Estimating the Financial Impacts on Producers of Deregulation in the NSW Egg Industry

Andrea Strong, Jim Johnston, Wayne Green and Graham Marshall *

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* Division of Rural and Resource Economics, NSW Agriculture & Fisheries, P.O Box K220, Haymarket, 2000. The views expressed in this paper are those of the authors and do not necessarily reflect those of NSW Agriculture & Fisheries.

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Abstract

Policy reforms to regulations in industry involve distributive effects on the wealth of producers and consumers. These effects play an important part in government decisions on whether deregulation should occur, how the deregulation should be implemented, and whether and at what level compensation should be paid to injured parties.

One of the principal concerns in the NSW egg industry when the deregulation option was being considered by government was the distributional impact on the wealth of egg producers, given the debt incurred by legal producers to purchase quota. This paper describes the analyses which were undertaken into the debt levels of egg producers which formed an important ingredient to the subsequent decision to deregulate the NSW egg industry and make ex gratia payments to egg producers of $61 million. The procedure involved obtaining a large data matrix of sales, leases and transfers of quota over the 1985 to 1989 period, synthesising the terms of purchase and debt levels for all producers, and establishing indicators for producers with critically high debt levels.

Results from the analysis indicated total debt in the NSW egg industry due to quota purchases was in the order of $20 million with an estimated 53 per cent of producers holding no debt and some 12 per cent of producers possibly in financial difficulty even with a $15 per quota payout.

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* The authors are Economists and + Director Economic Policy, respectively with NSW Agriculture & Fisheries.

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1. Introduction

When changes to product marketing arrangements are advocated by economists, it is usually argued that deregulation will promote economic efficiency and remove inefficiencies associated with bureaucratic involvement in industry. Whether such reforms to regulations are pursued by government is however often dependent on the distributional implications for producers and consumers rather than efficiency effects. Hence, the effectiveness of policy advice and the credibility of economic advisers will often depend on the extent to which they have analysed and documented the expected distributional effects.

In undertaking research on the likely impacts of alternative changes to egg marketing arrangements in NSW it was therefore important to try and trace the distributional effects. Several types of distributional effects were important both in creating the social pressures and political will for deregulation and in shaping the final policy adopted. The first was the income transfer from consumers to producers which the regulations caused through setting egg prices above the competitive equilibrium. This transfer effect had been well documented in the economics literature (Davis and Briggs 1983; BAE 1983) but only became a prominent public controversy when highlighted by the stance taken in the late 1980s by unlicensed egg producers in NSW. The approach adopted by these illegal producers, combined with media articles (Sutchbury 1988) which drew upon the conclusions derived in economics literature, aroused public awareness of equity and efficiency effects of egg industry regulation and caused consumers to perceive they were paying too much for eggs.

The second major type of distributional effect of regulations in the NSW egg industry, while strictly not separate from the first, involved the redistribution of income between producers. Income was transferred from producers entering or expanding in the NSW egg industry to those producers who were initially allocated with quota or who had purchased quota prior to changes in regulation. New entrants and the expansion of existing producers was encouraged by improvements to technology, which lowered production costs, and changes to production and marketing regulations that further increased egg industry profitability.

Deregulation of the egg industry had the potential to provide consumers with lower egg prices, assuming deregulation produced a competitive market. Such gains to consumers however would not necessarily occur at the expense of those who had been the beneficiaries of past transfers, rather, consumers would gain at the expense of present quota holders most of whom had purchased quota.

Claims by producers that they could be bankrupted by deregulation and that this was unfair since they were not the beneficiaries of free initial quota allocations therefore potentially had some validity and needed to be investigated. With this in mind, information on the number, amount and structure of debts incurred by legal producers to purchase quota was estimated. This is the principal subject of this paper. In order to provide a background for the distributional analysis however, attention is first given

to the efficiency and distributive effects of the pre August 1989 regulations and issues of compensation which emerge as a result of distributional effects of policy reform.

In section 2 of this paper a historical background to egg industry regulation is presented. This is followed in section 3 by a description of the industry structure including supply side characteristics, marketing features and industry regulations. The key features of deregulation implemented are described in section 4 and in section 5 an outline of the welfare analysis undertaken to quantify social costs and income transfers is provided. A theoretical analysis of compensation argument is briefly addressed in section 6 while in section 7 the analysis of the distributional impacts on producer debt levels is contained. The paper concludes with a summary of the analysis undertaken.

Two appendices accompany the paper. The first describes the deregulation options considered in the review of regulations in the NSW egg industry while the second presents a more detailed outline of the methodology used in estimating welfare effects of deregulation options.

2. History

The NSW egg industry has been regulated since the 1920s. An Egg Marketing Board was established in 1928 under the Marketing of Primary Products Act 1927, to market egg production and ensure industry quality standards. The early system was characterised by marketing regulation involving a home consumption pricing scheme and State equalisation egg levy. In 1965 the State egg levy was replaced by a national hen levy. This levy prevented NSW producers who were trading interstate under the protection of Section 92 of the constitution, from avoiding egg levy payments.

By instituting a levy on hens, as a more easily monitored surrogate for egg production, an incentive was created for producers to increase the productivity per hen. Faced with the inevitable subsequent increase in productivity and falling export returns in 1971-72, the Egg Industry Stabilisation Act 1971, was introduced. This legislation established a licensing system for producers with quota restrictions limiting the number of hens producers were allowed to hold. Below a maximum quota holding of 100,000 birds per producer, quota was freely tradeable.

Growth in productivity continued under the quota system due to technological advances such as genetic improvements and better nutrition. The higher production was in excess of consumption on the domestic market and was sold on low priced world markets. A large disparity exists between domestic shell egg prices and prices on the egg product export market. Cuts to initial quota allocations progressively reduced the national quota from 5.5 million birds in 1974 to 4.1 million in 1984. However these cuts were insufficient to eliminate the over supply.

To address these problems of matching production with domestic demand the Egg Industry Act 1983, was constituted. The Act replaced the NSW Egg Marketing Board by the NSW Egg Corporation with the view to making egg marketing operations in NSW more competitive and efficient. Under the same Act the Poultry Farmers' Licensing Committee (PFLC) was formed for the purpose of administering hen quota in order to control production so that returns could be maximised from domestic consumption of eggs and egg product and profitable export markets. In 1983 PFLC introduced condition of licence cuts. Because legislation exempted quota holdings of less than 5,000 birds from being

reduced, previous pro rata quota reductions were biased against larger producers. Condition of licence cuts operated by reducing the allowable number of birds held by all producers to a percentage of their base quota holding. Prior to deregulation condition of licence cuts were operating at 73 per cent. A more detailed chronology and description of regulations in the NSW egg industry has been documented by Green (1989). Further details of egg industry regulations prior to deregulation are presented in this paper in Section 3.

3. Industry Structure

3.1 Production

The NSW egg industry is characterised by falling overall numbers of producers but increasing numbers of producers operating larger farms. In 1973-74 there were 1,856 licensed egg producers in NSW. By 1987-88 this number had fallen to 321. The fall in numbers occurred in the category of the smallest producers (holding less than 20,000 hen quota). The number of the smallest producers fell from 1,830 to 264 from 1973-74 to 1987-88 while the number of producers with quota holdings greater than 50,000 rose from 4 to 23 over the same period. Average quota holdings increased over 300 per cent from 2,947 in 1973-74 to 12,700 in 1987-88. Part of this increase is due to condition of licence cuts which, by restricting the percentage of useable quota, caused idle capacity in the industry. In an attempt to utilise this excess capacity, producers purchased or leased additional quota units thus increasing the size of their quota holdings while leaving the size of their hen flocks unchanged.

Table 1: Number of Producers According to Size of Quota Holding

Size of Hen Quota	1972-73*	1983-84	1984-85	1985-86	1986-87	1987-88
Up to 20,000	1,830	494	425	355	330	264
20,001 - 50,000	22	37	37	41	32	34
Over 50,001	4	9	16	14	19	23
	1,856	540	478	410	381	321

* The Hen Quota Scheme was introduced in 1972-73
Source: PFLC (1988)

The increasing concentration in the NSW egg industry is further reflected in Table 2 where it is apparent that 18 per cent of producers in 1987-88 hold 68 per cent of hen quotas.

Table 2: Production by Size of Hen Quota Holding and Number of Producers, 1987-88

Size of Hen Quota	No. of Licensees	%	Total Quota (millions)	% Total
Up to 20,000	264	83	1.3	32
20,001 to 50,000	34	11	0.9	23
Over 50,001	23	7	1.8	45

Despite the concentration reflected in Tables 1 and 2, the majority of producers in the industry still have holdings of quota totalling less than 20,000.

Another significant characteristic of the NSW egg industry is increasing productivity. According to estimates by NSW Agriculture & Fisheries the number of eggs per hen per annum had increased from approximately 18 dozen in 1976 to 22.6 in 1987-88. Superior breeding, finely tuned feed mixes, improved veterinary care and advances in controlled shedding environments have contributed to gains in productivity. Quota restrictions have tended to pressure technical advances in hen productivity, the limiting input to the production mix, rather than the operation as a whole. The regulated system has prevented optimal structural adjustment in the NSW egg industry thus causing the industry to operate above its lowest possible marginal cost curve (Beck 1974, Alston 1986, Davis and Briggs 1983 and BAE 1983).

The majority of producers are specialised in producing eggs in highly capitalised intensive systems. However there is an increasing tendency to operate the higher cost free range systems because of premium prices paid by consumers concerned with animal welfare and health issues. The majority of NSW egg producers are concentrated in the Sydney and Tamworth areas. It was estimated that of the 321 licensed quota holders in 1987-88 there were only 251 distinct entities. According to PFLC' records, in many cases several licences were effectively owned by a single individual. This fact was important for the analysis of debt levels of producers.

In 1987-88, 79.1 million dozen eggs were produced. Of these 59.1 million dozen were sold on the domestic shell market, 11.7 million dozen went into egg product and 7.8 million dozen were sold on the export market. The remaining 0.5 million dozen were stored. Hence there were 8.3 million dozen eggs in NSW in excess of domestic markets and 20 million dozen for which hen levies were required for price equalisation. Unlicensed producers illegally held an estimated 80,000 hens which, at 22.6 dozen eggs per bird, were capable of producing 1.8 million dozen eggs.

3.2 Types of Producers

There are three categories of producers classified according to marketing function. The three groups are producer agents, producer packers and consignors. Producer agents perform all marketing functions, grading,

candling and packing eggs and supplying eggs direct to retail outlets at a minimum wholesale price set by the Corporation. Producer packers grade, candle and pack eggs but deliver to the Corporation or producer agents for distribution, while consignors only produce eggs. In 1989 there were 158 producer packers and producer agents, and 93 consignors. Producers in the Tamworth area are almost exclusively consignors.

3.3 Marketing Arrangements in the NSW Egg Industry

In 1983-84 producer agents held 31 per cent of the total shell egg market. By 1987-88 this share had increased to 54 per cent at the expense of Corporation sales. The Corporation supplied about 90-95 per cent of the lower value egg product sales and all export sales. Trading losses for the Corporation in 1987-88 amounted to $15.1 million. Losses incurred by the Corporation were funded by profitable shell egg and egg product sales as well as hen levies collected from producers. No taxpayers' funds were available to the Corporation to off-set operating losses. The Corporation was responsible for regulating prices for shell eggs and health standards while Good Food Products Australia Pty Ltd, a subsidiary established in 1988 and jointly owned with the Victorian Egg Marketing Board, performed manufacturing and marketing functions for egg based products.

Although the Corporation was responsible for setting the wholesale or set price for eggs it did not control or recommend a retail price. Producers consigning eggs to the Corporation were paid the wholesale price less a margin to cover the Corporation's handling and selling costs. The Corporation had to purchase all eggs produced at the set price. Prior to deregulation the wholesale price at which the Corporation and producer agents were required to deliver to retail outlets was 190 cents per dozen, the farm gate price paid to consignors was around 145 cents per dozen and the retail price was in the range 200-205 cents per dozen. These prices are a weighted average across all grades for the different levels of the marketing chain.

