Some Economic Implications of Minimum Pricing: The Case of Wine Grapes in Australia

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Minimum pricing arrangements for grapes taken up by wineries in Australia are briefly reviewed. A partial equilibrium model is developed to illustrate the implications of such arrangements for income transfers and dead-weight losses in both the grape and wine markets. An attempt is made to incorporate the contingencies of the long lead times associated with grape production and the possible occurrence of monopolistic behaviour by wineries. The analysis is theoretical, so that, while directed specifically at the wine grape industry in Australia, much of it is relevant to other instances of minimum pricing for agricultural commodities.

1 Introduction

The Wine Grape Processing Industry Act of 1979 introduced minimum pricing arrangements for grapes used for wine making in New South Wales. Initially, the legislation covers the multi-purpose varieties of Sultana and Muscat Gordo Blanco, with possible extension to additional varieties at a later date. With complementary legislation passed in Victoria, these States have been brought into line with pre-existing legislation in the dominant grape producing state of South Australia.

This new legislation means that varieties which contribute about 70 per cent of the grapes grown for wine making in Australia are now covered by minimum pricing arrangements. Co-operative wineries, however, which are exempt from the minimum price legislation, account for about 20 per cent of total Australian crushings, so that about 50 per cent of the grapes used for wine making would be affected. It is thus an opportune time for a review of the economic implications of administered prices. While the following discussion is directed at the grape industry, much of the theory can also be applied to other agricultural commodities.

Section 2 presents a brief statistical overview of the Australian grape industry and outlines the administered pricing arrangements in the various states. The standard theoretical model of an effective minimum price is described in section 3. Sections 4-7 expand the model in various directions. An attempt to incorporate the notion of long lead times in production decisions is presented in section 4. Section 5 presents a brief analysis of non-competitive behaviour by wineries in their grape intake, which has been a source of contention to growers in recent years. Input usage and the nature of the demand function for grape inputs are outlined in section 6. In section 7, the effects on the wine market under several assumptions as to the structure of that market are discussed. Finally, in section 8, there is a summary of the discussion and the major conclusions.

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1 Multi-purpose varieties are suitable for wine making, drying or fresh consumption, while specialist wine grapes have only limited marketability outside wine making.
2 Overview of the Grape and Wine Industries

Grape production in Australia is dominated by the states of South Australia (which produces around 40 per cent of the total), Victoria (35 per cent) and New South Wales (20 per cent). Around 800 kt of grapes are produced in Australia annually, of which multi-purpose varieties account for more than 50 per cent.

Approximately 60 per cent of Australia's grape production is used for wine making and spirit distillation, with most of the balance being dried. The fresh market absorbs only small quantities. In South Australia and New South Wales, wine making and spirit distillation absorb the bulk of the grape crop. However, in Victoria, drying provides a market outlet for about 75 per cent of production. About 25 per cent of the grapes used for wine making in Australia are drawn from the multi-purpose varieties — principally Sultana and Muscat Gordo Blanco.

The wine making sector is made up of public and private wineries of varying sizes and a number of grower owned co-operatives. Only a small number of growers sell grapes to wineries under contract. A number of wineries, however, own and operate their own vineyards.

In recent years, between 25 per cent and 40 per cent of dried vine fruit production has been consumed domestically, the remainder being exported. Returns to growers from dried vine fruit sales have been influenced by equalisation and stabilisation arrangements.

Legislated minimum prices in South Australia are determined by a working party which includes representatives from wine makers and grape growers, officers of the South Australian Department of Agriculture and Fisheries, and the office of the South Australian Commissioner for Prices and Consumer Affairs. The working party takes into account varietal demands and level of supply, but places most emphasis on increases in production costs.

Prior to 1979, minimum prices for grapes in the Murrumbidgee Irrigation Area (MIA) were determined after consultation between the Wine Grapes Marketing Board and MIA Winemakers' Association. South Australian minimum prices were generally taken into account, with variations for local farm and market circumstances. As the new legislation in New South Wales initially covers only certain multi-purpose varieties, this system is likely to continue for wine grapes.

Table 1 lists minimum prices for selected varieties of grapes in South Australia and the MIA between 1974 and 1980.

Differences in marketing circumstances and quality make comparisons of minimum prices across the two states difficult. Further, the relative importance of the varieties varies considerably between the two states. However, the divergences between minimum prices for Shiraz and Cabernet Sauvignon in South Australian irrigated regions and the MIA in recent years seem substantial. Table 2 lists the estimated quantities of these two varieties left on the vine in the 1978-79 season.

The quantities left on the vine in South Australia represented a substantially higher proportion of production in that state than was the case in New South Wales.

