-commodity relationships in demand and supply.
- The model contains 11 structural demand/supply equations and four market-clearance identities which together determine 15 endogenous variables, namely, four prices, four domestic demand quantities, three export demand quantities and four supply quantities.

The algebraic representation of the model is as follows:

(1a) $D_a^d = D_a^a(P_a, P_n, P_c, P_m, A_a^d, A_c^d, A_m^d, Z_1)$ (domestic demand - apparel wool)

(1b) $D_a^e = D_a^e(P_a, P_c, P_m, A_a^e, A_c^e, A_m^e, Z_2)$ (export demand - apparel wool)

(1c) $D_n^d = D_n^d(P_a, P_n, P_c, P_m, A_n^d, A_c^d, A_m^d, Z_3)$ (domestic demand - non-apparel wool)

(1d) $D_c^d = D_c^d(P_a, P_n, P_c, P_m, A_a^d, A_n^d, A_c^d, A_m^d, Z_4)$ (domestic demand - cotton)

(1e) $D_c^e = D_c^e(P_a, P_n, P_c, P_m, A_a^e, A_n^e, A_c^e, A_m^e, Z_5)$ (export demand - cotton)

(1f) $D_m^d = D_m^d(P_a, P_n, P_c, P_m, A_a^d, A_n^d, A_c^d, A_m^d, Z_6)$ (domestic demand - synthetic fibres)

(1g) $D_m^e = D_m^e(P_a, P_n, P_c, P_m, A_a^e, A_n^e, A_c^e, A_m^e, Z_7)$ (export demand - synthetic fibres)

(1h) $S_a = S_a(P_a, P_n, Z_8)$ (supply-apparel wool)

(1i) $S_n = S_n(P_a, P_n, Z_9)$ (supply-non-apparel wool)

(1j) $S_c = S_c(P_c, Z_{10})$ (supply-cotton)

(1k) $S_m = S_m(P_m, Z_{11})$ (supply-synthetic fibres)

(1l) $D_a^d + D_a^e - S_a \equiv 0$ (market clearance-apparel wool)

(1m) $D_n^d - S_n \equiv 0$ (market clearance-non-apparel wool)

(1n) $D_c^d + D_c^e - S_c \equiv 0$ (market clearance-cotton)

(1o) $D_m^d + D_m^e - S_m \equiv 0$ (market clearance-synthetic fibres)

where D, S, P and A are the quantity demanded, quantity supplied, fibre price and promotion expenditure, respectively. Other exogenous variables affecting individual fibre demand and supply are captured in the $Z_i (i = 1,....11)$ vectors. The subscripts, a,n,c and m relate to apparel wool, non-apparel wool, cotton, and synthetic fibres, while the superscripts, d and e refer to the domestic and export markets, respectively.

The base Marshallian elasticities are provided in Table 2. (Similar matrices had to be developed for meats and dairy products.) Key points concerning the data and their sources can be summarised as follows.

- Data were for the financial years 1991/1992 to 1993/94.
- The Marshallian domestic price elasticities of demand and supply were drawn from previous studies or based on the authors' judgement. The Marshallian export price elasticities of demand were derived as excess-demand elasticities (see Alston, Norton and Pardey 1995, p.324).
- Promotion elasticities were based partly on previous studies but mostly on the authors' judgement.
- The base prices and quantities were obtained mainly from government publications, such as ABARE's *Commodity Statistical Bulletin*, either directly or after some adjustment.
- The base promotion expenditure data came mostly from industry sources either as published data or as estimates received in response to requests from the authors. However, data relating to the promotion of synthetics were estimated by the authors' largely on the basis of anecdotal evidence. For example, the data were estimated based partly on the belief that manufacturers of synthetic fibres generally out-spend the wool industry on research and promotion by three to one (Wool Industry Review Committee 1993).

Clearly, the data used in the analysis were far from perfect, a point which will receive attention later.

Selected Results for the Australian Fibre, Meat and Dairy Industries

Fibres

The following account of results for the Australian fibre industry, save for the final paragraph, has been extracted verbatim from the forthcoming paper by Hill et al (1996).

The estimated base general equilibrium promotion elasticities for Australian fibres are presented in Table 3. Consider, for example, the figures in the fifth column which are the general equilibrium elasticities associated with a one per cent increase in expenditure on apparel wool promotion on the export market. Such an increase would cause a 0.061 per cent increase in the price of apparel wool, a 0.083 per cent increase in the quantity of apparel wool traded, a 0.144 per cent increase in revenue for apparel wool producers, a 0.166 per cent increase in producer surplus accruing to apparel wool producers and a 0.062 per cent increase in their profits net of the incremental promotion expenditure.

The signs of the general equilibrium elasticities depend on a complex pattern of cross-commodity price and promotional relationships. For example, increased promotional expenditure on apparel wool will, as a 'first-round' affect, cause the demand for apparel wool to shift right and the price of apparel wool to increase. As a 'second-round' effect, the demand for substitute (e.g., cotton) can be expected to shift rightward (because the price of apparel wool is now at a higher level) causing the price of cotton to increase. This effect will lead to further adjustments in the apparel wool market. All of this is complicated further through cross-price relationships in supply and the fact that wool is sold domestically and internationally.