There were two sites owned by the Corporation, one at Sydney (Lidcombe) the other at Tamworth. The Sydney operation incorporates the manufacturing arm, Good Food Products Australia Pty Ltd while Tamworth is principally involved in grading and distribution to the shell egg market.

3.4 Regulations

The stated objectives of the regulations in the NSW egg industry were to ensure efficient marketing and distribution of eggs, stabilise egg production and prices paid by consumers and received by producers, protect the small family farm, provide "reasonable" returns to efficient producers and maintain product quality.

Two theories have emerged concerning reasons for regulation in industry. The traditional efficiency theory of regulation or the "public interest" theory interprets "government intervention which differentially affects the fortunes of various industries and occupations as the product of altruistic efforts by the legislature to promote the public good." (Sieper 1982). Based on this theory the objectives of efficient marketing, industry stability and fair returns to producers are promoted to improve allocative efficiency and social welfare. The more recent theory advanced by Buchanan and Tullock (Tullock 1983) is the distributive or "public choice" theory. This theory argues that the public sector is also guided by Adam Smith's "invisible hand". Politicians and bureaucrats maximise their own utility functions by maximising votes, financial positions and career prospects.

Although regulations are often defended on public interest theory grounds it is frequently the personal goals of individuals in the public sector which explains the failure of regulations in achieving their objectives.

Regulations that have existed in the NSW egg industry can be broadly classified as production restrictions, price regulations and marketing controls. Production was restricted by quota constraints. Although freely tradeable, quota was restricted to a maximum holding limit of 100,000 quota units. Condition of licence cuts further restricted the actual number of hens per licensed producer to 73,000 birds. An equalisation scheme, made possible by the ability to separate the domestic market with a less elastic price elasticity of demand from the overseas market, formed the basis of price regulations. The scheme pooled returns from profitable domestic shell and egg product sales and losses on export markets. Where losses on the equalisation scheme occurred hen levies were collected from producers to finance the set wholesale price. Funds from the hen levy were also channelled into financing the operations of the regulating authorities and prosecuting illegal producers.

Marketing controls restricted the ability of producers to supply eggs to domestic and overseas markets. Only the Corporation and those producers licensed as agents were allowed to supply shell eggs direct to retail outlets and regulations were in place restricting the grades that were admissible in the domestic shell egg market. The Corporation exercised a monopoly on the supply of eggs to export markets.

Regulations caused distortions in the industry leading to inefficient allocation of resources. By placing quotas on hens instead of the output eggs, non-hen inputs were used in increasing amounts in an attempt to maximise the output per restricted input (Davis and Briggs 1983). ACIL (1988) estimated this obstacle to structural efficiency at 3 cent/dozen. Limiting the flexibility of quota utilisation through such regulations as fixing an upper limit on quota held caused another hindrances to industry operating on the minimum cost curve. Economies of scale were potentially lost from this restriction. The capital tied up in purchasing quota was a further cost to current producers from the marketing arrangements (Alston 1986).

A major effect of the regulations was the income transfer from consumers to producers. A proportion of the higher price at which shell eggs were sold on the domestic market was absorbed by retailers who exhibited price averaging behaviour across eggs and other products sold. However to some extent higher prices were passed on to consumers. Consumers were also denied the opportunity of purchasing different quality grades of eggs (such as misshapen eggs) at market (discount) prices. In addition consumers were insulated from seasonal fluctuations in price by production controls instituted by the PFLC. Although stability of prices is often advocated as an objective of marketing arrangements, the benefits derived by consumers is questionable especially if prices are stabilised at a higher price (BAE 1983).

The controls restricting the Corporation's operations further contributed to losses in the industry. Constraints restricting the use of the capital and equipment owned by the Corporation solely for egg based products reduced the operating efficiency of the Corporation. Regulations forced the Corporation to accept all eggs at a single price and controls prevented price differentiation between different quality eggs.

Other major areas of costs associated with regulations in the NSW egg industry were in the areas of administration and enforcement of regulations through policing illegal production. Illegal production came not only from unlicensed producers but also from farmers producing outside their quota allowance.

4. The Recommended Deregulation

4.1 Background

As part of a general examination of legislatively based regulations and controls operating in NSW, the NSW Minister for Agriculture and Rural Affairs announced a review of the system of egg industry regulations on July 6, 1988. The consultants ACIL Australia Pty. Ltd. were contracted to undertake the review (ACIL 1988). This review, completed in November 1988, provided a background for the eventual deregulation in July 1989. In brief the ACIL report recommended a two year transition period of deregulation with the immediate removal of the 100,000 quota ceiling; the creation of a new company holding the Egg Corporation assets, to be owned partly by a producer co-operative and partly by licensed producers; and a lowering of quota in the industry to just satisfy peak domestic demand.

Several previous studies had been conducted into regulation of the egg industry; for the Australian industry, Balderstone et al. (1982) and BAE (1983); for Victoria, McArthur et al. (1980) and the Public Bodies Review Committee (1987); for South Australia, Burgan and Thomson (1987); and for NSW, Gilchrist and Rees (1981) and Davis and Briggs (1983). In general the studies found regulations caused losses in efficiency and were maintained at an unjustifiable cost to consumers. Recommendations differed in the degree of deregulation required. The McArthur et al. (1980) inquiry recommended complete deregulation. A year later, Gilchrist and Rees (1981) recommended retention of some regulations and alteration of others (to improve the efficiency with which the objectives of the regulations were achieved), while the inquiry into the Victorian industry in 1987 recommended a phased removal of quota over a seven year period.

The NSW government considered that the ACIL report had failed to consider some important consequences of their proposed deregulation option. In an attempt to investigate these areas, NSW Agriculture & Fisheries conducted a major review of the regulations in the NSW egg industry. As part of this review the consultants, Gresham Partners, were engaged by NSW Agriculture & Fisheries to evaluate the financial position of the NSW Egg Corporation and investigate its competitiveness in a deregulated environment. This information was obtained to assist government decision-making on the option of whether some or all of the current regulations should be removed and the timing of such deregulation. In particular it was important to determine whether granting equity in the Corporation to current holders of transferable hen quota (as recommended by ACIL) was an acceptable easement to loss of quota value resulting from phasing out quotas. Information on the statutory authority's financial position was also important to decisions regarding the timing of the possible public float of the Corporation.

4.2 Features of Deregulation Implemented

Reaching a socially optimal position (maximum social utility) has two criteria, economic efficiency and equitable distribution of wealth. The socially optimal distribution of income between producers and consumers is an equity judgement for society and generally considered to be outside the realm

of economists (Mishan 1972). Allocative efficiency was argued as the principal reason for instituting complete deregulation in the NSW egg industry. However the time was also politically ripe for deregulation. In announcing the review of marketing arrangements the Minister for Agriculture and Rural Affairs stated "this government was elected on a platform of less regulations and fewer controls". Compensation to those adversely affected by changes to the system was also supported by efficiency arguments. The main efficiency argument states that compensation is necessary to reduce obstruction by those detrimentally affected and so allow the realisation of gains from policy reform (Section 7). The undertaking by the Minister that no legal producer would be disadvantaged by changes to the system of industry regulation is likely however to have been a major determinant of the size of the eventual payout.

The deregulation took effect immediately when it was legislated in August 1989, retaining only the health standards of the regulated system. The key elements of the reforms are as follows:

1. immediate dismantling of the quota system

2. compensation of $15 a quota bird paid to producers owning quota. No compensation was to be paid to those producers who were leasing quota from licensed producers. The $61 million payout to producers for lost quota values was to be funded in part by the sale of assets of the NSW Egg Corporation and Good Food Products Australia Pty Ltd and from consolidated revenue.

3. The immediate corporatisation and ultimate sale, preferably as a going concern, of the NSW Egg Corporation, with producers having the opportunity to tender to buy the Egg Corporation's assets at both Tamworth and Lidcombe.

4. All restrictions on the prices at which the Corporation could buy and sell eggs were removed immediately. The Corporation was no longer required to buy all eggs produced.

5. Restrictions on competition to the Corporation were removed. Markets that were serviced by the Corporation were opened to competition from other egg marketers.

6. Restrictions on the handling, packaging and grading of eggs were removed Laws that protect human health were continued.

Between February and May 1989, subsequent to the receipt of submissions on the ACIL report, several alternative methods of implementing deregulation were considered. The various options differed mainly on the need for a transition period and the extent of deregulation required. Details on the various options considered are presented in Appendix 1.

The issue of whether compensation should be paid; at what level and to whom, was also heavily investigated under a number of options, as was the question of how compensation was to be financed. The idea of a consumer egg tax was closely examined for example as an alternative to funding from consolidated revenue.

Work undertaken by NSW Agriculture & Fisheries attempted to quantify the welfare effects of different deregulation options. Earlier work by Alston (1986) and BAE (1983) provided an indication of the magnitude of social losses caused by distortions from the competitive equilibrium in the Victorian and Australian egg industry respectively. An outline of the estimates of social losses for the NSW egg industry is contained in the following section. More detail of the methodology used is presented in Appendix 2.

5. The Efficiency and Distributional Effects of Deregulation

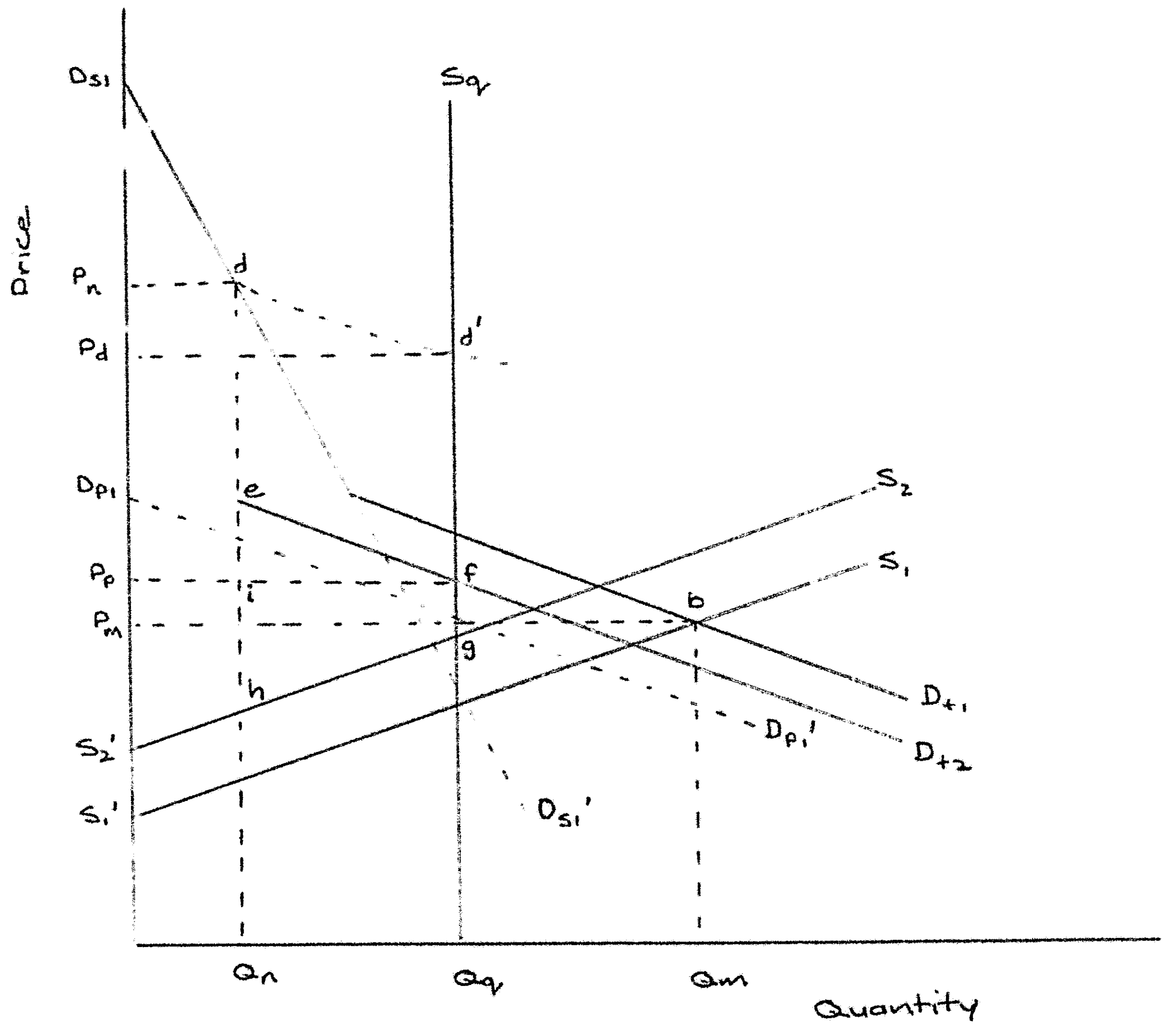
There are both efficiency effects and distributional implications from regulation. The emphasis of the analysis in this section is to highlight both social costs and income transfers associated with regulations in the NSW egg industry. Social costs indisputably cause a loss in social welfare. The effect on social welfare, however, of distributional effects depends on society's value judgements. It is left to society (or the political process) to make judgements on the equity of the distributive effects.