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2 The material in this section draws heavily on the IAC (1979) report on grapes and wine (see also BAE 1980).

3 Stabilisation arrangements for dried vine fruit ended with the 1979-80 season.

4 While the working party was established in 1978, similar arrangements existed prior to that time.
Table 1: Minimum Prices for Selected Varieties of Grapes Used for Wine Making

<table>
<thead>
<tr>
<th>Season</th>
<th>Shiraz</th>
<th>Sultana</th>
<th>Grenache</th>
<th>Doradillo</th>
<th>Riesling</th>
<th>Cabernet Sauvignon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/t</td>
<td>$/t</td>
<td>$/t</td>
<td>$/t</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Non-irrigated, South Australia (delivered winery)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>142</td>
<td>—</td>
<td>97</td>
<td>79</td>
<td>157</td>
<td>205</td>
</tr>
<tr>
<td>1975</td>
<td>196</td>
<td>—</td>
<td>134</td>
<td>109</td>
<td>216</td>
<td>282</td>
</tr>
<tr>
<td>1976</td>
<td>196</td>
<td>—</td>
<td>134</td>
<td>109</td>
<td>216</td>
<td>282</td>
</tr>
<tr>
<td>1977</td>
<td>210</td>
<td>—</td>
<td>150</td>
<td>125</td>
<td>235</td>
<td>305</td>
</tr>
<tr>
<td>1978</td>
<td>200</td>
<td>180(a)</td>
<td>150</td>
<td>135(a)</td>
<td>240</td>
<td>280 252(a)</td>
</tr>
<tr>
<td>1979</td>
<td>200</td>
<td>180(a)</td>
<td>150</td>
<td>135(a)</td>
<td>240</td>
<td>280 252(a)</td>
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<tr>
<td>1980</td>
<td>200</td>
<td>—</td>
<td>150</td>
<td>150</td>
<td>285</td>
<td>310</td>
</tr>
<tr>
<td>Irrigated, South Australia (ex vineyard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1974</td>
<td>112</td>
<td>69</td>
<td>76</td>
<td>68</td>
<td>134</td>
<td>164</td>
</tr>
<tr>
<td>1975</td>
<td>157</td>
<td>100</td>
<td>107</td>
<td>96</td>
<td>188</td>
<td>230</td>
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<tr>
<td>1976</td>
<td>157</td>
<td>97</td>
<td>107</td>
<td>96</td>
<td>188</td>
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<td>1977</td>
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<td>110</td>
<td>120</td>
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<tr>
<td>1978</td>
<td>135</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>210</td>
<td>185</td>
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<tr>
<td>1979</td>
<td>135</td>
<td>127</td>
<td>120</td>
<td>120</td>
<td>210</td>
<td>185</td>
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<tr>
<td>1980</td>
<td>135</td>
<td>155</td>
<td>128</td>
<td>140</td>
<td>245</td>
<td>185</td>
</tr>
<tr>
<td>Murrumbidgee Irrigation Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1974</td>
<td>105</td>
<td>66</td>
<td>74</td>
<td>66</td>
<td>130</td>
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</tr>
<tr>
<td>1975</td>
<td>150</td>
<td>100</td>
<td>107</td>
<td>96</td>
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<tr>
<td>1976</td>
<td>125</td>
<td>100</td>
<td>107</td>
<td>96</td>
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<tr>
<td>1977</td>
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<td>110</td>
<td>120</td>
<td>110</td>
<td>205</td>
<td>200</td>
</tr>
<tr>
<td>1978</td>
<td>125(b)</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>205</td>
<td>185</td>
</tr>
<tr>
<td>1979</td>
<td>125(c)</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>205</td>
<td>185</td>
</tr>
<tr>
<td>1980</td>
<td>100</td>
<td>158(c)</td>
<td>100</td>
<td>120</td>
<td>205</td>
<td>140</td>
</tr>
</tbody>
</table>

(a) Separate prices established for Angle Vale. (b) Grapes pooled: actual price paid to growers from pool proceeds, approximately $72/t. (c) Minimum price established under the 1979 legislation.

Source: IAC (1979, p. A44, adapted from Table 9).