Kinnucan (1996) has shown that the 'own' price effects of incremental promotion expenditure can be zero or negative in the presence of cross-commodity effects of the type assumed in this paper. This also holds when the commodity concerned is sold on multiple markets. Consider a two-commodity example where both commodities are sold in two markets, the two commodities are substitutes in demand in each market as well as substitutes in supply and incremental promotion expenditure on commodity 1 has a positive (negative) effect on the demand for commodity 1(2). It can be demonstrated that an increment of promotion expenditure on commodity 1 in market 1 will have a zero effect on the price of commodity 1 (i.e., zero 'own' price effect) if:

$$(2) \qquad \frac{\tilde{\beta}^1_{11}}{\tilde{\beta}^1_{21}} = \left(\frac{\rho_2}{\rho_1}\right)\left(\frac{\rho_1\tilde{\eta}^1_{12} + (1-\rho_1)\tilde{\eta}^2_{12} + \tilde{\varepsilon}_{12}}{\rho_2\tilde{\eta}^1_{22} + (1-\rho_2)\tilde{\eta}^2_{22} + \tilde{\varepsilon}_{22}}\right)$$

or

$$(3) \qquad \frac{\tilde{\beta}^1_{11}}{\tilde{\beta}^1_{21}} = \left(\frac{\rho_2}{\rho_1}\right)\left(\frac{\tilde{\eta}^*_{12} + \tilde{\varepsilon}_{12}}{\tilde{\eta}^*_{22} + \tilde{\varepsilon}_{22}}\right)$$

where $\tilde{\eta}_{ij}$ = absolute value of the elasticity of demand for commodity i with respect to price of commodity j; $\tilde{\varepsilon}_{ij}$ = absolute value of the elasticity of supply of commodity i with respect to price of commodity j; $\tilde{\beta}_{ij}$ = absolute value of the elasticity of demand for commodity i with respect to promotion expenditure on commodity j; ρ_i = proportion of commodity i sold on market 1; subscripts 1,2 denote commodities 1 and 2, respectively; the * superscript denotes aggregate demand; and superscripts 1,2 denote markets 1 and 2, respectively. Note that $\tilde{\eta}^*_{ij}$ is the quantity-weighted average of $\tilde{\eta}^1_{ij}$ and $\tilde{\eta}^2_{ij}$. If the left-hand-side of (3) or (4) is greater (less) than the right hand-side then the 'own' price effect will be positive (negative).

Several of the general equilibrium price elasticities in Table 3 are extremely small and, in the case of apparel wool promotion on the domestic market, all the general equilibrium price elasticities are zero while, in the case of non-apparel wool promotion on the export market, the elasticities for apparel and non-apparel wool prices are zero (corrected to three decimal places). In some cases, the 'own' price effects from incremental promotion expenditure are negative (domestic cotton promotion, domestic synthetic fibre promotion, export cotton promotion and export synthetic fibre promotion). A point to keep in mind when rationalising these results is that a given rightward shift in the demand for a commodity in one market segment as a result of increased promotion expenditure will have a smaller impact on price the more elastic is aggregate demand and the more elastic is supply. For example, the bulk of Australia's apparel wool is exported and, hence, the aggregate demand elasticity for Australia's apparel wool is influenced heavily by the (assumed) higher export demand elasticity of -3.4 than the (assumed) lower domestic demand elasticity of -0.8.

The general equilibrium price elasticities are used to compute the general equilibrium quantity elasticities (see Piggott *et al.* 1995, equations 8-11) which are, in turn, used to compute general equilibrium elasticities for producer surplus (Piggott *et al.* 1995, equation 17). The zero values for several general equilibrium price elasticities and negative values for some 'own' price effects therefore filter through to zero or negative 'own' quantity and 'own' producer surplus effects. If the 'own' producer surplus effect from incremental promotion is zero or negative, the 'own' profit effect will be negative.

The profitability of incremental promotion expenditure can also be expressed in terms of benefit-cost ratios having the increase in producer surplus in the numerator and the increase in promotion expenditure in the denominator. The values of the numerator and denominator are calculated by applying the percentage changes from the matrix of general equilibrium elasticities to base values for producer surplus and promotion expenditure.

Selected benefit-cost ratios are reported in Table 4. An example of the calculations involved is given in Appendix A. The diagonal elements in Table 4 are benefit-cost ratios associated with a one per cent increase in the promotion expenditure indicated by the row and column heading, assuming all other forms of promotion expenditure remain constant. For example, if there is a one per cent increase in apparel wool promotion on the export market with all other forms of promotion expenditure remaining constant, there is a 1.498 dollar increase in producer surplus accruing to apparel wool producers for each additional one-dollar outlay on promotion. On the other hand, the producer surplus accruing to apparel wool producers is diminished by 0.211 dollars for each additional one-dollar outlay on domestic apparel wool promotion expenditure, assuming no change in other forms of promotion expenditure.

The off-diagonal elements in Table 4 are benefit-cost ratios associated with simultaneous one per cent increases in the promotion expenditures indicated by the row and column headings, assuming all other forms of promotion expenditure remain constant, *with the benefits and costs being those applying to the producers of the commodity corresponding to the row heading*. For example, if there is a simultaneous one per cent increase in domestic apparel wool and domestic cotton promotion expenditure, the producer surplus accruing to apparel wool producers declines by 11.258 dollars for each additional one-dollar outlay on apparel wool promotion. On the other hand, if there is a simultaneous one per cent increase in both domestic and export apparel wool promotion, the producer surplus accruing to apparel wool producers increases by 1.474 dollars for each additional one-dollar outlay on promotion expenditure.

The results of only five types of incremental promotion expenditure are presented in Table 4: domestic promotion of apparel wool, non-apparel wool, cotton and synthetic fibres and promotion of apparel wool on the export market. Moreover, only increments in two types of promotion at any one time are analysed. Nevertheless, the results shown in the table demonstrate the types of outcomes possible when cross-commodity impacts and multiple markets are considered. Some of the results are highlighted below.

- There are several negative ratios and some of those which are positive are also less than one. Such ratios indicate unprofitable incremental promotion expenditure. For example, increased domestic promotion of apparel wool is only profitable for apparel wool producers if it is accompanied by increased promotion of non-apparel wool on the domestic market or increased promotion of apparel wool on the export market.