To quantify efficiency and distributional effects of deregulation of the NSW egg industry the Marshallian concepts of producer and consumer surplus were employed. The usefulness of these concepts as methods to determine costs and benefits associated with departures from the competitive equilibrium is reviewed by Currie et al. (1971) and Randall (1982). Previous work by Alston (1986), Edwards and Freebairn (1982) and BAE (1983) provide examples of using these concepts to analyse the effects on social welfare of industry regulation.

A simple comparative static, partial equilibrium model was constructed to represent the NSW egg industry (Figure 1). The model assumes a linear aggregate supply curve (S_1S_1') and linear, shortrun aggregate demand functions for two markets; shell egg ($D_{s1}D_{s1}'$) and egg product/export ($D_{p1}D_{p1}'$). Specifying the demand schedule in this manner departs somewhat from earlier frameworks (Alston 1986 and BAE 1983), which assume perfectly elastic export demand and no separate egg product demand curve. Both the supply and demand schedules relate to farm level prices and quantities. In an effort to simplify the analysis the marketing sector has been ignored. Further it is assumed that no interstate trade exists for shell eggs, i.e. the demand for shell eggs remains limited to that of NSW consumers and the supply to the NSW shell egg market remains limited to NSW producers, either due to regulation or the prohibitiveness of the cost of transporting eggs interstate. Aggregate demand ($D_{s1}D_{t1}$) is derived by the horizontal summation of the shell egg and egg product/export demand curves.

To quantify efficiency and income effects of the industry regulations it is necessary to have data on a number of price/quantity coincidences, egg production costs and price elasticities of demand and supply. The data used for cost of production and price were figures at December 1988 and were provided by NSW Agriculture & Fisheries. Various studies of egg industries were reviewed to approximate elasticities in the NSW egg industry (Hickman 1979 and Collard et al. 1983). The NSW Egg Corporation provided information on quantities consumed on different markets. Details of the parameters used to construct the model are outlined in Appendix 2.

Figure 1


Price
Quantity
D_{S1}
S_q
P_n
P_d
D_{P1}
P_p
P_m
S_2'
S_1'
d
d'
e
f
i
g
h
b
S_2
S_1
D_{t1}
D_{t2}
D_{P1}'
D_{S1}'
Q_n
Q_q
Q_m

If the NSW egg industry was in a situation of free trade equilibrium the price P_m and quantity Q_m would be market clearing. Because of the existence of quotas on inputs to production (hens), wholesale price fixing and price equalisation through hen levies, this economically efficient equilibrium is not achieved.

The price P_n is the regulated wholesale price actually received by producers and that paid by shell egg consumers (assuming zero marketing costs), while P_d equals the price P_n less the cost of the hen levy. P_d is thus the equalised price received by producers after accounting for sales of egg product and exported eggs at prices generally lower than the regulated wholesale price. These losses are financed by the hen levy. The level of P_d is determined by the point at which the Parish curve, dd^1 (the locus of equalised prices associated with different levels of aggregate production) intersects with the industry supply curve under a hen quota system ($S_2'gS_q$). This supply curve has been assumed for simplicity to kink to a perfectly inelastic slope at Q_q which is the level of production associated with hen quota allocation and conditions prior to deregulation. In reality substitutability of other inputs for hens perpetuates some positive relationship between production and price despite the quota restriction.

By setting the regulated price in the domestic market at P_n, shell egg sales are restricted to Q_n. This moves the effective demand curve to $D_{s1}deD_{t2}$. The surplus of production over shell egg consumption ($Q_q - Q_n$) is sold for egg product and export at the market-clearing price of P_p.

In addition to the price and consumption effects of regulations there are implications for costs of production as a result of the quota system. The obstruction to achieving the minimum cost production system because of distortions in input use, limits on accomplishing economies of scale, and distorted incentives for technological innovation, is represented by the leftward shift of the supply curve to S_2S_2'.

Economic surplus in a free market environment amounts to the area $D_{s1}bS_1'$ (with consumer and producer surplus represented by the areas $D_{s1}bP_m$ and P_mbS_1' respectively). By imposing regulations in the industry, economic surplus is reduced to $D_{s1}defgS_2'$. The area $D_{s1}dP_n$ is the consumer surplus of the shell egg market under regulation while eif is the consumer surplus on the egg product export market. It is important to note part of the area eif, attributable to consumption of export eggs, accrues to foreign consumers. In total consumer surplus is reduced by the area $D_{s1}bP_m - (D_{s1}dP_n + eif)$ from industry regulations. Much of this loss in consumer surplus is a transfer to producers because of the higher shell egg prices in the regulated market.

Producer surplus under regulation amounts to the area $S_2'P_ndh + ifgh$ (or equivalently $S_2'P_dd'g$). The change in producer surplus is therefore $P_mbS_1' - S_2'P_dd'g$. Whether this is positive or negative will largely depend on the leftward shift in the supply curve and on the level at which the regulated wholesale price is set.

The loss in economic surplus in the regulated system as compared to the unregulated environment is a dead weight loss to society from government intervention. The loss occurs as a result of the shift in the supply curve, limitations on supply because of quota constraints and restrictions on shell egg consumption by regulating the shell egg price above the competitive equilibrium. In Figure 1 the dead weight loss due to regulations is represented by the area $dbS_1'S_2'gfe$.

From the analysis the gains from deregulation due to the elimination of the loss $S_1'S_2'gfe$ were estimated at between $13 to $15.5 million. This range reflected the effect of the two different price elasticities of demand used to test the sensitivity of the analysis.

The shift to the right of the industry supply schedule would allow the level of production immediately prior to deregulation (i.e., approximately 70 million dozen per annum) to be produced at a cost saving estimated to be $10.5 million. The remainder of the gain accrues to consumers and producers because of the greater output and consumption associated with the unregulated market and free market equilibrium price.

In comparison, results from the BAE (1983) study for Australia estimated social costs due to consumption foregone and surplus production at $8.57 million in 1981-82. The BAE study estimated the cost due to obstruction to the supply shift at $4.45 million for the same year. Alston (1986) estimated the net social gain from deregulation of the Victorian egg industry at $9.8 million. This amount includes gains caused by allowing industry to shift to a lower marginal cost curve.

6. The Issue of Compensation

The distributional impacts of policy change raises issues of compensation. It has been argued policy reforms should be pursued if there is a net welfare improvement after institutional costs of implementing the change have been taken into account. According to the Kaldor-Hicks criterion, a social change is desirable if the gainers are able to fully compensate the losers and still remain better off (Kaldor 1939, Hicks 1939, 1941).

Alternatively, the earlier documented Paretian criterion for social improvement is more restrictive, requiring that a least one individual is made better and none worse off. This criterion contains no compensation option. Very few policy reforms would be implemented based on the Paretian criterion as there are very few policies that adversely affect no-one.

When investigating compensation issues it is important to appreciate redistribution mechanisms necessary to allow equity are not costless. Although a policy reform may commend itself on efficiency criteria prior to considering the means by which this may be achieved, the cost of implementing redistribution may preclude real efficiency gains from reform.

The issue of whether and at what level compensation should be paid to individuals damaged by policy reform was advanced by Rausser (1987). Rausser reviews equity and efficiency reasons for compensation.

6.1 Advantages of Compensation

Arguments in favour of compensation follow the ensuing rationale. It is argued legitimate policy rights emerge from longstanding policy. Individuals adjust resource allocations believing that policies will endure. "....public policy is a contract with the public.... and change might be interpreted as a breach of contract for which compensation is due." (Rausser 1987).

The separation of equity and efficiency effects on the grounds of property right arguments is indefinite. As income is inextricably linked to resources and individuals' behaviour, the presence of efficiency effects cannot be ignored. It may be that by paying compensation, the cost of adjustment to the deregulated environment is reduced. For example compensation may allow more

rapid concentration, vertical integration and the adoption of technically superior systems or it may allow less efficient producers to pursue other career options.

The principal efficiency reason for compensation centres around reducing obstruction to change. Where compensation is not undertaken those damaged by policy reforms may engage in activities such as lobbying to prevent change. If there are visible net social gains to be had from policy change then there may be a robust case to compensate the losers if this is politically necessary to allow society as a whole to move to a preferred position.

A further advantage of paying compensation arises from the increased certainty in industry this action causes. By paying compensation a precedent is set for dealing with distributional effects in future deregulation of industries. It creates the expectation in society that individuals damaged by policy reform will be adequately compensated. The resultant perceived reduced uncertainty facing individuals operating under regulation could be expected to influence their resource allocation decisions and increase their willingness to invest.

In addition by paying compensation legal producers are not seen to have been disadvantaged by complying with the regulations. If government elected not to pay compensation, the incentive to operate legally in other regulated industries would be diminished. Thus the costs of enforcement in these industries in the future would increase.

6.2 Disadvantages of Compensation

Contrary to these arguments is the reality that in other cases where individuals are damaged through price fluctuations, changes in taste, adverse macroeconomic events or the development of new technology, compensation is seldom paid. Further it can be argued that to the extent there are benefits from regulation, these are received by industry rather than government thus removing the moral argument for government to pay compensation. If there is an efficiency reason for implementing regulations however then government can be seen to be regulating to generate benefits for society.

In contrast to the 'credible' government argument in favour of compensation there is the argument that there is no expectation that current policies will be continued indefinitely into the future. There are ways individuals can hedge against uncertainty about the stability of current government policies such as insuring against potential losses. Also by setting a precedent of paying compensation, the expected rents in other regulated industries due to a reduction in perceived uncertainty, are likely to be increased. With the increase in expected rents embodied in asset values, a precedent of compensation ultimately increases the size of the compensation payment necessary to off-set distributional implications of policy reform in other industries. As a result the eventual dismantling of regulations may be made more arduous.

It is important in commenting on the efficiency effects of compensation to recognise the finite nature of public funds. By pursuing one project the undertaking of another projects is excluded. The opportunity cost to society from failing to utilise these funds in other ways needs to be assessed.

Further it is not clear that payment of compensation to producers is the most appropriate instrument to promote structural efficiency. More active instruments such as research, education or reliance on the rural adjustment scheme may be superior to a compensation payment in promoting structural adjustment.

Finally there is an argument that paying compensation would "introduce another distortion into the system" (Rausser 1987) by requiring the collection of taxes to finance payments.

6.3 Level of Compensation

Assuming there is a case for compensation the issue becomes at what level should it be paid. According to Johnston and McInnes (1983) "full compensation is normally seen as the amount necessary to restore an individual or firm to the utility, income earning capacity or wealth that they would otherwise have had but for the damage inflicted by another individual firm or government". Often there is considerable difficulty and uncertainty in calculating losses to a party.