Table 2: Quantities of Cabernet Sauvignon and Shiraz Left on Vine in New South Wales, Victoria and South Australia: 1978-79(a)

<table>
<thead>
<tr>
<th>State</th>
<th>Cabernet Sauvignon</th>
<th>Shiraz</th>
<th>Proportion</th>
<th>Production</th>
<th>Left on vine</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Production t</td>
<td>Left on vine t</td>
<td>%</td>
<td>Production t</td>
<td>Left on vine t</td>
<td>%</td>
</tr>
<tr>
<td>N.S.W.</td>
<td>7 402</td>
<td>384</td>
<td>5.2</td>
<td>27 197</td>
<td>1 445</td>
<td>5.3</td>
</tr>
<tr>
<td>Vic.</td>
<td>3 632</td>
<td>121</td>
<td>3.3</td>
<td>9 430</td>
<td>550</td>
<td>5.8</td>
</tr>
<tr>
<td>S.A.</td>
<td>15 825</td>
<td>2 426</td>
<td>15.3</td>
<td>48 708</td>
<td>12 033</td>
<td>25.7</td>
</tr>
</tbody>
</table>

(a) No significant surpluses were recorded in 1979-80.

and Victoria. It seems reasonable to suppose that this was due, at least in part, to the higher minimum prices in South Australia, which do not adequately reflect the state of demand relative to supply, given the marked ongoing switch in demand patterns away from red wines.

An estimate of the surpluses of the different varieties of wine grapes as a result of the legislated minimum prices in South Australia could provide an indication of the effectiveness of the minimum prices in that state. However, inadequate data are available for this purpose. Prior to the 1976-77 season, quantities of wine grapes left on the vine in South Australia were minimal. In recent seasons, these quantities have become more substantial, but there has been disagreement as to the actual figure, with estimates ranging between 20 kt and 50 kt in the 1978-79 season. Further, the volume of grapes left on the vine may not provide an adequate estimate of the underlying surplus because surplus grapes can be converted into additional stocks of wine. The situation for multi-purpose grapes is even more problematical because grapes not taken up by wineries can be diverted toward drying or the fresh market so that, even with an effective minimum price in force, only minimal quantities of grapes are likely to be left on the vine. An analysis of changes in the proportions of multi-purpose grapes taken up by the fresh market or for drying picks up the effects of factors in addition to the minimum price to be paid by wineries. For example, while the relative importance of drying as a market outlet for multi-purpose grapes has tended to increase in recent seasons, this has coincided with an improvement in the market prospect for dried vine fruit.¹

While the existence or significance of grape surpluses in South Australia is unclear, much of the following discussion is centred on the short run, so that the analysis is relevant to any instance in which an effective minimum price operated even for a single season. Section 4 raises some long-run issues which, to be relevant, would require a more extended period in which an effective minimum price operated. Even if such a period has not occurred in the past, there is clearly the potential for it to occur in the future, so that an awareness of the possible long-run implications is important.

The new (1979) legislation in New South Wales and Victoria, making minimum prices in these states legally enforceable for the first time, raises the possibility of substantial grape surpluses emerging in the future should the minimum prices significantly exceed the market clearing price. It follows the Australian Agricultural Council's agreement in principle in 1976 on the need for uniform legislation for the determination of minimum prices for certain varieties of grapes. The legislation in both states provides for minimum prices for multi-purpose² grapes acquired by wineries to be negotiated annually by an equal number of grower and wine-maker representatives and for the formation of a Joint Negotiating Committee representing both New South Wales and Victoria. Should agreement fail to be reached, the matter will be referred to an independent arbitrator for determination.

3 A Basic Minimum Price Model

The economic implications of minimum price legislation can be analysed in a simple partial equilibrium framework.³ In this section the focus is primarily on the short run which can be interpreted as a single season. The short-run supply response is

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¹ It is unlikely, however, that this improvement will be maintained in the longer term, particularly if the expected difficulties with access to the EC market eventuate.

² The New South Wales legislation initially covers only Sultana and Muscat Gordo Blanco varieties, with provision for possible extension to further varieties in the future.

³ While partial equilibrium analysis has only limited scope for analysing such issues as substitutability in grape usage and interstate trading, it has the advantage of being relatively simple and could provide a framework into which a more detailed analysis can be incorporated.
likely to be very own-price inelastic. Growers have only limited scope for varying production in response to a change in prices and, as the minimum prices are announced just prior to the vintage, this further limits the scope for a significant grower response in the short run. Further, because of the perishable nature of grapes, growers have the incentive to deliver all of their current crop when the price is equal to or exceeds the marginal costs of harvesting and delivering (provided that a market outlet is available), even though the fixed costs of production are not covered. The short-run supply response should be more elastic for multi-purpose grapes because of the existence of alternative market outlets (i.e., drying and the fresh market) not available to growers of specialist wine grapes.

In Figure 1, \(DD\) is the demand curve\(^{11}\) for a certain variety of grape to be used for wine making and \(SS\) the supply curve. It is assumed that both curves have the usual properties. \(P^*\) is the market clearing price in the absence of intervention by government or producer organisations.

\[\text{Figure 1: Basic model of an effective minimum price.}\]

\(^{11}\) In practice, grape growers often deliver grapes to the winery at a time specified by the winery. In some cases, this may not be the optimal time for growers, in terms of the quality and quantity of production.