- On the other hand, promotion of apparel wool on the export market is always profitable for apparel wool producers except for the case where it is accompanied by increased promotion of synthetic fibres on the domestic market.

- Increased promotion of apparel wool on the export market is more profitable for apparel wool producers if accompanied by a simultaneous increase in the promotion of non-apparel wool on the domestic market.

- Increased domestic cotton promotion is only profitable for cotton producers when accompanied by increased promotion of non-apparel wool on the domestic market or increased promotion of apparel wool on the export market (see Appendix A).

- Note the relatively much larger (in absolute value) benefit-cost ratios in the row for domestic cotton promotion. These are a result of the fact that the base ratio of cotton producer surplus to cotton promotion expenditure (1,738.7) is very large relative to that for the other fibres (e.g., 8.9 in the case of apparel wool). Hence, even if the percentage change in producer surplus following a one per cent increase in domestic cotton promotion (either alone or simultaneously with increased promotion expenditure on another fibre) is much less than one per cent, the benefit-cost ratio associated with the incremental promotion expenditure can be large in absolute value.

There has been a suggestion recently that an additional $70M be spent on apparel wool promotion in order to build market share. This would amount to a 17 per cent increase in the three-year budget for apparel wool promotion used as the base budget in calculating the results presented above. One can compare the benefit-cost ratios associated with different ways of allocating the additional expenditure. For example, assuming both domestic and export promotion expenditures are increased by 17 per cent, the benefit-cost ratio would be 1.48. The benefit-cost ratio decreases as more of the additional budget is allocated to domestic promotion. For example, if domestic promotion expenditure is increased by 50 per cent with the remainder of the additional $70M going to additional export promotion (representing a 15 per cent increase in the latter), the benefit-cost ratio decreases to 1.30.

Meats

Some results for Australian meats have been published in Piggott et al (1995) and are summarised here. The emphasis in that paper was on outlining methods and the types of questions that can be addressed. Hence, the types of results presented differed somewhat from those reported above for the fibre industry.

Two important results apparent from the matrix of general equilibrium elasticities (Table 5) are: (a) a one per cent increase in lamb promotion on either the domestic or export market causes a decrease in lamb producers' profits; and (b) export promotion of 'beef' and 'red meat' has a positive impact on the profits of all producer groups.

Various simulations were reported in the paper. For example, a simultaneous five per cent increase in domestic beef and lamb promotion expenditure was found to decrease pork producers' profits by about 0.1 per cent. If domestic beef promotion expenditure was increased by five per cent, pork producers would have to increase their promotion expenditure by a little less than five per cent in order to preserve their existing level of profit. These increments in promotion expenditure would result in beef profits increasing by 0.03 per cent and lamb profits decreasing by 0.08 per cent.

An experiment conducted since the paper was published addressed the following issue. Suppose that all forms of meat promotion expenditure were increased by one per cent. What would be the impact on profits across the different groups of producers and for the meat industry as a whole? How would these results compare with the situation in which the same increment in expenditure was used, perhaps along with contributions from elsewhere, to lobby for microeconomic reform which subsequently resulted in a one per cent increase in consumer incomes? The results are shown in Table 6. While beef

producers gain a little from an across-the-board increase in promotion expenditure, lamb, pork and chicken producers lose although the meat industry as a whole gains slightly (about $1.2M). The lobbying exercise is profitable for all producer groups and the industry as a whole gains $20M.

The effectiveness of meat promotion in enhancing producers' profits can also be presented as benefit-cost ratios showing the ratio of the increase in producer surplus to the increase in promotion expenditure. For example, in the cases of a one per cent increase in domestic promotion of beef, lamb and pork where each is assumed to occur in isolation, the benefit-cost ratios are 2.85, 0.49 and 1.84, respectively. The benefit-cost ratios associated with spending the extra dollars on lobbying which subsequently raises consumer incomes by one per cent are 14.85, 12.31 and 51.89 for beef, lamb and pork producers, respectively.

Dairy

Preliminary results from a study of the effectiveness of dairy promotion were presented in Hill, Piggott and Griffith (1996a) but those results have been modified as the research has continued. The big difference between modelling the impacts of dairy promotion versus those for meat and fibres is the high degree of government intervention in the Australian dairy industry.

The approach that has been taken in modelling returns to dairy promotion was to use equilibrium displacement modelling to simulate returns assuming a free-market situation as is expected to prevail by about the year 2000 and then to examine graphically how the returns would compare with those obtained in a situation of government intervention of the kind currently in place. This approach is similar to that used by Freebairn (1992a; 1992b) in modelling the impact of the Kerin Plan and evaluating returns to research in the Australian dairy industry.

The general equilibrium profit elasticities associated with dairy promotion under simulated free-market conditions are shown in Table 7. Generally, 'own-promotion' is profitable (positive elasticities) and has a negative or zero impact on profits in competing industries (negative or zero elasticities). An exception is that export promotion of dairy products is unprofitable. With the assumed elasticity figures, and given that exports account for only 2.3 per cent of raw milk under the simulated free-market conditions, the price rise associated with export dairy promotion was predicted to be negative after cross-commodity impacts are taken into account.

Benefit-cost ratios of the type presented for the fibre industry are given in Table 8. Note that an increment of domestic dairy promotion expenditure is profitable irrespective of whether it is accompanied by an increment of promotion expenditure on export markets or on domestic promotion expenditure on one of the competitor products. An increment of dairy export promotion expenditure is more unprofitable when accompanied by an increment in domestic promotion expenditure on one of the competitor products than if it occurs in isolation. It is profitable when accompanied by an increment of domestic dairy promotion.