Uncertainty arises because in most instances the change in regulations will have some benefits to the injured party. In the example of the deregulation of the NSW egg industry, producers' quota assets were made worthless. The loss in quota value is highly visible. However additional losses such as lower non quota capital asset values may result if deregulation encourages firms to leave the industry causing excess capacity in physical assets in the industry. Countering losses in these areas, it is predicted that deregulation will enable movement towards more efficient production systems, thus shifting the supply curve of the industry to the right. There are expected benefits from no longer having to pay a hen levy to finance policing of illegal producers and meeting the costs of maintaining the bureaucracy of the regulatory authority. Future producers will benefit from not having to invest large capital sums in purchasing quota. Current producers who because of condition of licence cuts would have had to purchase additional quota units to maintain capacity utilisation will also be advantaged by the abolition of quota regulations. These benefits of deregulation will to some extent off-set the effect of lost quota values on the wealth of producers.

There is also uncertainty concerning what benefits in economic rents producers have received from the higher priced eggs due to the quota system. In their report ACIL (1988) suggested producers could repay quota purchases within four years. This would lead to the conclusion that no compensation for loss in quota value should be paid where quota has been owned for more than four years. Problems can be identified with this argument. Firstly there may be differences in the actual price paid by different producers to purchase quota. If purchased at a higher price, a longer period would be required to fully reap the benefits from owning quota. Secondly the individual could have sold quota at any time over the period. Quota forms part of an asset base. To maintain horizontal equity with a neighbour who sold quota the week before, payment at the full market value may be justified (Johnston 1984).

Consideration was given in the deregulation of the NSW egg industry to paying quota compensation which varied according to the period the quota had been held and hence the rents extracted in the interim. This basis for compensation was dismissed due to legal complications with quota ownership and the difficulties it might have added to political saleability due to the complexity of the compensation package. Both consolidated revenue and an egg retail tax were considered as means to finance the compensation set at $15

per quota held (or approximately $61 million). Use of consolidated revenue and funds raised from the sale of the Corporation's assets emerged as the preferred option as a consequence of the high collection and enforcement costs associated with the egg tax, legal problems with the tax and the high proportion of the population paying existing taxes who are consumers of eggs.

7. Distributional Effects - the Financial Positions of NSW Egg Producers

7.1 Distributional Effects

Analysis was conducted into the financial positions of NSW egg producers in an effort to provide information on important distributional implications of deregulation of the egg industry. There were a number of distributional effects of regulations in the NSW egg industry. Income was transferred from consumers to producers, from licensed producers to illegally operating producers and from producers purchasing quota to those producers in the industry who were initially allocated with quota.

The transfer of wealth from consumers to producers occurred because regulations forced trading in eggs at a price above the competitive equilibrium. Income was transferred from licensed producers to illegal unlicensed producers as illegal producers sold eggs on the shell egg market and therefore compounded the problem of egg production being in excess of shell egg demand. At the same time illegal producers avoided paying the equalisation levy (paid by legal producers) which was necessary to offset lower prices realised on sales of production, surplus to shell egg demand.

Income was redistributed from producers purchasing quota to those who were given quota originally. Those producers purchasing quota included new producers entering the industry, producers expanding in size in the industry, and producers who were attempting to utilise excess capacity created by condition of licence cuts.

The analysis of producers' financial positions involved investigating the latter distributional effect (that is, the debt producers had incurred to purchase quota) and the resulting gearing ratios of each producer in the industry.

7.1.1 Value of Quota

By allowing quota to be freely tradeable, income transfers arising from producers purchasing quota were very conspicuous. Quota was made freely tradeable in an attempt to mitigate some of the supply side inefficiencies associated with quota. However the net present value or the expected stream of returns from owning quota were capitalised into the price at which quota was traded. (In other industries where quota is not tradeable the economic rents of quota regulations are bid into physical assets linked to quota and to some extent are less obvious.) Thus the future benefit of quota ownership were conferred on those producers initially allocated with quota.

Within the egg industry there were two main sources of economic rents. Rents arose in egg production because returns to producers were set above the marginal cost of producing eggs. These rents were received by all egg producer groups.

The second source of rents in the egg industry arose from regulations maintaining the price of wholesaling eggs above the average cost of providing wholesale services. Rents from wholesaling were much greater than the rents from just producing. Wholesaling rents were only available however to producer agents who were prepared to abide by a producer agent's agreement which involved regular inspections by the Egg Corporation and restricted their wholesaling to certain retail outlets (basically small retail outlets and not supermarket chains). The regulations allowed for the creation of excessive wholesale margins through the setting by the Corporation of a

minimum wholesale price above the average cost of wholesaling eggs. This in turn produced a high expected income stream from activities of grading, packing and marketing eggs, enabling firms engaged in wholesaling activities to increase their production base by purchasing additional quota. Thus the economic rents from wholesaling eggs were bid into the value of quota, adding to the capitalised economic rents from producing eggs.

7.2 Reasons For Investigating Distributional Effects

There were a number of concerns regarding the effect of deregulation on producers' financial positions. Government had given an undertaking that NSW producers operating legally would not be disadvantaged by reforms to regulations in the NSW egg industry. Also ACIL consultants highlighted the effect of lost quota and non quota asset values on producers' financial positions as an area needing further investigation. On an industry level debts held by producers in entering the industry or expanding in size in the industry, were of major concern to the NSW Farmers' Association and producers. There were claims in the industry that debt was in the order of $72 million. It was important for policy makers to have details of the actual situation in industry to assist in making informed decisions on distributional issues of changing marketing arrangements.

These concerns about the effect of deregulation on the financial positions of egg producers were raised because of two main factors. The first related to lost quota values as a result of the abolition of the quota scheme while the second related to possible bankruptcy of producers because of reduced cash flows and lost quota asset security on loans.

The loss in quota value was a concern as a result of the above mentioned undertaking made by government that no legally operating producer would be harmed by changes to regulation. The presence of debt from quota purchases made the loss in quota value from deregulation highly visible to society and as such had important implications for the political acceptability of the proposed policy reforms.

The second issue concerned the possibility of producer' bankruptcy due either to loss of economic rents enjoyed by producers in the regulated environment as a result of egg prices set above the competitive equilibrium or to banks foreclosing on loans where quota had been held as security.

A priori, it was expected egg prices received by producers for eggs sold would fall as a result of deregulation. The removal of the production constraints associated with the quota system and the elimination of hindrances to structural adjustment in the industry from regulations would be expected to cause production to increase and prices to fall (Section 5). If cash flows fell in response to deregulation it would be increasingly difficult for producers to finance debts incurred to purchase quota or other assets; hence the potential for bankruptcy was considered to be high. This problem would have been diminished however, if voluntary collusion between producers restricted production and resulted in unchanged egg prices, despite deregulation.

It was considered also that the elimination of quota assets may have caused firms to become bankrupt if lending institutions had taken quota value as security for loans. The potential severity of the problem of reduced cash flows and of quota being taken as security for loans, was dependent on the level of outstanding debt held by producers.

To ascertain the effect of lost quota and physical asset values on the welfare of producers two analyses were conducted. The first involved assessing financial positions of producers by calculating debt to asset ratios for each producer in the NSW egg industry. The second entailed conducting a banking survey to determine from bank records the extent of outstanding loans held by producers and the extent to which hen quota was used as security for loans.

7.3 Calculating Debt to Asset Ratios of NSW Egg Producers

Debt to asset ratios for each producer were calculated to investigate producers' financial positions. Debt owed by producers was assumed to be from, the purchase of quota and the purchase of new sheds. The method used to estimate debt from the two sources was identical. To illustrate the debt calculation procedure, the calculation of debt due to quota purchases is described here (Section 7.3.1). Assets used in the ratio included quota and land. Although improvements to land, sheds and equipment were incorporated in earlier analyses these assets did not form part of the final asset calculation. Assets were calculated using differing values of quota to estimate producers' asset positions under various deregulation options. In the deregulation instituted, quota was abolished and therefore had zero value.

It is recognised that not all debts and assets held by producers are included in the calculation. For instance debt due to feed, land and equipment purchases was not included. On the asset side the value of hens held was omitted. Data collection problems and the minimal significance of the omitted debts and assets to the overall results, contributed to the decision to exclude these parameters.

To analyse the calculated ratios, a critical value of debt to asset was determined above which producers were deemed to be in financial difficulty.

7.3.1 Debt Calculation

Debt due to quota purchases was calculated by obtaining quota transaction histories for each producer from records held by the PFLC. From the PFLC' records a large database was constructed. The database included:

1. the producer number and corresponding base quota of each producer as at August 1, 1984. (Computerised records maintained by the PFLC were not in existence prior to this date.)

2. the producer number and corresponding base quota of each producer as at February 3, 1989.

3. all transactions from August 1, 1984 to February 3, 1989. The transaction information included the producer number of the buyer, amount of quota purchased, price of quota and date of the transaction.

4. postcodes to indicate the location in NSW of each current producer.

5. the type of each producer, i.e. consignor, producer packer, producer agent or producer agent/producer packer.

Considerable time was invested in validating the data provide by PFLC. A major obstacle involved isolating producers whose producer numbers had altered overtime due to a name change of the license holder. Legal

requirements demand the license number of producers must be changed if for example an individual marries and operates as a husband and wife. However no formal records were kept of these changes. Where it was apparent a new number had been allocated, the old number under which the producer had operated was changed so a single producer number was matched with all transactions of an operating entity in the database. This enabled the full transaction history of a particular producer to be maintained.

Statistical Analysis Systems (SAS) was the computer package used to analyse the transactions numbering approximately 2000 from 1984 to 1989. To do so, a number of simplifying assumptions were required. Firstly, to purchase quota individuals were assumed to have borrowed 100 per cent of the cost of the quota purchased. Secondly, it was assumed that no debt on purchases prior to August 1, 1984 was still held by February 3, 1989. And thirdly, it was assumed that all loans were at a specified interest rate and were repaid over a set period in equal monthly instalments. Two scenarios of payback period (4 and 10 years) and interest rate (10 and 15 per cent) were used to provide an indication of the sensitivity of the analysis to the assumptions made.

The date at which debt in the industry was assessed was February 3, 1989. This date has no particular significance other than it was the date PFLC made the data available for analysis and thus provided the most up-to-date information on quota transactions.

The assumption that producers borrowed 100 per cent of the cost of the quota purchased is likely to have over estimated the actual debt incurred by producers. There are two reasons however why this may be considered acceptable. Firstly, other debts incurred by producers such as debts to purchase feed (according to advisory officers with the NSW Agriculture & Fisheries in certain instances this may be substantial) have been ignored and therefore offset to some extent the over estimation of debt from this assumption. Secondly, although not all producers would have gone into debt to purchase quota it is not the debt suffered but the cash outlaid which is relevant in assessing the effect of writing off quota value on producers.

The second assumption of no debt prior to the August 1, 1984 principally arose as a result of the constraints on data availability. As PFLC only had records computerised from this date it was not feasible to assess debt incurred prior to this date. Despite this mechanical constraint on the inclusion of transactions in the calculation, there were some reasons for considering this to be on acceptable assumption. As part of the review of the NSW egg industry conducted by ACIL consultants, a figure of four years was estimated as the time required to recoup funds invested in quota purchases. In an unpublished paper ACIL estimated this four year amortisation period for an additional quota investment by assuming a return per dozen eggs sold and an appropriate discount rate. The ACIL calculation was also supported by calculations based on per annum leasing costs and costs of purchasing quota. In 1983 David Briggs with NSW Agriculture & Fisheries estimated the period required to recover investment in quota, based on leasing price per annum, at between four to five years. Relying on these findings of a four year payoff period, transactions prior to August 1984 would have little relevance to debt positions in February 1989.

The scenarios of payback period and interest rate were selected on the following grounds. Findings that quota purchases could be recovered after four years encouraged the selection of this time period as one scenario for payback period. Additional information on payback period was forthcoming from the banking survey conducted concurrently with the analysis of quota

transactions. From this, a payback period of 10 to 15 years was considered relevant to industry members. The lower end of this range, 10 years, was selected as an alternative payback period in the analysis.