\(^{1})\) While higher prices are often obtained in the drying or fresh market, supplying these markets often also involves greater cost and risk.

\(^{11}\) An income-compensated demand curve should be used for the purposes of this exercise. However, as the results are qualitative, the distinction is not regarded as important in this application. The results obtained by Willig (1976) provide further justification for this approach. It is assumed that producer and consumer surpluses represent reasonable measures of the benefits to producer and consumer groups.
An ineffective minimum price is one which always falls below the market clearing level, \( P^* \), in which case its existence has little relevance to the operation of the market. To influence the outcome of market trading, the minimum price must be set above the market clearing level. Figure 1 depicts an effective minimum price, \( P_m \), being set above \( P^* \). \( P_m \) is effective because it generates excess supply in the market — at price \( P_m \), quantity \( OX_2 \) is supplied, but a smaller quantity, \( OX_1 \), is demanded.

The minimum price results in a transfer of consumer surplus to producers. In Figure 1 this transfer is represented by the area \( P_mABP^* \). The area \( P_mCACP_2 \) represents economic rent accruing to grape growers, which provides a major incentive for wineries to establish their own vineyards. In addition, dead-weight losses of producer and consumer surpluses are generated — the area \( AFC \). This can be regarded as being made up of two parts:

(a) the dead-weight loss of consumer surplus (area \( AFB \)) — consumers place a value on \( OX_2-OX_1 \) additional units in excess of the market clearing price of those units;

(b) the dead-weight loss of producer surplus (area \( BFC \)) — the marginal or opportunity cost or producing \( OX_2-OX_1 \) additional units is below the market clearing value of those additional units.

Combining (a) and (b), \( OX_2-OX_1 \) additional units can be produced at a marginal or opportunity cost below the value which consumers place on these additional units. Economic welfare is reduced because of the inefficiency generated by the effective minimum price, and a simple measure of that loss is the area \( ABCF \).

It is beyond the scope of this paper to attempt to estimate accurately the size of these transfers and dead-weight losses. However, an estimate of the possible order of magnitude of these figures for Shiraz and Cabernet Sauvignon in the 1978-79 season is contained in the Appendix.

There is a further source of welfare loss. Economic efficiency dictates that production of the \( OX_1 \) units taken up at price \( P_m \) be undertaken by the lowest cost producers. In Figure 1, these are the producers whose marginal costs lie below point \( C \) on the supply curve. However, all producers who have marginal costs up to point \( E \) on the supply curve will be willing to supply at the minimum price \( P_m \). The excess of supply over demand at \( P_m \) indicates a necessity to ration uptake among the willing producers. Numerous such rationing schemes are possible, but the most likely is queueing or ‘first in first served’, which is arbitrary and, in general, will not ensure that production is concentrated only in the hands of the lowest cost producers. In Figure 1, queueing will result in production being undertaken by producers situated randomly along the supply curve up to point \( E \). Rationing on the basis of quality may also occur.

Unlike the dead-weight losses represented by area \( AFC \) in Figure 1, these additional dead-weight losses could be avoided if appropriate action were undertaken. For example, if the wine makers’ demand curve for grapes were known and the minimum price were announced prior to the commencement of the season, production quotas could be introduced and sold at a price equal to \( OP_m \) — \( OP \), to ensure that the required production be undertaken by the lowest cost producers. Alternatively, a tax at rate \( OP_m - OP \), per unit of grape production could be imposed on grape growers. However, in both cases, unless the revenue is redistributed to growers in a non-distortionary fashion, growers are worse off by the area \( P_mCFP \) relative to the non-intervention situation.\(^{11}\)

\(^{11}\) Under the minimum price arrangements or the tax or quota system where benefits are redistributed to growers, ‘rent seeking’ behaviour could be expected to generate additional social costs. Some discussion of this aspect is contained in Posner (1975).
The difficulties that at least some growers are likely to experience in selling all their output to wineries at the controlled prices are likely to result in diversion of grapes to drying or to the limited fresh market, depressing the price in that market. Interstate trading, where feasible, can also provide an outlet for surplus grape production. Grapes are likely to be moved from the high-price controlled states to the lower price states because of the limited market outlets in the former, provided that the prices received cover at least the transport and handling costs.

Finally, while a legislated minimum price introduces a degree of price stability to the market, it differs from the common buffer stock scheme for stabilising price. The latter arrangement ensures that growers are always able to find a market outlet for their production — either private buyers or the stockholding authority. As a vast theoretical literature has emerged on buffer stock schemes for stabilising prices, little would be gained by further discussion of these issues here (See, for example, Turnovsky (1977) and references cited therein).