Graphical analysis suggests that the returns to increased dairy promotion are higher in the current regulated market setting than in a free-market situation. However, this analysis does not take into account cross-commodity impacts which, as shown above, complicate outcomes considerably.

Sensitivity Analysis

In all of three studies discussed above, only a very crude sensitivity analysis was undertaken but it was sufficient to reveal that results certainly do change with assumptions about the magnitude of Marshallian demand and supply elasticities. In the

cases of fibres and meats, while the signs of the general equilibrium profit elasticities were robust with respect to a variety of changes in parameter values, some profit elasticities were changed markedly. For example, doubling all the domestic own- and cross-promotion elasticities resulted in the own-profit elasticity for export apparel wool promotion changing from 0.062 to 0.249. In the case of the dairy study, a doubling of supply elasticities resulted in domestic dairy promotion becoming unprofitable under assumed free-market conditions.

There is scope for undertaking a much more sophisticated type of sensitivity analysis using, for example, Monte Carlo-type simulation procedures and this will be one of the directions of future research. There are now software packages available which can be used in conjunction with spreadsheet packages (e.g., the @Risk add-on to Excel) to undertake such analyses.

The Importance of Cross-Commodity Impacts

It is insightful to examine the various components which make up the BCRs working from the demand functions in which most of the cross-commodity relationships are embodied. This analysis is presented in Appendix B for the case of apparel wool promotion and serves to highlight the importance of induced price changes following an increment of promotion expenditure in determining the value of the benefit-cost ratios. Note, in particular, that changes in the prices of synthetic fibres and cotton are important in determining the benefit-cost ratio associated with increased apparel wool promotion.

The benefit-cost ratios associated with own-promotion of fibres were recomputed assuming: (a) cross-promotion elasticities were zero; and (b) cross-price elasticities were zero. Note that, in the evaluation of the effectiveness of own-promotion, the latter amounts to assuming that the only impact of promotion is to shift the promoted commodity's demand function along a stationary supply function which, of course, is the assumption implicit in most of the early empirical work on the effectiveness of commodity promotion programs. The results are shown in Table 9. Ignoring cross-promotion effects biases the benefit-cost ratios upward in all cases. Ignoring cross-price elasticities biases the benefit-cost ratios upwards in three cases and downwards in two cases.

The implications of ignoring cross-demand effects have been explored by Kinnucan (1996). He refers to cross-promotion demand effects as 'spillover' and cross-price demand effects as 'feedback'. A graphical depiction of the concepts is given in Figure 1. It is assumed that there are two commodities--wool and synthetics--each sold on a single market and in fixed supply. Initially the price of each commodity is given by P_1. An increment of expenditure on wool promotion shifts demand from D_1 to D_2, with the size of the horizontal shift depending on the own-promotion elasticity for wool, β_{ww}. Spillover shifts the demand for synthetics from D_1 to D_2, with the size of the horizontal shift depending on the cross-promotion elasticity for synthetics with respect to wool promotion, β_{sw}. If these were the only effects, prices for wool and synthetics would rest at P_2. However, relative prices have changed and this induces feedback: because the price of synthetics has fallen, the demand for wool shifts leftward to D_3 with the size of the horizontal shift depending on the cross-price elasticity of demand for wool with respect to the price of synthetics, η_{ws}; and because the price of wool has risen, the demand for synthetics shifts rightward to D_3 with the size of the horizontal shift depending on the cross-price elasticity of demand for synthetics with respect to the price of wool, η_{sw}. The final prices in each market are at P_3.

In this simple model, for a given outlay of additional promotion expenditure on wool, the increased profits to wool producers are directly related to the extent of the price increase for wool. Profits (net of promotion expenditure) can be decreased by the increment of promotion expenditure if the price rise for wool is sufficiently small. Indeed, the price

rise for wool might be negative. The likelihood of a small or negative price rise for wool is greater the more inelastic is the demand for synthetics, the greater is the promotion spillover effect and the greater is the feedback effect from synthetics to wool. If feedback effects are ignored, and irrespective of whether spillover effects are ignored, the price movement for wool would be predicted to be from P_1 to P_2: the increase in profits for wool producers would be overstated. If spillover effects are ignored but feedback effects are included, then the price for wool would be predicted to rise above P_2 because the initial rise in the price of wool from P_1 to P_2 would lead to a prediction of an increase in demand for synthetics to the right of D_1 and, hence, a rise in the price of synthetics above P_1 and a further shift in wool demand to the right of D_2.

Tracing through the effects of ignoring spillover and/or feedback becomes more complex when allowance is made for products to be sold on more than one market and own- and cross-supply responses are introduced. However, it should be clear that ignoring cross-commodity effects has the potential to bias results severely.

Concluding Comments

As with any analytical tool, the modelling procedure used in the Australian studies discussed above have weaknesses which are discussed in various publications (e.g., Piggott 1992 and Piggott *et al.* 1995). The procedure does lend itself to speedy generation of results provided, of course, the analyst is prepared to make informed judgments about missing parameter values. Sensitivity analysis of the type recommended above can offset lack of information to some degree.

While the assumed parameter values used in the Australian studies were based in part on elasticities derived from previous econometric studies, information on some elasticities was extremely limited, particularly with regard to own- and cross-promotion elasticities. In this context, recent econometric work (e.g., Piggott et al 1996) aimed at producing theoretically consistent sets of demand parameters incorporating promotion effects and flexible functional forms will facilitate future research. But even basic information on the base prices, quantities and promotion expenditures was scarce or non-existent in some cases. Moreover, data limitations required the authors to use highly-aggregated measures of promotion (e.g., export promotion of apparel wool). In practice there are many types of promotion expenditure and, in principal, one would expect them to vary in their effectiveness.