Information from the banking survey on the approximate interest rates faced by producers indicated an average rate of 18 per cent suggesting the 10 to 15 per cent range selected for the analysis of debt levels was lower than actually experienced by producers. This was considered a minor oversight given the negligible impact of interest rate on results (Table 3). The assumption that loans were repaid in equal monthly instalments was consistent with banking survey findings.

Given these assumptions it is possible to calculate the principal remaining on a loan at a particular point in time. The formulae are as follows.

$$A = L\,[i(1+i)^n]/[(1+i)^{n-1}] \quad \ldots\ldots 1$$

$$D = A\,[(1+i)^{m-1}]/[i(1+i)^m] \quad \ldots\ldots 2$$

Where:

A is the amount of the equal monthly instalments
L is the cost of the quota purchased
i is the assumed interest rate
P is the principal outstanding debt on the quota (or new shed) purchased
n is the payback period
m is the payback period less the period lapsed since the purchase of the quota and the date debt in the industry was assessed (February 3, 1989)

Figure 2 provides a graphical representation of the method used to calculate the debt positions of egg producers.

If quota valued at $100,000 was purchased in June 1, 1988 then by February 3, 1989, eight months of a ten year payback period would have lapsed. By applying the formulae described above with an assumed interest rate of 15 per cent, a debt of approximately $97,000 would be remaining on the loan at February 3, 1989.

In Table 3 the results of applying this calculation to each quota purchase transaction in the industry, from August 1984 to February 1989, are presented. Total debt due to quota purchases in the industry using a 10 year payback period and 15 per cent interest rate amounts to $19.9 million, well below industry claims of $72 million. The average debt of all those holding debt was $176,000. With an estimated 251 producers in the industry, and the number of producers with debt numbering 113, an estimated 55 per cent of all producers were found to hold no debt due to quota purchases. The maximum debt held by any one producer totalled $4.1 million. Analysing debt by type of producer showed producer packers/producer agent with on average the highest debt levels at $324,000 and consignors with the lowest debt levels, averaging $86,000. The analysis was seen to be highly sensitive to the assumption of length of payback period but relatively unaffected by the selection of interest rate.

Figure 2

Amortisation of a Quota Purchase

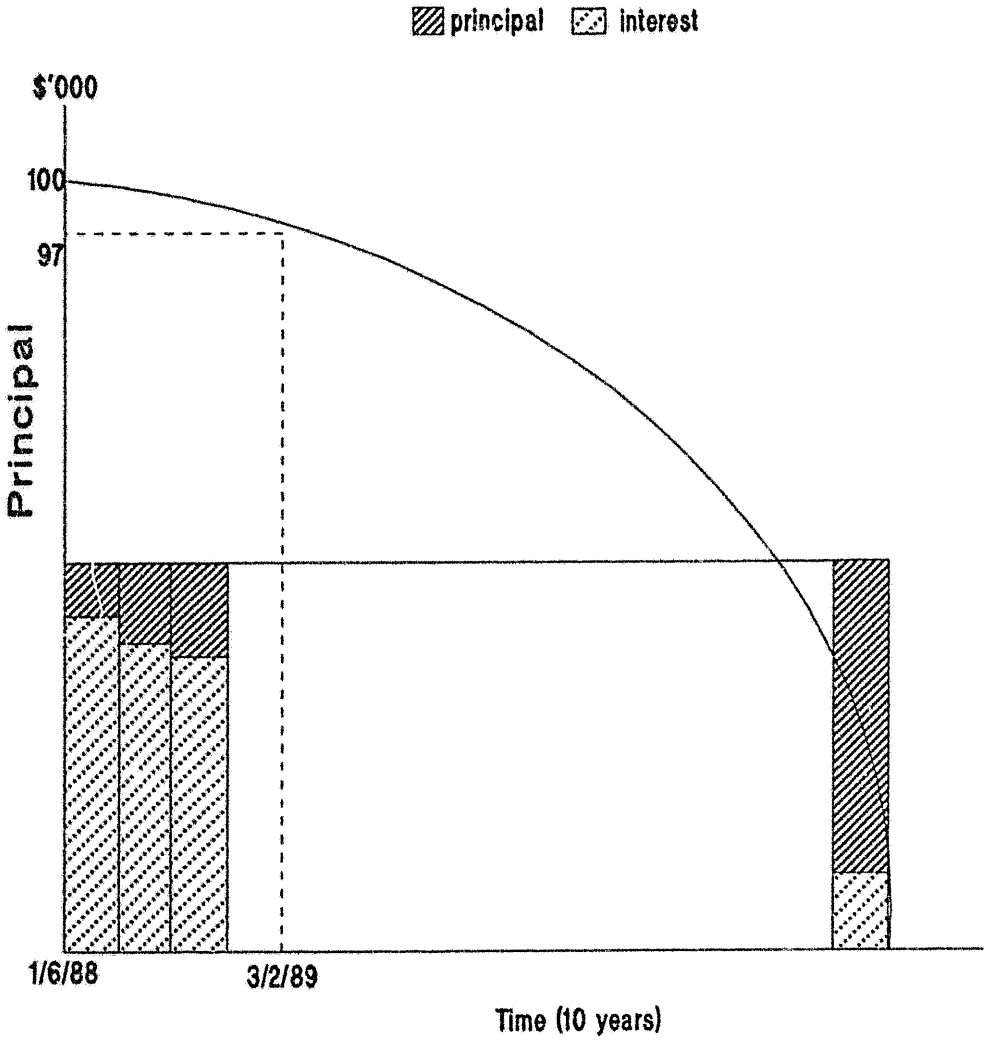


Table 3: NSW Egg Producers' Estimated Debt Levels from Quota Purchases

	N	Mean	Sum	Maximum
			(units $'000)	
10 years 15%				
All Producers	113	176	19,905	4,087
Producers by Type				
Consignors	29	86	2,505	248
Packers	0	-	-	-
Packers/Agent	40	324	12,976	4,087
Agent	44	101	4,424	700
10 years 10%				
All Producers	113	172	19,439	4,038
4 years 15%				
All Producers	113	117	13,230	3,397
4 years 10%				
All Producers	113	114	12,909	3,350

Debt due to the purchase of new shedding was calculated using the same method as described for quota purchase. The approximate value of debt due to new shedding purchases was $5 million. The two debt figures were added to form the numerator of the debt to asset ratio. Therefore the total debt in the industry from the calculation using actual quota transactions and shed purchases was approximately $25 million.

7.3.2 Asset Calculations

The asset denominator of the ratio was estimated for two broad analogies of asset holdings. This was because of uncertainty regarding the assumptions made in estimating the capital assets and the desire not to under estimate the number of egg producers in serious financial difficulties. The first estimate included quota, land and improvements, sheds and equipment while the second, only quota and land. Although it would be appropriate to use the first estimate in a regulated scenario, the second estimate is more appropriate under deregulation as assets included in the first estimate may have negligible resale value if producers were being forced out of the industry. It was the latter figure, considered to err on the side of an under estimation of asset values, that was relied upon for much of the analysis (Tables 6 to 8).

Five different scenarios of quota values were used to calculate the asset figures; quota priced at $0, $5, $10, $15 and $18. The $18 price approximated the current market value of quota. Summary statistics on the ratio were analysed by location of producers, by type of producer and by size of producer. The locations were classified as Sydney, Newcastle and Gosford, Tamworth and other NSW. Two types of producers were compared, consignors and others (others included producer packers, producer packer/producer agents and

producer agents). The size groupings analysed were producers with base quota less than or equal to 25,000 between 25,000 and 50,000 and greater than 50,000.

1. Land

The area of land owned by egg producers was estimated from Local Consensus Data studies (LCD) which were prepared by poultry advisory officers with NSW Agriculture & Fisheries in consultation with three groups of commercial egg producers (NSW Agriculture & Fisheries 1987). Information provided in the LCD studies estimated the area of land required by a small egg producer (holding a base quota of 10,500 hens) at 4 ha and the area required by a large producer (holding a base quota of 60,000 hens) at 10 ha.

From this information a straight line equation, relating base quota to area was calculated, taking the form:

Area = 1.215×10^{-4} base quota + 2.712

A per hectare value of land was established for the areas: Sydney, Tamworth, Newcastle and Gosford through conversations with the Valuer General's office and by surveying real estate agents in the four areas. The per hectare value in the Tamworth area was used as a proxy to calculate land values throughout country NSW.

Using this per hectare value for the various areas, the total value of land held by producers was calculated by multiplying the per hectare land value according to the producers location against area held.

2. Improvements

Improvements are the physical additions to the land before shed. or equipment are added. Improvements included: fencing; water bores; site preparation for shedding, roadworks, electricity supply, connection of water mains; and the construction of a dam. The data for calculating improvements was also obtained from the 1986-87 LCD study. It was assumed that each farm had improvements based on their size classification. The three groups were: Small (base quota less than 22,800); Medium (base quota between 22,800 and 47,500); and Large (base quota greater than 47,500). These numbers are the mid-points between the Small (base quota 10,600), Medium (base quota 35,000), and Large (base quota 60,000) farm sizes presented in the LCD for 1986-87.

The total amount of improvements assumed for the farms were, Small $23,800 Medium $25,316 and Large $86,246. The Large farm had a great deal of improvements not found on the Small and Medium farms thus causing large disparity in the proportion of improvements attributed to different farms.

3. Equipment

Equipment as part of the assets calculated for the egg farms includes items such as cages and attachments to the cages, general farm machinery and motor vehicles. The data was once again obtained from the 1986-87 LCD and from NSW Agriculture & Fisheries poultry officers. The figures used were the depreciated value or current value of each item.

The estimation of the value of equipment for each farm was performed in two parts. Firstly, equipment was divided into lumpy and non lumpy equipment. Non lumpy equipment were items, the value of which appeared to vary with the

number of hens actually held, that is 73 per cent of the base quota. The value of this non lumpy equipment was converted to a per bird basis for the three sizes of farms found in the LCD 1986-87. Value of other equipment was added to obtain a figure for lumpy equipment assets for the three size classifications. The calculations performed are as follows.

1. If base quota is less than 22,800 then:
   equipment = $59,210 + ($2.635 x base quota x 0.73)

2. If base quota is between 22,800 and 47,500 then:
   equipment = $97,045 + (2.773 x base quota x 0.73)

3. If base quota is greater than 47,400 then:
   equipment = $141,544 + (3.075 x base quota x 0.73)

The LCD for 1984-85 was used to calculate the value of equipment for the large farms because the LCD for 1986-87 assumes that a number of large items of equipment were recently replaced, making the estimates for the large farms disproportionately greater than those of the other sized farms.

A limitation of the LCD was that it provided data only on assets held by consignor producers. The additional equipment used by producer packers and producer agents, such as egg sorting and grading machines and trucks were included in the calculation of assets by obtaining data from the NSW Agriculture & Fisheries Research Station at Gosford. The amount of grading equipment owned was calculated to be a function of farm size as determined by base quota. A simple straight line equation relating the current value of grading equipment to base quota was determined.

Value of grading equipment = base quota + 30,000

It was estimated that the average value attributable to grading equipment on the smallest grading operation was $30,000 while equipment valued at $100,000 would be held by a farm with a 70,000 base quota.

Trucks were valued on the basis of $10,000 for a Small farm, $30,000 for a Medium farm and $40,000 for a Large farm.

4. Sheds

Shed values were obtained from an update of the shed survey conducted by NSW Agriculture & Fisheries in 1985. Using data from the survey on age and capacity of the shed and assuming a scrap value of 5 per cent and a useful life of 30 years, a reducing balance method was used to calculate the depreciated value of sheds owned. The calculation was as follow:

Depreciated shed value = new cost $(1-e)^{age}$

Where:

e = 1 - exp [ln (percent scrap value)/useful life]

New cost of sheds was estimated by using a cost per bird figure for different types of sheds and multiplying this by the capacity of the shed (Table 4).

Table 4: Estimated Cost per Bird to Construct Different Types of Shedding

Shed Type	Cost per Bird $
Sawtooth	12
Gable	13
Skillion	12
High rise	16
Environmentally controlled highrise	20
Half monitor	13
Semi-environmentally controlled highrise	18
A frame	16
Skillion (litter)	10
Californian	12
Gable (deep litter)	10
Sawtooth (deep litter)	10

These figures were obtained from estimates provided by poultry officers NSW Agriculture & Fisheries.