4 Lags and Variability in Production

The basic model takes no account of the long lead times involved in bringing plans for increased grape production to fruition or of the production variability resulting from the variability in meteorological and biological conditions.

Long lead times can be introduced by assuming a relatively price inelastic short-run supply curve and a more price-elastic long-run supply curve. The greater elasticity of the long-run supply curve is a reflection of the greater scope which growers have for varying production in the long run. New vines can be planted and brought to fruition, or existing vines can be grubbed. The effects of changes in the rate of fertiliser application tend to cumulate over time, as do the effects of more intensive pruning. In the longer term, bud grafting projects can be brought to fruition, allowing some alteration in the varietal mix of existing vines. If growers expect great difficulty in selling their output at the controlled prices, they may alter their varietal mix in favour of non-controlled varieties.

Yield fluctuations can be incorporated by introducing ‘shadow’ supply curves. In periods of low yields, the short-run supply curve can be conceived of as lying to the left of the normal or expected short-run curve while, in periods of high yields, the shadow short-run supply curve will lie to the right of its normal position. A similar argument can be made for the long-run supply curve — actual production may be greater or less than the expected level as a result of atypical weather patterns (see Figure 2).

Given the long lead times associated with the long-run supply response, producers will necessarily react to an expectation of future price. This expectation of future prices is likely to be based, at least in part, on current price levels (i.e. an adaptive expectations mechanism).

\( DD \) is the wineries’ demand curve for a specific type and quality of grape. \( S_{w} \) is the short-run supply curve, given normal weather, while \( S_{B} \) and \( S_{u} \) are the below average and above average weather short-run supply curves, respectively. \( S_{b} \), \( S_{h} \) and \( S_{u} \) are the corresponding long-run curves.\(^\text{11}\)

\(^{11}\) Assuming wineries to be price takers in all other factor markets and in the wine market (or given the demand schedule for wine in the case of a price searcher in the wine market), \( DD \) gives the profit maximising level of grape usage for each grape price.

\(^{12}\) An indication of the extent of fluctuations in grape production can be obtained from IAC (1978).
In the absence of price intervention, prices in the short run will fluctuate between $P_a$ and $P_b$ because of yield fluctuations. This has two effects:

- It ensures that the market clears, so that the efficiency losses outlined in section 3 do not arise.
- Growers do not face a biased system of prices on which to base their long-run production decisions, given that such decisions are based on expected prices which, in turn, are based, at least in part, on current realised prices.

Effective minimum price legislation, on the other hand, will result in excess supply, at least in some periods (typically in periods of high yields), and at these times, the inefficiencies outlined in section 3 will emerge. In addition, it may result in growers basing their longer term production decisions on an expected price which is unrealistically high, so that the problems of excess production and resource misallocation will be exacerbated over time. This is an important consideration when demand patterns are changing over time, a "classic" example being the shift away from red wines. A falling relative price of red wine grape varieties not only helps to ensure short-run market clearance of these varieties, but also encourages growers to make appropriate longer term production decisions.

5 Non-competitive Winery Intake

The model has so far assumed that winery intake is competitive, i.e. wineries do not have any significant monopsonistic power in their grape purchases. This conforms with the view of the Industries Assistance Commission, . . . the Commission considers that there is a sufficiently large number and adequate distribution of wineries to ensure that wineries would not be able to act together or separately to reduce the average price of grapes' (IAC 1979).

\footnote{Of course, producers are likely to take some account of possible future sales constraints when making longer term production decisions.}

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However, little empirical work has been done on this question, and non-competitive behaviour by wineries has been a source of contention to growers. In 1978, there were 287 wineries crushing 10 t or more (BAE 1979). About seven per cent of these accounted for almost 80 per cent of total crushings. Even with a lower level of concentration in the wine-making sector, significant transport and handling costs may still result in a degree of monopsonistic power for some wineries, particularly if wineries have an inefficient spatial distribution. Thus, the possibility of non-competitive behaviour by wineries should not be discounted until more research is done in this area.

The two alternative winery intake market structures can be analysed in the simple partial equilibrium framework presented in Figure 3.

![Figure 3: A monopsonistic market structure.](image)

\( DD \) is the winery demand curve for grapes. The \( AFC \) curve is the wineries average factor cost under monopsonistic conditions, or the supply curve under competitive conditions. \( MFC \) is the wineries marginal factor cost under the monopsonistic assumption. Without a monopsony in grape inputs, \( AFC, MFC \) and input price are synonymous. However, where a monopsony exists, the distinction between \( MFC \) and \( AFC \) becomes crucial. This analysis is relevant to both the short run and the long run. The short-run supply \( (AFC) \) curve is likely to be very own-price inelastic, so that the \( MFC \) curve can be regarded as being ‘inelastic’.