Given the public policy dimensions of the promotion issue, it seems reasonable that industries be required to provide data to assist public evaluation of promotion programs. This ought to include very detailed breakdowns of how promotional dollars are spent. Indeed, it would be in the public interest if industry representatives and researchers liaised on data needs to support the public evaluation of promotion programs.

Notwithstanding the limitations of the modelling approach and data deficiencies, it does seem that several forms of incremental promotion expenditure in the Australian fibre, meat and dairy industries are at the very least questionable in terms of benefits to producers. The returns from alternative uses of levy dollars, in particular, the returns from research and development, are also difficult to measure and highly uncertain, although many studies have suggested that the returns are high (see, for example, Scobie, Mullen and Alston 1991). As explained at the outset, a major concern is that evaluation of the profitability of incremental promotion expenditure seems to be given relatively little attention compared with incremental expenditure on research and development, even though expenditure of levy dollars on promotion far exceeds expenditure of levy dollars on research and development. Little is known about the *ex-ante* evaluation process for promotion campaigns, although *ex-ante* and *ex-post* evaluations of promotion campaigns, like any other investment decision, are important management tools.

In this paper attention has not been given to the vertical distribution of benefits and costs from incremental promotion expenditure. This would be an obvious extension to the present analysis, as would 'endogenising' promotion expenditure by incorporating a tax variable in the supply functions within the structural models.

Appendix A

Calculating Cotton Benefit-Cost Ratios

The following notation is used in the example below:

BCR = benefit-cost ratio

Q_c = equilibrium quantity of cotton

P_c = equilibrium price of cotton

PS_c = cotton producer surplus

A_c^d = expenditure on domestic cotton promotion

A_c^e = expenditure on export cotton promotion

EQ_c = proportionate change in Q_c

EP_c = proportionate change in P_c

EPS_c = proportionate change in PS_c

EA_c^d = proportionate change in A_c^d

EA_c^e = proportionate change in A_c^e

$\pi(P_c, A_c^d)$ = general equilibrium elasticity of P_c with respect to A_c^d

$\pi(P_c, A_c^e)$ = general equilibrium elasticity of P_c with respect to A_c^e

ε_{cc} = own-price elasticity of cotton supply.

The change in producer surplus for any commodity resulting from an increment of promotion expenditure on that commodity or a related commodity is measured as $2EQ_c + EQ_c^2$. The value of EQ_c can be found either by working from the demand function or the supply function.

The following example (see next page) of the calculation of benefit-cost ratios for cotton promotion will serve to demonstrate. (This particular example is interesting because of an anomaly: a one per cent increase in domestic cotton promotion is more profitable to cotton producers if accompanied by a one percent increase in domestic non-apparel wool promotion than if it occurs alone.)

For an increase in domestic cotton promotion alone:

$$BCR = EPS_c(PS_c) \div EA_c^d(A_c^d)$$

$$PS_c = \$869.379425M$$

$$A_c^d = \$0.5M$$

$$EPS_c = 2EQ_c + (EQ_c)^2$$

$$EQ_c = \varepsilon_{cc} EP_c$$

$$= \varepsilon_{cc} \pi(P_c, A_c^d) EA_c^d$$

$$= (1.5)(-0.01224)(0.01)$$

$$= -0.0001836$$

$$EPS_c = -0.0003672$$

$$EPS_c(PS_c) = \$-0.3192069M$$

$$EA_c^d(A_c^d) = \$0.005M$$

$$BCR = -0.3192069 \div 0.005$$

$$= -63.841$$

For an increase in domestic cotton promotion accompanied by an increase in domestic non-apparel wool promotion:

$$EP_c = \pi(P_c, A_c^d) EA_c^d + \pi(P_c, A_n^d) EA_n^d$$

$$= (-0.01224)(0.01) + (0.04728)(0.01)$$

$$= 0.00035$$

$$EQ_c = (1.5)(0.00035)$$

$$= 0.00053$$

$$EPS_c = 0.00105$$

$$BCR = 182.816$$

Appendix B

An Example of Decomposing Benefit-Cost Ratios

The equilibrium quantity of apparel wool demanded (Q) has to satisfy the equation:

$$Q = D_a^d(P_a, P_n, P_c, P_m, A_a^d, A_c^d, A_m^d, Z_1) + D_a^e(P_a, P_c, P_m, A_a^e, A_c^e, A_m^e, Z_2)$$

If there is a change in A_j^d and/or A_j^e, the resulting proportionate change in Q (i.e., EQ) on which the change in producer surplus depends (see Piggott et al 1995, equation A.14) will be the sum of terms containing : (a) general equilibrium elasticities for price with respect to promotion variables; (b) Marshallian price and promotion elasticities; (c) proportions sold on the domestic and export market; and (d) the proportionate changes in the promotion variables. In our model there are eight components when only domestic apparel wool promotion is increased and 16 components when both domestic and export promotion of apparel wool is increased. The contribution of the various components to the change in equilibrium quantity in the case of an increase in domestic wool promotion are shown in Table B.1.

This allows one to decompose the (approximate) BCR into (a) direct promotion impacts; and (b) indirect impacts through induced price changes. The decompositions are shown in Table B.2. In both cases the effects come mainly through export market effects because of high price elasticities, the high level of export relative to domestic promotion expenditure and the high proportion of wool exported.