7.3.3 Results

Results of the analysis are presented in Tables 5 to 8. Three different levels for the critical value of the debt to asset ratio were selected to identify producers in financial difficulty. The ratio levels selected were 0.4, 0.5 and 0.8. A ratio of 0.4 is interpreted as meaning that for every $4 of debt, a producer holds $10 worth of assets that is the producer has 60 per cent equity in his or her operation. The level of the critical debt to asset ratio for an industry is largely dependent on the expected income flows from operations. The critical value used in the initial analysis was set at 0.8 (Tables 5 to 6). However, following discussions with financial consultants and lending institutions values of 0.4 and 0.5 were taken to be more realistic critical values.

Despite this, some interesting comparative results were obtained from the 0.8 analysis. Table 5 provides results where the asset base comprises land, improvements, shedding, equipment and quota while in Table 6, assets considered were land and quota holdings only.

Consignors appeared to have on average a lower debt to asset ratio than other producers (Table 5) with an average figure of 0.05 compared with 0.08 for other types of producers. This was consistent with the relative producer group relationship of debt results in Table 3. It was interesting to note that 69 per cent of consignors and 44 per cent of all other producers held no debt at all. The lower ratio shown for producer agents and producer packers (other producers) as compared with consignors, reflects the increase in the size of quota holdings and is indicative of those producers recently expanding egg industry operations.

Growth in the number of producers involved in the wholesale aspects of the egg industry was stimulated by the existence of excessive wholesale margins created by the Corporation through the setting of the minimum wholesale price. This price was set at a level to cover Egg Corporation costs which were greater than producer agent costs of providing the same services. It was estimated by Gresham Partners that the Corporation's costs of grading, packing and distribution were 30 cents per dozen, 21 cents per dozen higher than costs incurred by private firms to carry out these same activities. The Corporation's average marketing costs were greater because of the higher fixed costs of the Corporation, operational constraints (payment of award wages) and the Corporation operating below its optimal size. Hence the producer agents held a competitive advantage over the Corporation which allowed them to illegally discount the statutory minimum wholesale price to increase market share. The size of the total shell egg market held by producer agents increased from 31 to 54 per cent from 1983-84 to 1987-88.

Of the four locations analysed, producers in Tamworth were found on average to have the highest debt/asset ratios. High land asset values contributed to the lower average ratio in the Sydney region.

Larger sized producers exhibited higher ratios in the comparison of producers by size. Those producers with base quota greater than 50,000 had on average a ratio of 0.22 while producers with less than 25,000 base quota showed an average ratio of 0.05. This was consistent with expectations that the larger producers were generally more active in purchasing quota. A significant proportion of larger producers were producer agents which had expanded in the industry to realise the additional rents available from profitable grading and distribution of eggs.

Results on the number of producers in financial difficulties based on a critical value of 0.8 indicated no producers with debt problems when quota was valued at $18. Even with quota values written-off few producers appeared troubled, the exception being the largest producers (greater than 50,000), 28 per cent of whom had debt/asset ratios greater than 0.8 at zero quota value.

By narrowing the asset base to only quota and land (Table 6), the average ratios appear to have increased approximately 60 per cent. This increase in average ratio substantially raised the estimated percentage of producers in financial difficulty. While 28 per cent of producers with greater than 50,000 hen quota were estimated to be in financial difficulty using the large asset base and a zero quota valuation, 74 per cent appeared troubled using the smaller asset base and a zero quota value.

Despite this sizeable increase in absolute terms the relative relationships by type, area and size were generally unchanged. An exception occurred in the analysis of producers by area. Tamworth producers showed on average the highest ratio when the larger base was used but the Newcastle/Gosford area emerged slightly higher when only land and quota formed the asset base. This can be attributed to the relatively larger physical asset capital held by producers in the Newcastle/Gosford area.

Table 5: Summary Table of Debt to Asset(a) Ratios of NSW Egg Producers, for All Producers, by Type(b), by Area(c) and by Size

	Quota value=$18					Quota value=$0		Quota value=$5		Quota value=$10		Quota value=$18	
	N	MEAN	MEDIAN	MAX	%ratio=0	Ratio>0.8							
						%	number	%	number	%	number	%	number
Producer by Type													
Consignors	93	0.050	0	0.721	68.8	3.2	3	1.1	1	1.1	1	0	0
All Others	157	0.081	0.029	0.548	43.9	4.5	7	1.9	3	0	0	0	0
Producers by Area													
SYDNEY	129	0.071	0.010	0.721	49.6	2.3	3	1.6	2	0.8	1	0	0
NEWC/GOSF	20	0.078	0.033	0.418	45.0	5.0	1	0	0	0	0	0	0
TAMWORTH	53	0.088	0	0.449	50.9	7.5	4	0	0	0	0	0	0
OTHER COUNTRY	48	0.044	0	0.548	68.7	4.2	2	4.2	2	0	0	0	0
Producers by Size													
<=25,000	214	0.048	0	0.720	61.2	1.9	4	0.5	1	0.5	1	0	0
>25,000&<=50,000	18	0.155	0.127	0.528	5.6	5.6	1	5.6	1	1	0	0	0
>50,000	18	0.217	0.134	0.526	5.6	27.8	5	11.1	2	0	0	0	0

Note: a. Assets include land, improvements, equipment and sheds
b. Producers types are Consignors (only produce eggs), and All Other producers are agents, packers, or both
c. Areas are Sydney, Newcastle and Gosford, Tamworth, and Other Country areas

Table 6: Summary Table of Debt to Asset(a) Ratios of NSW Egg Producers, for All Producers, by Type(b), by Area(c) and by Size

	Quota value=$18					Quota value=$0		Quota value=$5		Quota value=$10		Quota value=$18	
	N	MEAN	MEDIAN	MAX	%ratio=0	Ratio>0.8							
						%	number	%	number	%	number	%	number
Producer by Type													
Consignors	93	0.080	0	1.090	68.8	18.3	17	7.5	7	4.3	4	1.1	1
All Others	158	0.143	0.048	1.393	43.7	22.8	36	13.9	22	8.9	14	1.9	3
Producers by Area													
SYDNEY	129	0.113	0.017	1.093	49.6	14.7	19	9.3	12	4.7	6	1.6	2
NEWC/GOSF	20	0.145	0.052	0.678	45.0	30.0	6	15.0	3	15.0	3	0	0
TAMWORTH	53	0.142	0	0.800	50.9	37.7	20	18.9	10	11.3	6	0	0
OTHER COUNTRY	48	0.102	0	1.393	67.3	16.3	8	8.2	4	6.3	3	4.1	2
Producers by Size													
<=25,000	216	0.089	0	1.328	61.1	13.0	28	7.9	17	4.6	10	0.9	2
>25,000&<=50,000	18	0.252	0.185	0.901	5.6	66.6	12	27.8	5	11.1	2	5.6	1
>50,000	19	0.332	0.208	0.699	10.5	73.7	14	42.1	8	31.6	6	15.8	3

Note: a. Assets include land and quota only
b. Producers types are Consignors (only produce eggs), and All Other producers are agents, packers, or both
c. Areas are Sydney, Newcastle and Gosford, Tamworth, and Other Country areas

Table 7: Percentage of Producers in Financial Difficulty ie. Equity < 50%

	$5	$10	$15	$18
All Producers	19	13	9	8
Producers By Type				
Consignors	16	9	5	4
All Others	20	15	11	10
Producers by Area				
Sydney	15	12	8	6
Newcastle/Gosford	25	15	15	15
Tamworth	32	19	11	11
Other Country	12	8	6	6
Producers by Size				
< 25,000	12	8	7	6
> 25,000 & < 50,000	50	28	11	11
> 50,000	63	42	32	32

In Table 7 the percentage of producers with debt/asset ratios greater than 0.5 for different values of quota, by type, area and size of producer are shown. For both Table 7 and 8 the debt figure again is due to quota and new shedding purchases while the assets are the lower quota and land asset base. At a quota value of $18, 8 per cent of producers appear to be in financial difficulties (Table 7). As this was approximately the pre deregulation market value of quota it may seem that this figure is unexpectedly high. However there are valid reasons for the estimate of producers in financial difficulty being at 8 per cent. For example an individual producer may have purchased a sizeable amount of quota at a price above the market value. Alternatively producers' assets in existence in a regulated environment were estimated to have negligible value in a deregulated environment. Sheds, equipment and improvement assets were excluded from the lower asset base.

Although the ratio of 0.5 appears to be a valid industry average indicator for producers in financial difficulties, because of differences in efficiency of firms within the industry it may be higher for certain individual producers. While it is considered the best results were generated from the data available these possible errors associated with the synthesising of the industry situation need to be appreciated when interpreting the results.

The number of all producers calculated to be in financial difficulty was raised 11 percentage points to 19 per cent by lowering quota value to $5 (Table 7). Generally the percentage of producers estimated to be in financial difficulty in the different categories (type, area and size) was doubled by reducing the value of quota from $18 to $5. The percentage of consignors and producers with between 25,000 to 50,000 quota units in financial difficulty however increased from 4 to 16 per cent and 11 to 50 per cent respectively. Lower land values held by these groups (the majority of consignors are located in Tamworth where real estate values are below metropolitan averages) contributed to the higher relative percentage of these producers found to be in financial difficulty at the lowest value of quota used in Table 7.

Table 8: Number of Producers with Debt(a) to Asset(b) Ratios Greater than 0.4 and 0.5

	Total Number	D/A Ratio > 0.4 No.	D/A Ratio > 0.4 %	D/A Ratio > 0.5 No.	D/A Ratio > 0.5 %
All Producers	253	30	11.8	23	9.1
Producers by Type					
Consignors	95	7	7.4	5	5.3
All Others	158	23	14.6	18	11.4
Producers by Area					
Sydney	131	15	11.5	11	8.4
Newc/Gosford	20	3	15.0	3	15.0
Tamworth	53	8	15.1	6	11.3
Other Country	49	4	8.2	3	6.1
Producers by Size of Quota					
<=25,000	216	17	7.9	15	6.9
>25,000&<=50,000	18	5	27.8	2	11.1
>50,000	19	8	42.1	6	31.6

Note: a. Debt is due to quota and new shed purchases
b. Assets include quota valued at $15 and land holdings

In Table 8 the percentage of producers in financial difficulties for critical values of the ratio of 0.4 and 0.5 are compared. The quota value used to calculate assets was $15, the eventual payout received by producers. Using the lower ratio of 0.4, 12 percent of all producers, 30 production units, were in financial difficulties at a payout of $15 per quota. The relative percentages by type, area and size are unchanged from the previous Tables. It is of note however that 42 per cent of producers with base quota greater than 50,000 were estimated to be in financial difficulties at a payout of this level. Again this indicates that the larger producers were those expanding in the industry and therefore were likely to be in greater financial difficulty in a deregulated environment than small producers.

A greater percentage of producer agents and producer packers were found to be in financial difficulty at a payout of $15. Fifteen per cent of producers involved in wholesaling were estimated as being in financial difficult, approximately double that of consignors, re-emphasising the growth in quota holding of this type of producer.

7.4 Banking Survey

7.4.1 Objectives

The objectives of the banking survey were to determine: the number of egg producer clients with outstanding loans and the total value of these loans; the structure of the loans, which was important when calculating debt as outlined above; and whether banks had accepted hen quota as security for loans.

7.4.2 Results

Results were obtained from six banks all of which conducted limited surveys. From this information 73 producer clients were found to have a total debt of $12 million. Four banks had outstanding debts ranging between $2.2 to $2.9 million while the remaining two had outstanding debts between $0.5 to $1.6 million.

Twenty one clients had taken out loans totalling $3.2 million to purchase hen quota. Seven of these clients had also borrowed for physical asset purchases. Clients taking out loans for physical asset purchases totalled 59, with $8.8 million borrowed for this purpose. Limited information provided by banks on the length of term over which loans were taken indicated most clients borrowed 3 to 5 years ago with a loan term of 10 to 15 years.