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\( ^{15} \) See, for example, Anon. (1976): the Wine Grape Marketing Board is reported to have argued that wine makers could set whatever prices they liked and whatever conditions of payment they liked. Also, Hefford and Round (1978) provide some discussion of the welfare costs of monopoly power in some Australian manufacturing industries, including the wine and brandy industry.

\( ^{16} \) For some discussion of concentration and profitability, see Round (1976).

\( ^{17} \) Marginal factor cost is the increase in the total cost of purchasing that input when one additional unit is purchased.
Under competitive conditions, quantity $OX_1$ is traded at price $OP^*$. However, under monopsonistic conditions without intervention, wineries equate their demand for grapes with the marginal factor cost rather than the average factor cost of grapes. Only quantity $OX_1$ would be taken up, and growers would be paid the supply price for this quantity, $OP_m$. This means that wineries will take up less than the competitive quantity of grapes, for which growers are paid less than the competitive price. If a minimum price is introduced at $OP_m$, it is clear that the MFC curve becomes $P_mABMFC$ and quantity $OX_2$ will be taken up by the wineries. A minimum price of $OP^*$ would result in the competitive outcome being achieved.

In general, any minimum price between $OP_m$ and $OP$, will result in growers being able to sell a larger quantity of grapes at a higher price than in the presence of monopsony without intervention. However, for legislated minimum prices below $OP^*$, a level of production and intake below the competitive optimum will be achieved. For minimum prices above $OP^*$, less than the competitive quantity will be taken up, but a level of production above the competitive level will be encouraged, which will lead to the types of resource misallocation outlined in section 3.

It is clear, then, that the existence of non-competitive behaviour by wineries in their grape intakes can provide a role for minimum price legislation. However, to eliminate the inefficiencies inherent in the monopsonistic outcome and to avoid the creation of new ones, the minimum price would need to be set at the competitive market clearing level. This implies a minimum price sufficiently flexible to respond to movements in demand and supply and an ability to make reasonable forecasts of the underlying market clearing price.

6 Winery Intake Demand

Grapes are an input into the wine-making process, so that winery demand for grapes is a derived demand, and the theory of the demand for a productive input can be utilised.

The demand for an input can be derived from the unconstrained maximum profit function (Varian 1978, ch. 1) and is a function of the price of the output $p$ and the vector of input prices $e$.

$$dg = dg (w, p)$$

Applying this theory to the demand for grapes for wine making, it indicates that, for a given technology, the demand is a function of the price of wine, the price of wine grapes and the price of other productive inputs such as labour, capital, non-controlled grape varieties and energy.

The unconstrained maximum profit function is derived on the assumption that all inputs and the final output can be adjusted optimally in response to any change in the price of inputs. In this sense, the demand function, equation (1), can be regarded as a long-term or unconstrained demand function. In the short run, some inputs will be fixed (e.g. capital). Letting $z$ be a vector of prices of the fixed inputs, and redefining $w$ as the vector of prices of the variable inputs, the short-run or constrained demand function for the input is a function of $p, w$ and $z$.

$$dg = dg (p, w, z)$$

In general, the constrained demand curve would be less own-price elastic than the long-run or unconstrained demand curve.
The effects of a freely fluctuating price of grapes is clear from this analysis. It influences the relative price of inputs which, in turn, influences the cost-minimising input combination. Secondly, it influences the marginal costs of production and, thus, the profit maximising level of output.

In Figure 4, \(dg(w,p)\) is the demand curve for a specific variety of grapes, and \(dg(w,p,z)\) is the constrained demand curve, conditioned by the fixed input, \(z\). Assume that the legislated minimum price prevents the grape price falling below \(OP_m\), whereas, under competitive conditions, the price would fall to \(OP_1\), at least in some periods. The lower grape intake of \(OG_1\), rather than \(OG_1\), is a reflection of several effects:

(a) to the extent that it is possible, a switch by wineries toward various multi-purpose grape varieties not covered by the legislation, relative to the combination which would have been optimal at a lower wine grape price;

(b) a greater relative usage of non-grape inputs, such as capital equipment capable of extracting additional wine from a given volume of grapes, additional labour to reduce grape wastage, and so on; and

(c) a higher profit maximising wine price, leading to reduced wine sales and, consequently, reduced usage of grape inputs (assuming grapes to be a 'normal' input, i.e. grape usage rises as wine output increases, given the relative input price).