Table 1: Expenditure of Levy Dollars on Promotion vs. Research and Development: Australian Wool, Red Meat and Dairy Industries[a]

Commodity/ Year	Promotion		Research and development		Total	
	$M	%	$M	%	$M	%
Wool						
1989/90	173.355	77.645	49.911	22.355	223.266	100
1990/91	215.069	78.453	59.067	21.547	274.136	100
1991/92	168.000	78.116	47.064	21.884	215.064	100
1992/93	137.086	76.217	42.776	23.783	179.862	100
1993/94	114.377	76.576	34.987	23.424	149.364	100
1994/95	99.806	78.932	26.639	21.068	126.445	100
Average	*151.282*	*77.657*	*43.407*	*22.343*	*194.690*	*100*
Red Meat						
1990/91	54.907	64.612	30.072	35.388	84.979	100
1991/92	61.412	64.486	33.821	35.514	95.233	100
1992/93	70.226	59.930	46.955	40.070	117.181	100
1993/94	70.911	59.983	47.307	40.017	118.218	100
1994/95	70.611	60.624	45.862	39.376	116.473	100
Average	*65.613*	*61.927*	*40.803*	*38.073*	*106.417*	*100*
Dairy						
1990/91	14.292	67.415	6.908	32.585	21.200	100
1991/92	14.300	60.750	9.239	39.250	23.539	100
1992/93	14.963	54.452	12.516	45.548	27.479	100
1993/94	16.236	54.948	13.312	45.052	29.548	100
1994/95	19.489	53.040	17.255	46.960	36.744	100
Average	*15.856*	*58.121*	*11.846*	*41.879*	*27.702*	*100*

[a] The sources are: (a) for wool, various Annual Reports of AWC, WRDC, AWRAPO and pers. comm. with IWS and AWRAP; (b) for red meat, Annual Reports of MRC and AMLC; and (c) for dairy, Annual Reports of DRDC, various issues of DRDC's *Research in Progress* and Annual Reports of ADC.

Table 2: Base Marshallian Elasticity Matrix for Fibre Study[a]

Dependent variable	Elasticity with respect to											
	Apparel wool price	Non-apparel wool price	Cotton price	Synthetic fibre price	Domestic apparel wool promotion	Domestic non-apparel wool promotion	Domestic cotton promotion	Domestic synthetic fibre promotion	Export apparel wool promotion	Export non-apparel wool promotion	Export cotton promotion	Export synthetic fibre promotion
Domestic apparel wool demand	-0.80	0.05	0.20	0.30	0.20	0.00	-0.025	-0.05	0.00	0.00	0.00	0.00
Export apparel wool demand	-3.40	0.00	1.30	1.60	0.00	0.00	0.00	0.00	0.20	0.00	-0.05	-0.10
Domestic non-apparel wool demand	0.10	-0.80	0.20	0.30	0.00	0.10	-0.025	-0.10	0.00	0.00	0.00	0.00
Domestic cotton demand	0.05	0.02	-0.20	0.10	-0.05	-0.05	0.10	-0.10	0.00	0.00	0.00	0.00
Export cotton demand	25.00	10.00	-86.00	50.00	0.00	0.00	0.00	0.00	-0.05	-0.05	0.10	-0.15
Domestic sythetic fibre demand	0.05	0.15	0.10	-0.40	-0.05	-0.10	-0.05	0.20	0.00	0.00	0.00	0.00
Export synthetic fibre demand	350.00	100.00	857.00	-2008.00	0.00	0.00	0.00	0.00	-0.10	-0.05	-0.05	0.20
Apparel wool supply	1.40	-0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-apparel wool supply	-0.10	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cotton supply	0.00	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Synthetic fibre supply	0.00	0.00	0.00	1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[a] Source is Hill, Piggott and Griffith (1996). Values are based on published estimates and authors' judgement.

Table 3: General Equilibrium Promotion Elasticities for Australian Fibres[a]

Dependent variable	Promotion variable							
	Domestic apparel wool	Domestic non-apparel wool	Domestic cotton	Domestic synthetic fibres	Export apparel wool	Export non-apparel wool	Export cotton	Export synthetic fibres
Price								
Apparel wool	0.000	0.033	-0.009	-0.033	0.061	0.000	-0.015	-0.032
Non-apparel wool	0.000	0.066	-0.017	-0.066	0.014	0.000	-0.003	-0.008
Cotton	0.000	0.047	-0.012	-0.047	0.035	-0.001	-0.007	-0.021
Synthetic fibres	0.000	0.053	-0.014	-0.052	0.029	-0.001	-0.006	-0.016
Quantity								
Apparel wool	0.000	0.033	-0.009	-0.033	0.083	-0.001	-0.020	-0.043
Non-apparel wool	0.000	0.076	-0.019	-0.076	0.011	0.000	-0.002	-0.006
Cotton	-0.001	0.071	-0.018	-0.070	0.052	-0.002	-0.010	-0.031
Synthetic fibres	-0.001	0.096	0.025	-0.094	0.051	-0.001	-0.011	-0.029
Revenue								
Apparel wool	0.000	0.067	0.017	-0.066	0.144	-0.001	-0.034	-0.076
Non-apparel wool	0.000	0.142	-0.036	-0.141	0.024	0.000	-0.005	-0.014
Cotton	-0.001	0.118	-0.031	0.117	0.087	-0.003	-0.017	-0.052
Synthetic fibres	-0.001	0.149	-0.039	-0.146	0.080	-0.002	-0.018	-0.045
Producer Surplus								
Apparel wool	0.000	0.067	-0.018	0.066	0.166	-0.001	-0.039	-0.087
Non-apparel wool	0.000	0.152	0.038	0.151	0.021	0.000	-0.005	-0.012
Cotton	-0.001	0.142	-0.037	-0.140	0.104	-0.003	-0.021	-0.063
Synthetic fibres	-0.002	0.191	-0.050	0.188	0.103	-0.002	-0.023	-0.058
Net Profit								
Apparel wool	-0.002	0.067	-0.018	-0.066	0.062	-0.001	-0.039	-0.087
Non-apparel wool	0.000	0.042	0.038	0.151	0.021	0.000	-0.005	-0.012
Cotton	-0.001	0.142	-0.037	-0.140	0.104	-0.003	-0.021	-0.063
Synthetic fibres	-0.002	0.191	-0.050	0.227	0.103	-0.002	-0.023	-0.058

[a] The numerical values indicate the percentage change in the dependent variable indicated in the row heading with respect to a one per cent increase in expenditure on the promotion variable indicated in the column heading after allowing for all cross-market impacts.