The survey provided debt details on a sample of producers. From the result that 73 clients (30 per cent of producers) held debt totalling $12 million, an attempt was made to extrapolate an industry figure from the survey data by relying on results from the debt calculations (Section 7.3). The debt calculation indicated approximately 50 per cent of producers had debts. Factoring up the survey results based on this 50 per cent figure indicated a debt holding totalling $20.5 million in the industry. This figure was below the result of the total debt calculation (debt due to quota and new shedding) in Section 7.3 of $25 million. Results from the two approaches supports the finding that debt in the NSW egg industry was between $20-$25 million.

The final issue investigated in the banking survey was whether banks had accepted quota value as security for loans. The status of the loans would be affected if quota was accepted as security for the loan and deregulation subsequently eliminated quota. It was found only two banks had accepted hen quotas as part of the security for loans. In one case, hen quota was only occasionally accepted as security, while, in the other 25 per cent of market value to hen quota (50 per cent for exceptional cases) was accepted for security.

8. Concluding Remarks

The review of regulations and options for deregulation undertaken by NSW Agriculture & Fisheries was extensive. Some of the important considerations involved in the decision-making process have been highlighted in this paper and include issues such as allocative efficiency gains to society and distributional impacts of deregulation, financial impacts on producers of deregulation and appropriate compensation to parties detrimentally affected by policy reforms.

Regulations that existed in the NSW egg industry can broadly be classified as production restrictions, price regulations and marketing controls. Marshallian consumer and producer surplus concepts were used to measure efficiency effects and income transfers from consumers to producers of these regulations. From this analysis it was found gains to society from abolishing marketing arrangements were up to $15.5 million (excluding savings from greater efficiency in the Egg Corporation). Substantial gains to society were estimated to arise by the elimination of obstacles to structural adjustment in the egg industry, such as quota on hen inputs which caused distorted input use and distorted incentives for technological innovation, and regulations on quota ownership which prevented firms accomplishing economies of scale.

Immediate deregulation of the NSW egg industry was selected as the optimum policy option on the grounds of economic efficiency. Other partial deregulation options were dismissed principally because they failed to promote economic efficiency and perpetuated problems of enforcement costs and operating losses incurred by the Corporation.

As distributional effects of deregulation are important to the political acceptability of policy reforms, it was vital for policy advisers to have these areas well researched in recommending changes to policy. The main distributional effect of deregulation analysed in this paper was that associated with losses in quota value and the financial impact of this on producers.

Transferability of quota in the NSW egg industry resulted in highly visible losses to producers from deregulation and as such was particularly important to government decision-marking on the changes to public policy in the egg industry. Losses to producers were embodied in capital outlays producers had made to purchase quota. Because many producers had incurred debt to purchase quota, loss in quota value was relevant to producers' financial positions. The price at which quota was traded reflected the present value of the expected stream of returns from quota ownership. Rents capitalised into the value of quota arose from two sources. Firstly returns on egg production were above the marginal cost of production and secondly returns from wholesaling eggs were regulated above the efficient cost of supplying these services. The greatest rents in the industry arose from wholesaling eggs. These greater rents encouraged the increase in relative size and number of producer agents in the industry.

In relation to debt in the industry therefore it was not surprising that producer agents had the highest average debt levels as this indicated the growth in quota holding of this type of producer. Large producers (holding more than 50,000 quota units) were also found to have outlaid considerable amounts to purchase quota. As producer agents tended also to be large producers this was not unexpected.

The total debt burdens sustained by producers in the NSW egg industry were calculated from PFLC' records and estimated separately from the banking survey conducted. These debt burdens were estimated to be in the order of $20 to $25 million while the eventual compensation payout made by government was $61 million ($15 per quota hen).

Despite the payment of compensation approximately $34 million in excess of calculated debt levels, analysis using gearing ratios indicated that 12 per cent of all producers would still be in financial difficulty at this level. The reasonably high proportion of producers in financial difficulty even at this level of payout reflects the pro rata nature of the payment. Had it been possible to pay compensation which varied according to the period quota had been held and hence the rents which had been extracted in the interim this would have better targeted compensation to injured parties.

The compensation paid of $61 million was considered by government to be equitable and therefore necessary to maximise social welfare. It also reflects, by inference, the payment considered necessary by government to neutralise obstruction to policy reform and so realise social gains from deregulation.

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Appendix 1

Deregulation Options Considered

Several options were considered with the view to determining the most appropriate form of deregulation. The three basic options considered were:

(1) retain the regulated system in a modified form

(2) dismantle the system but retain quota for a period

(3) deregulate the system immediately

The basic option (2) was further divided into three sub options which varied on the method of retaining quota.

The sub options were: maintaining the current quota level forever; reducing quota to a level to eliminate the production of egg product; and the introduction of a two price quota which contained (i) a base quota to supply the shell egg market and (ii) a secondary quota to supply the product market at a lower price.

Option 1

The first basic option involved retaining quota and a minimum wholesale price for shell eggs but the introduction of a two tiered pricing system to limit domestic and export market losses on egg product. Option 1 also included the removal of the Corporation's monopoly on the supply of shell eggs to chain retail outlets and the removal of statutory requirements for grading and packaging while the continued enforcement of public health standards by the licensing committee.

This option was supported by NSW Farmers' Association and was popular with producers of other States. However, it failed to address the important problems of the current system. The disadvantages of option 1 were:

- it failed to consider the strong possibility that legal challenges may prevent the Corporation from being able to collect hen levies in the future.
- operating losses incurred by the Corporation would continue.
- prices would not fall due to the inefficiencies of the Corporation. This would continue the unacceptable level of cost to consumers from the system.
- producer agents which were able to market eggs more cheaply than the Corporation would be unable to do so because of the retention of the minimum wholesale price. (Gresham Partners report estimated the Corporation's costs of grading, packing and distribution of shell eggs were 30 cents per dozen compared with costs of 7 cents per dozen by private producers.)
- the politically embarrassing prosecutions of unlicensed producers at a cost of around $1 million annually would continue.
- NSW producers would be disadvantaged if, in the near future, another State (eg. Victoria) was to deregulate.

Option 2

The key elements of the second option included initially enforcing quota at the then current production level (68 million dozen 1988-89), after which progressively expanding quota over 5 years to 78 million dozen; abolishing the minimum wholesale price; and selling the assets of the Corporation by public tender. The advantages of this strategy were: egg prices to consumers would fall; the Corporation's losses would be eliminated; and, by retaining quotas, the immediate need for government to consider compensation payments, in an effort to offset financial impacts on producers, would be eliminated.

Disadvantages of this option were that prosecutions of illegal producers would continue and quota values would decline, possibly to zero, causing producer opposition to government policy.

The three sub options of option 2 all had disadvantages which precluded their implementation. The options of retaining the then current quota forever and retaining a reduced level of quota forever perpetuated the problems of losses in economic efficiency arising from the quota system. All three sub options had continuing problems of enforcement, with substantially greater costs in this respect estimated from the two price quota system.

Option 3

The third option of complete deregulation which was implemented by government, is identical to option 2 with the exception that quota is abolished. This option had the advantage that enforcement costs would be eliminated but raised the issue of compensation for loss of quota value to producers.

Compensation Options

Issues concerning the size and timing of compensation paid out to producers and the method of raising revenue to finance the payments were investigated. In considering the issues of size of payout, full, partial and a minimal payouts to producers were assessed. The full payout to all quota holders approximated $73 million (4,081,138 total hen quota at $18 per quota). Partial payment was considered to be an amount less than this figure to reflect the advantage producers had gained over time from higher prices in the quota system, while at the same time still covering current debts producers had incurred to finance quota purchases. The minimal payment was described as the amount equal to revenue raised from the sale of the assets of the Corporation.

Attempts were made to equate the compensation paid with the cost of the quota and length of time quota had been owned and thus the benefit already accrued from the regulated system by quota owners (effectively the partial payment described above). Despite the existence of a computerised database containing this information, legal and administrative problems prevented this course of action.

It was considered by government that compensation of $15 per bird was required to avoid severe financial difficulties for many producers, minimise the political backlash from producers, maintain equity between producers and reduce the risk of legal challenges to the governments decision. This level of compensation lay between full and partial levels of compensation.

Also considered in investigations of the appropriate size of compensation were the capital gains tax implications of lost quota values in a deregulated environment. Both the possibility that lower quota values could be treated as a capital loss (tax asset) when quota was sold and the question of whether the payout of $15 would be subject to capital gains tax were reviewed. Analysis of quota transactions indicated average tax assets due to capital losses on a payout of $15 per bird at $11,000 per producer. The eligibility of producers for capital losses or gains due to losses or gains respectively, in quota value remained an unresolved issue.

When assessing the timing of compensation payouts it was recognised that delays in compensation after the announcement had been made would force some producers into obtaining carry-on finance. Details provided by a banking survey conducted indicated in some cases banks accepted hen quota as security for loans. Eliminating quota value and delaying quota payments may have jeopardised producers' financial positions. Although affecting a minority of producers, the undertaking by the Minister for Agriculture and Rural Affairs not to disadvantage legally operating producers was a factor in establishing the timetable for deregulation.

In relation to financing compensation payments, three options were reviewed. All three options included obtaining a portion of funds from the sale of the Corporation's assets and additional funds from either:

1. a specific retail egg tax involving a business franchise license fee levied on retail egg sales.

2. funds from consolidated revenue

3. an initial egg tax to be phased out after a number of years in favour of funding from consolidated revenue.

In relation to the first option, adoption of an egg tax to finance compensation would avoid the precedent of paying out quota value from consolidated revenue. Thus the egg tax option did not reduce government funds designated for other government projects.

However an egg tax would be likely to induce strong retailer opposition and possible litigation. (A danger existed the egg tax might be successfully challenged under section 90 of the constitution.) A major incentive for deregulation, lower retail prices, would be largely dissipated if a tax were implemented. Further there would be high collection costs and enforcement difficulties associated with the egg tax. It was also considered that as many tax payers consume eggs, consolidated revenue was an appropriate source of funds.

Given the estimated low cost effectiveness of an egg tax and its association with continued high prices to consumers, funding from consolidated revenue was selected as the major source of finance for compensation.

Appendix 2

Estimation of the Model for Determining Welfare Effects of Regulations in the NSW Egg Industry

1. Introduction

Details of the methodology used in the estimation of social costs and income transfers associated with government intervention in the NSW egg industry are outlined below. The basic model described includes a perfectly elastic aggregate supply function and an aggregate demand schedule constructed from the horizontal summation of a shell egg demand schedule and a egg product/export demand schedule. The marketing sector is ignored to reduce complication in the analysis. All prices are farm level. Also it is assumed there is no interstate trade in eggs.

The model is used in last section of the appendix to provide quantitative analysis on the welfare effects of some of the various options which were under consideration at the time regulations were reviewed.

2. Demand Schedule

Estimation of the shell egg demand schedule relied on industry price and consumption data and estimates of price elasticity of demand. The farm gate price for shell eggs, (a weighted average across size grades) applying at December 1988 was 145 cents per dozen. The consumption in the NSW shell egg market at this level was 60 million dozen eggs. This price and quantity corresponds to point, a, on Figure 1. The slope of the shell egg demand curve was derived from elasticity estimates by assuming linearity of the demand function. To allow for inaccuracies in estimating the elasticity of demand (eg. intertemporal changes or variation at different price levels) two alternative elasticities were used in the estimation. The two elasticities that were used were 0.15 estimated by Hickman (1979) and 0.27 estimated by Collard et al. (1983). To illustrate the methodology only the less elastic shell egg demand curve is indicated in Figure A1 as $D_{s1}D_{s1}'$.