In the short run, the conditional grape input demand schedule, \(dg(w,p,z)\) is the relevant one. As drawn in Figure 4, this schedule is less elastic than the unconditional schedule so that, at the lower price of \(OP_1\), only \(OG_2\) units of grapes are taken up. The lower elasticity of the short-run demand curve is a reflection of the less elastic short-run supply response in the wine market, leading to a smaller contraction in sales.
and the existence of fixed inputs which restrict the scope for substitution between inputs. Action by wineries to take advantage of a temporary period of low grape prices to build up wine stocks could be a counteracting factor.14

7 The Effects of Minimum Grape Prices on the Wine Market

Approximately 250 ML of wine was consumed on the Australian domestic wine market in 1979-80, of which around 3 per cent was imported.

Sales of dry red wines have declined in recent years, with the level of sales in 1979-80 being about 20 per cent below that of 1975-76. Dry white wine sales have grown at a rate in excess of 20 per cent a year since 1972-73, and dry white table wine accounted for about 50 per cent of the total wine market in 1979-80.

Imported wine attracts a protective margin (custom duties and sales tax). In 1977-78, the average ad valorem equivalents of the protective margin ranged between 30 per cent and 75 per cent, depending on the category of the imported wine (IAC 1979).

The implications of an effective minimum price for wine grapes on the wine market itself can be analysed under several different assumptions as to the market structure. Three such assumptions are considered here: a competitive wine market, price-searching behaviour by wineries, and wineries facing import competition.

7.1 A Competitive Wine Market

![Figure 5: A competitive wine market](image)

In Figure 5, $DD$ is the market demand curve for wine. $SS$ is the supply curve for wine, given competitive behaviour by wineries and no minimum price legislation for grapes. $S_mS$ is the supply curve in the presence of an effective minimum price for grapes.

14 Removal of Section 31A of the Taxation Act has reduced the incentive for wineries to hold stocks in excess of the level necessary to cover inter-vintage sales.
grapes. The gap between the two curves narrows as the competitive grape price approaches the minimum, so that the curves eventually become coincident.

In the absence of intervention, the wine price settles at its competitive level of $OP^*$, at which $OX_2$ units are consumed. With an effective minimum wine grape price, the wine price rises to $OP$. Provided that the slopes of the demand and supply curves are not extreme, the price of wine does not rise to cover the entire effect of the minimum grape price. Rather, the burden of the increase is shared by consumers and wine makers. In the new equilibrium, the transfer to wine growers is given by the area $PACP_w$, of which $P_AFP^*$ represents a transfer of consumer surplus and $P^*FCP_w$ is a transfer of producer surplus from wine makers. In addition, $ABF$ is a dead-weight loss in consumer surplus, and $FBC$ is a dead-weight loss in wine makers’ producer surplus.

An estimate of the possible order of magnitude of the transfers and dead-weight losses identified in Figure 5 is contained in the Appendix.

7.2 Price Searching by Wineries

In Figure 6, $DD$ is the demand curve facing the price-searching wine maker for his differentiated product. $MC$ is the marginal cost curve in the absence of minimum price legislation, and $MC_mMC$ is the corresponding curve in the presence of an effective minimum price. As in the competitive case, the two curves eventually become coincident.

Before the introduction of the minimum price, the profit maximising output is $OX_1$, selling at price $OP_2$. This compares with the competitive outcome of $OX_1$ units sold at price $OP^*$. The non-competitive outcome generates a dead-weight loss of the area $CAB$.

The minimum price arrangements result in a profit maximising price of $OP_3$, with sales of $OX_1$. Dead-weight losses are increased to the area $FAE$. Again, in
general, the full impact of the minimum grape price will not be passed on to consumers — some of the burden will also be borne by the wine maker. The transfer to growers is $P_sHEP_t$, of which an amount equal to area $P_sFGP_2$ is borne by consumers.

7.3 Imports Competing Against Local Wineries

![Diagram of wine supply and demand]

In Figure 7, $DD$ is the domestic demand curve for wine. $SS$ and $S_mS$ are the supply curves as previously described for domestic wine. The import price (which may or may not include an element of protection for the domestic industry) is $OP$, and it is assumed that the import price of wine is independent of the level of Australian imports. Before the introduction of a minimum wine grape price, $OX_2$ units of wine are produced locally, and $OX_3-OX_2$ imported.\(^\text{10}\)

With an effective minimum wine grape price, domestic production falls to $OX_1$, and imports correspondingly increase. In this case, there is no transfer from consumers and no dead-weight consumption loss. Local wine makers lose $P_rACBP_1$, in producer surplus, of which $P_rABP_2$ is transferred to grape growers and $ABC$ is a dead-weight loss. An estimate of the possible order of magnitude of these transfers and dead-weight losses is also contained in the Appendix.