Table 4 Selected Benefit Cost Ratios Associated with Australian Fibre Promotion[a]

Promotion variable	Promotion variable				
	Dom. apparel wool	Dom. non-apparel wool	Dom. cotton	Dom. synthetics	Export apparel wool
Dom. apparel w.	-0.211	41.687	-11.258	-41.477	1.474
Dom. non-apparel w.	1.224	1.226	0.916	0.003	1.396
Dom. cotton	-65.624	182.816	-63.841	-307.860	117.636
Dom. synthetics	-6.045	0.093	-7.591	-5.995	-2.715
Export apparel wool	1.474	2.102	1.339	0.904	1.498

[a] The diagonal elements are benefit-cost ratios associated with a one per cent increase in the promotion expenditure indicated in the row and column headiag, assuming all other forms of promotion expenditure remain constant. The off-diagonal elements are benefit-cost ratios associated with simultaneous one per cent increases in the promotion expenditures indicated by the row and column headings assuming all other forms of promotion expenditure remain constant, with the benefits and costs being those applying to the producers of the commodity corresponding to the row heading.

Table 5: Meat General Equilibrium Profit Elasticities

Profits	Promotion variable						
	Dom. beef	Dom. lamb	Dom. red meat	Export beef	Export lamb	Export red meat	Dom. pork
Beef	0.010	0.004	0.008	0.017	0.000	0.014	-0.003
Lamb	-0.009	-0.012	0.003	0.004	0.013	0.002	-0.007
Pork	-0.011	-0.011	-0.010	0.006	0.000	0.004	0.011
Chicken	-0.023	-0.023	-0.022	0.003	0.000	0.002	-0.011

Table 6: Profit Impacts of Increased Promotion versus Domestic Consumer Income Enhancement: Australian Meats

Industry	Percentage increase in profits associated with a one per cent increase in:	
	Promotion	Consumer incomes[a]
Beef	0.04	0.2
Lamb	0.03	0.5
Pork	-0.01	0.7
Chicken	-0.07	0.7
All meat	0.02 ($ 1.2M)	0.33 ($20M)

[a] Assumes income elasticities of demand at farm level of 0.5.

Table 7: Dairy General Equilibrium Profit Elasticities

Profits	Promotion variable			
	Domestic dairy	Domestic fruit juice	Domestic soft drink	Export dairy
Raw milk	0.018	-0.016	-0.011	-0.006
Fruit juice	0.010	0.007	-0.017	-0.001
Soft drink	-0.015	-0.033	0.066	-0.034
Margarine	0.008	0.000	0.000	0.000

Table 8: Dairy Benefit-Cost Ratios[a]

Profits	Promotion variable			
	Domestic dairy	Domestic fruit juice	Domestic soft drink	Export dairy
Domestic dairy	1.616	1.029	1.232	1.342
Domestic fruit juice	0.881	1.260	0.619	1.227
Domestic soft drink	275.574	181.272	356.427	172.486
Export dairy	1.342	-2.939	-1.927	-0.018

[a] The diagonal elements are benefit-cost ratios associated with a one per cent increase in the promotion expenditure indicated in the row and column heading, assuming all other forms of promotion expenditure remain constant. The off-diagonal elements are benefit-cost ratios associated with simultaneous one per cent increases in the promotion expenditures indicated by the row and column headings assuming all other forms of promotion expenditure remain constant, with the benefits and costs being those applying to the producers of the commodity corresponding to the row heading.

Table 9: Selected Fibre Promotion Benefit Cost Ratios: Full Effects versus Partial Effects[a]

	Full effects	No spillover	No feedback	No spillover or feedback
Domestic apparel w.	-0.211	0.268	0.187	0.187
Domestic non-apparel w.	1.226	1.230	0.969	0.969
Domestic cotton	-63.841	0.775	0.430	0.430
Domestic synthetic fibres	-5.995	0.217	0.113	0.113
Export apparel wool	1.498	1.511	1.054	1.054

[a] The numerical entries in the first column are the diagonal elements from Table 4. That is, they are the benefit-cost ratios associated with 'own-promotion' assuming other forms of promotion expenditure remain constant. The remaining columns are the benefit-cost ratios when either spillover, feedback or both effects are ignored.