In developing the demand schedule for eggs used in processing and for export we were unaware of any price elasticity of demand estimates. To circumvent this data limitation two points on the demand schedule were obtained and, assuming linearity, the product/export demand schedule was constructed. The NSW Egg Corporation estimated that for its partly owned subsidiary Good Food Products Australia Pty. Ltd. to return normal profits from processing 10 million dozen eggs, it could afford to purchase eggs at 85 cents per dozen. In addition under one contract totalling 3 million dozen eggs, the Corporation could purchase eggs profitably at 103 cents per dozen. From these two points the demand schedule for egg product was estimated ($D_{p1}D_{p1}'$). Although not indicated on the Figure A1 a second more price elastic egg product demand schedule was constructed which also passed through the 1988 price/quantity point for eggs used in egg processing and export (ie. 85 cents per dozen/ 10 million dozen) to allow some sensitivity analysis of the results.

The aggregate demand schedule in the absence of price regulation is derived by the horizontal summation of the demand schedule for shell eggs and that for eggs for processing and export. The aggregate demand schedule using the two less elastic demand schedules thus becomes $D_{s1}D_{t1}$, kinked at the maximum price at which eggs are demanded for product and export.

Under the pre August 1989 regulations, shell egg consumption was restricted to 60 million dozen due to regulation of the wholesale price (at a level corresponding to a farm gate price of 145 cents per dozen). With the shell egg demand schedule specified as $D_{s1}D_{s1}'$ and the egg product/export demand schedule specified as $D_{p1}D_{p1}'$ the aggregate demand schedule with regulations becomes $D_{s1}abD_{t1}'$.

3. Supply Schedule

NSW production for the year 1988 amounted to 70 million dozen eggs. As stated earlier the payment received by producers was 145 cents per dozen. To calculate net returns to producers however, approximately 30 cents per dozen for the hen levy is deducted, leaving net returns to producers of 115 cents per dozen. Using information on prices paid to lease quota per annum, it is possible to calculate an approximate value of marginal economic rent which lessees expect to earn by holding hen quota. Given that the average lease price of quota was $3.50 and the number of eggs per hen per annum was approximately 22.6 dozen (PFLC 1988), marginal economic rents were around 15 cents per dozen. It follows that marginal costs of production across the industry were about 100 cent per dozen.

The location of the supply schedule will vary according to the aggregate hen quota level and the conditions associated with hen quota. The supply schedule will kink upward when the level of hen quota begins to restrict production and increasing quantities of non-hen inputs are necessary to overcome the limit on hen utilisation. For the purpose of simplifying model estimation, however, this substitutability of other inputs for quota hens has been ignored, so that the supply schedule under hen quotas kinks to the vertical at the aggregate level of production for 1988.

It appears possible, based on estimates provided from NSW Agriculture & Fisheries Poultry Research Station at Seven Hills, that changes in hen quota conditions (particularly the reduction of the age at which hens must be paired with hen quota from 26 weeks to 19 weeks) and in on-farm management routines could lead to marginal costs at the current level of production being reduced by 5-15 cents per dozen. (i.e, to 85-95 cents per dozen.) Elimination of the hen quota system altogether may lead to further cost reductions as a result of producers no longer having the incentive to choose relatively high-cost input mixes with the objective of maximising output per quota hen.

It was with considerable uncertainty therefore, that estimation of a supply schedule could proceed. With modification of quota conditions, or dismantling of the hen quota system, it was considered that marginal costs at the existing aggregate production level would fall within the range 75-95 cents per dozen. In the estimation of values of decision variables which follows, a marginal cost of 85 cents per dozen has been selected as the 'most likely'.

Contrasting with the model presented in Section 5 it was assumed that over the relevant range of aggregate production levels supply was infinitely price elastic (i.e. production can increase over this range without any change in the marginal cost of production). This was considered to be a realistic assumption because of the excess capacity in the industry.

The supply schedule corresponding with existing hen quota conditions has been represented as infinitely price elastic over the relevant production range, based on a marginal cost of production of 100 cents per dozen. This schedule is labelled as $S_n S_n'$. Under a hen quota system the supply schedule will kink

to the vertical at the production level achievable with the aggregate quota allocation (given our simplifying assumption of non-substitutability of other inputs for quota hens). With aggregate quota set at the 1988 level, this kink is assumed to occur at the then current level of production (i.e., approximately 70 million dozen eggs). The assumed supply schedule in the absence of regulations is represented in Figure A1 as $S_m S_m'$ at 85 cents per dozen.

4. The Estimated Model

The model was used to estimate the effects of implementing a number of alternative options. The alternatives considered were:

1. Continue existing arrangements without change.
2. Cease price regulation. Maintain hen quotas but change quota conditions, to allow a lower cost of production. Set aggregate level of hen quota so that aggregate production remains at current level (70 million dozen).
3. As for 2, but set aggregate level of hen quota so that aggregate production is reduced to the current level of shell egg consumption (60 million dozen).
4. As for 2, but issue secondary hen quota allowing aggregate production to exceed 70 million dozen. Eggs from the secondary hen quota to be used only for processing or export.
5. As for 3, but issue secondary hen quota allowing aggregate production to exceed 60 million dozen.
6. Complete deregulation.

The foregoing modelling assumes eggs are a homogeneous commodity. In fact there is considerable variation of egg size and appearance. Moreover, the small proportion of eggs with cracked shells or over-sized air cells (1-2 per cent of all production) cannot be used for shell egg consumption. In practice there would be a range of prices at any one time corresponding with eggs of differing characteristics. For the purposes of this exercise, however, we have assumed that all eggs are of an "average quality and size".

5. Economic effects of adopting various options

Use of the model to estimate the effects of adoption of each option upon prices, quantities and economic surplus (as a measure of total welfare) will yield a range of possible outcomes corresponding with the alternative specifications of the demand and supply schedules. These effects are listed in Table A1.

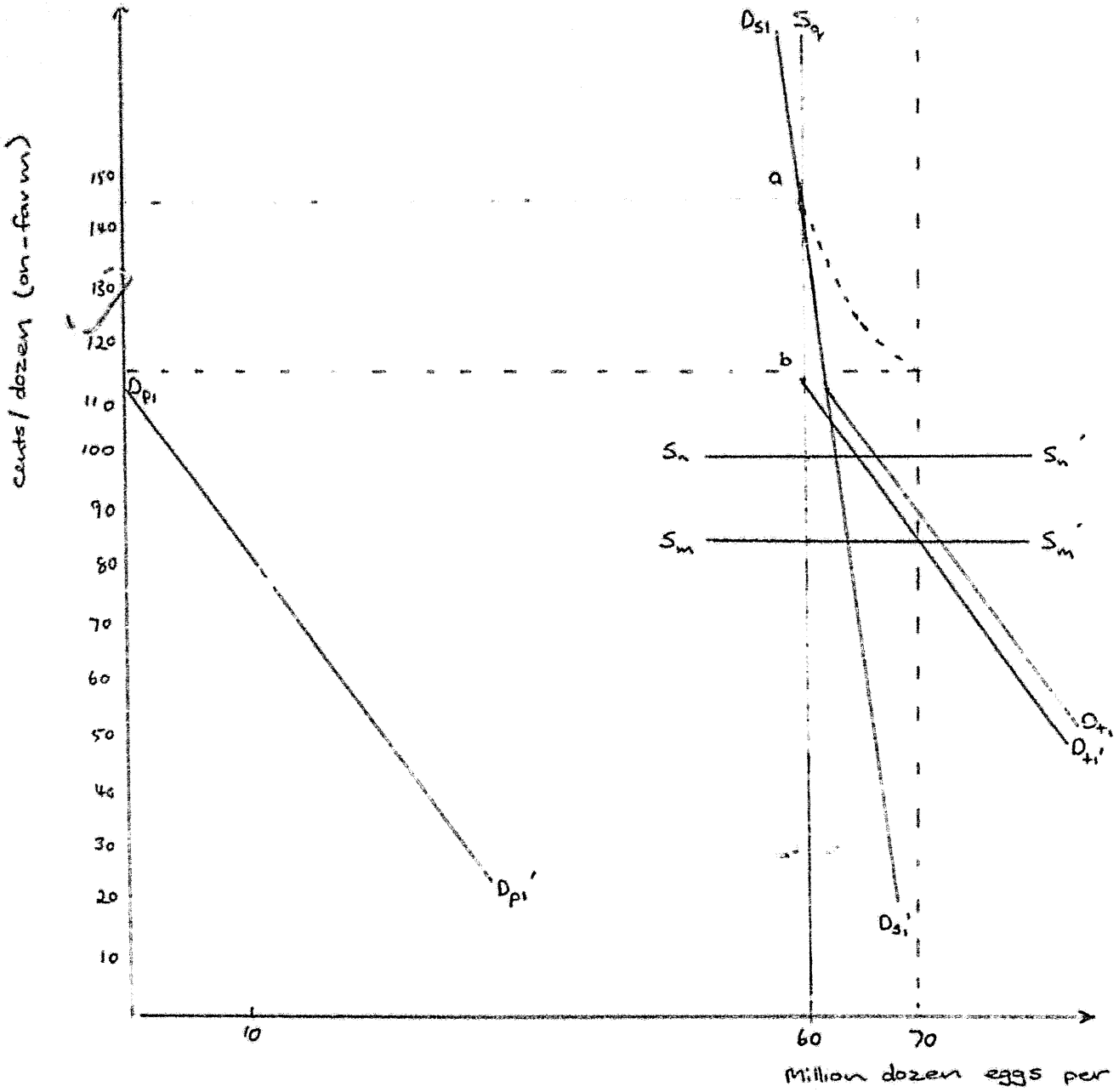
For each of the options considered, losses of economic surplus compared with the complete deregulation option (which under assumptions of perfect competition and absence of externalities yields the optimal level of economic surplus) have been calculated. For Option 1 the supply schedule used for calculation of economic surplus was $S_n S_q$ (i.e., where marginal cost is 100 cents per dozen) and for options 2-6 the supply schedule used was $S_m S_m'$,(i.e., where marginal cost is 85 cents per dozen)

The following estimates of economic surplus, however, do not take into account administration and enforcement costs of each of the regulatory options (options 1-5). Inclusion of these costs would reduce economic surplus for some options relatively more than for others. It is likely that these costs would be higher per dozen eggs for Options 4 and 5 due to the need to administer an additional class of quota as well as enforce separation of the shell egg and processing/export markets.

Table A1: Estimated Economic Effects of Alternative Options

	Option 1: No change	Option 2: Price deregulated. Quota conditions modified. Quota sufficient for 70 m doz.	Option 3: Option 2 but with quota sufficient for 60 m doz.	Option 4: Option 2 with secondary quota for production exceeding 70 m doz.	Option 5: Option 3 with secondary quota for production exceeding 60 m doz.	Option 6: Complete deregulat
Farm-gate return	115c/doz. (i.e.,the equalised return).	90-101c/doz.	145c/doz.	*90-101c/doz. for base quota eggs. *75-95c/doz. for secondary quota eggs (likely 85c/doz)	*145c/doz. for base quota eggs. *75-95c/doz. for secondary quota eggs (likely 85c/doz.)	75-95c/do (likely 85c/doz.)
Quantity[2]						
- to shell egg market	60 M doz.	63-67 M doz.	60 M doz	63-67 M doz.	60 M doz.	63-69 M d (likely 6 M doz)
- to processing/ export market	10 M doz.	3-7 M doz.	1-2% of shell eggs which cracked	3-19 M doz. (3-8 M doz. of this from base quota) (Likely 11-12 M doz. with 4-8 M doz from base quota).	3-16 M doz. (likely 10 M doz)	3-16 M do (likely 1 doz.)
Economic Surplus [2]	$13M-$15.5M below level at competitive equilibrium	$0.1M-$0.8M below level at competitive equilibrium	$2.0M-$4.6M below level at competitive equilibrium	Equal to level at competitive equilibrium	$1.2M-$3.2M below level at competitive equilibrium	Equal to level at competit equilibr

1. Estimates apply to effects at December 1988.
2. Per annum.


cents / dozen (on-farm)
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
D_{S1}
S_q
a
b
D_{p1}
D_{p1}'
S_n
S_n'
S_m
S_m'
D_{t1}
D_{t1}'
D_{s1}'
10
60
70
Million dozen eggs per annum