Table B.1: Components of EQ for Increased Domestic Apparel Wool Promotion[a]

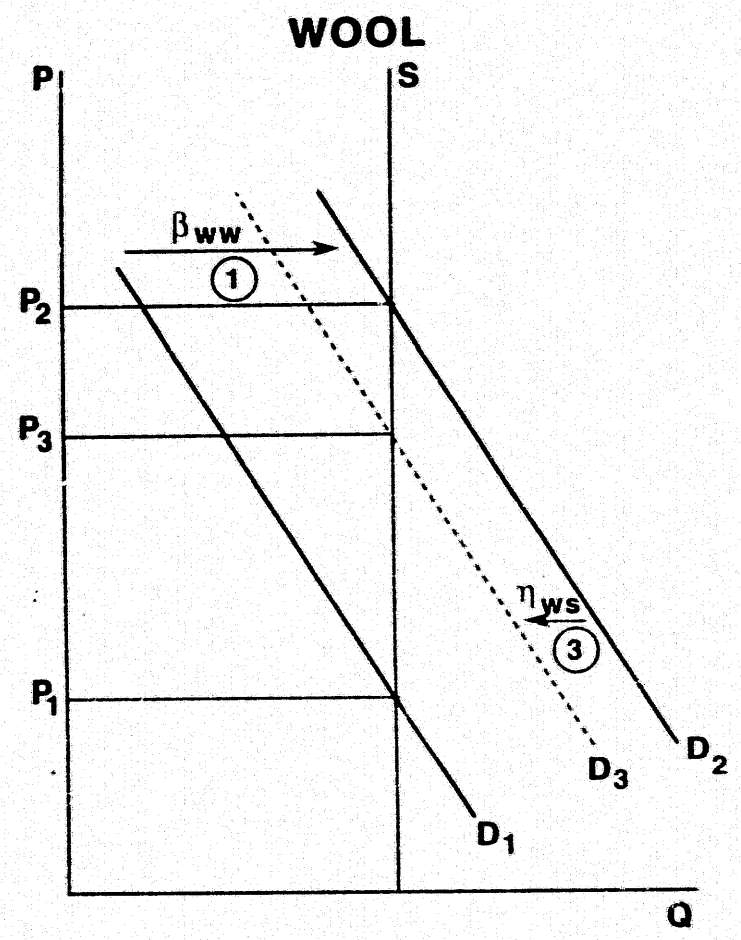
Component	% contribution
$\rho\,\eta^{s}_{aa}\,\pi(P_a, A^d_a)\,EA^d_a$	-0.165
$\rho\,\eta^{d}_{ae}\,\pi(P_e, A^d_a)\,EA^d_a$	0.009
$\rho\,\eta^{d}_{ac}\,\pi(P_c, A^d_a)\,EA^d_a$	0.104
$\rho\,\eta^{d}_{am}\,\pi(P_m, A^d_a)\,EA^d_a$	0.199
$(1-\rho)\,\eta^{s}_{aa}\,\pi(P_a, A^d_a)\,EA^d_a$	-274.924
$(1-\rho)\,\eta^{s}_{ac}\,\pi(P_c, A^d_a)\,EA^d_a$	264.177
$(1-\rho)\,\eta^{s}_{am}\,\pi(P_m, A^d_a)\,EA^d_a$	414.806
$\rho\,\beta^{d}_{aa}\,EA^d_a$	-304.205
Total	100

[a] In interpreting the results in needs to be kept in mind that EQ is actually negative when there is an increment of domestic apparel wool promotion (all other forms of promotion remaining constant) so that a negative percentage contribution in the results indicates that the particular effect had a positive influence on Q.

Table B.2: Components of BCRs for Increased Apparel Wool Promotion

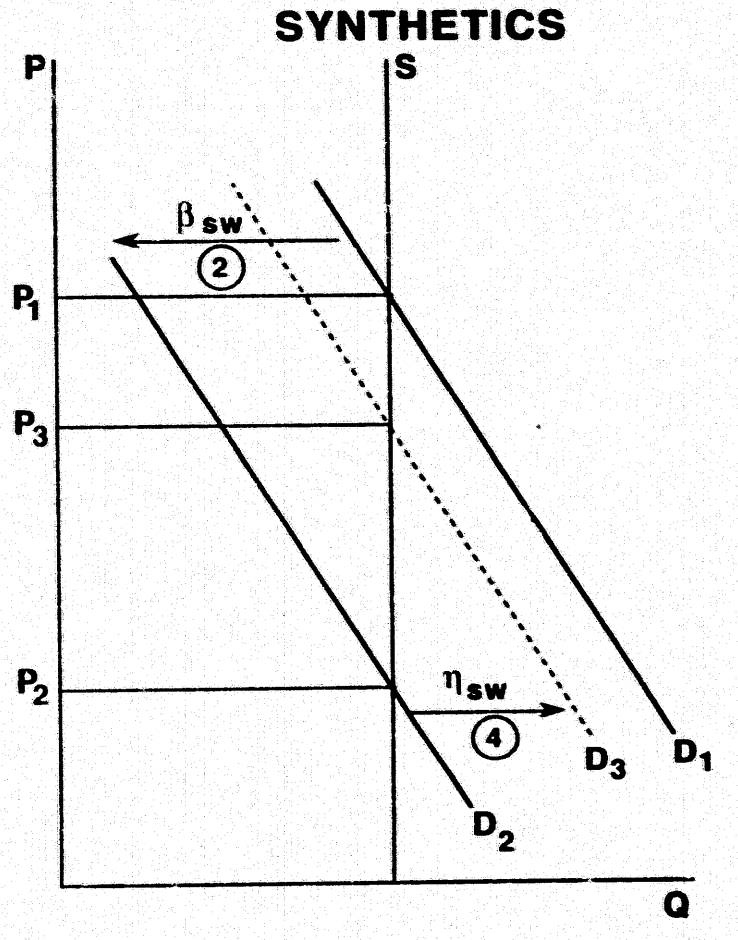
	Increased domestic promotion only	Increased domestic and export promotion
	(%)	(%)
Direct promotion impact	-304	242
Change in P_a	-275	-251
Change in P_n	≈0	≈0
Change in P_c	264	54
Change in P_m	415	54
Total	100	99

Figure 1: Spillover And Feedback



$D_1 \rightarrow D_2$ = 'own-promotion' effect

$D_2 \rightarrow D_3$ = feedback



$D_1 \rightarrow D_2$ = spillover

$D_2 \rightarrow D_3$ = feedback

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