The preceding discussion can be summed up as follows. In general, the entire increase in the price of grapes will not be passed on to wine consumers — at least part will be borne by wine makers. An exception occurs in the case where the demand for wine is completely price inelastic. Where wine makers are competing with imports which can be regarded as perfect substitutes for the local product, wine makers bear the entire cost of the minimum price. In each case, sales of locally produced wine contract (assuming that the demand curve for wine is not completely price inelastic).

\(^{10}\) For simplicity, it is assumed that local and imported wines are perfect substitutes in consumption.
8 Summary and Conclusions

A discussion of the economic implications of the recent extension of minimum pricing legislation in the Australian wine grape industry has been presented. While an attempt has been made to relate the theory to the contingencies of the grape industry, much of the discussion can be applied more generally to other instances of a legislated minimum price.

If monopsonistic behaviour by wineries were significant, a minimum grape price set either above or below the competitive price could alter market transactions. However, in the absence of monopsony and arrangements designed to circumvent the effects of a minimum price, such a price must be set above the competitive price to be effective. Where such a minimum price was in force, it could be expected to lead to grape surpluses or diversion of grapes onto the drying or fresh market. Transfers from wine makers and wine consumers to grape growers, and dead-weight losses arising out of a misallocation of resources. The fact that the full impact of the minimum price for grapes would be unlikely to be borne by wine consumers alone has been stressed.

It has been shown that, if wineries exhibited monopsonistic behaviour in their grape purchases, transfers and dead-weight losses would be created. However, the evidence on the existence or non-existence of such monopsonistic behaviour is inconclusive. It has also been shown that, if such behaviour did occur and were considered undesirable, government intervention would need to replicate the competitive market outcome to eliminate that distortion and prevent the creation of new distortions. This would require flexibility and a sensitivity to market circumstances in the determination of the minimum price.

An attempt has been made to incorporate yield fluctuations and long lead times in production decisions in the model. It was suggested that flexible grape prices provide a reasonable safeguard against temporary grape surpluses stemming from high yields. In so far as growers were shielded from periods of low prices while continuing to receive the benefit of periods of high prices, legislated minimum pricing arrangement could lead to growers basing long-term production decisions on an unrealistically high assessment of likely future grape prices.

It is hoped that this analysis can contribute toward an appraisal of the costs and benefits of minimum pricing for wine grapes. An important conclusion is that dead-weight losses are likely to be incurred and that these will not be borne by wine makers and wine consumers in isolation. All members of the community can expect to share the burden of any resource misallocation. Grape growers themselves will bear the effects of inadequate market outlets, especially for wine grapes, the burden of which is unlikely to be shared equally among growers.

Appendix

To obtain an accurate measure of the transfers and dead-weight losses identified in Figure 1 would require an empirical estimate of the demand and supply curves. While such an estimate is beyond the scope of this paper, an estimate of the possible order of magnitude of these figures can be attempted.

In the 1978-79 season, substantial quantities of Cabernet Sauvignon and Shiraz were left on the vine in South Australia (see Table 2). The following assumptions were made for these two varieties in South Australia:

(i) Sixty per cent of the production of each variety was grown under irrigation, so that the effective minimum price in the 1978-79 season was $151/t for Shiraz and $223/t for Cabernet Sauvignon. From Table 2, it was assumed
that the quantities demanded at these prices were 48 708 t of Shiraz and
15 825 t of Cabernet Sauvignon.

(ii) The market clearing prices would have been either $120/t, $130/t or $140/t
for Shiraz and $170/t, $190/t or $210/t for Cabernet Sauvignon.

(iii) The demand curve for both varieties is linear, with the point price elasticity
of demand at the average minimum price being 0.2.

(iv) The supply curve for each variety is linear, with the point price elasticity of
supply at the assumed market clearing prices being 0.2.

In Table A1, the transfers for both varieties are summarised, corresponding to
area $P_mABP^*$ in Figure 1.

Table A1: Transfers from Producers to Consumers in Figure 1 for Selected Varieties of Grapes: 1978-79

<table>
<thead>
<tr>
<th>Variety</th>
<th>Assumed market clearing price</th>
<th>Assumed minimum price</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/t</td>
<td>$/t</td>
<td>$'000</td>
</tr>
<tr>
<td>Shiraz</td>
<td>120</td>
<td>161</td>
<td>1 997</td>
</tr>
<tr>
<td></td>
<td>130</td>
<td>161</td>
<td>1 510</td>
</tr>
<tr>
<td></td>
<td>140</td>
<td>161</td>
<td>1 023</td>
</tr>
<tr>
<td>Cabernet Sauvignon</td>
<td>170</td>
<td>223</td>
<td>839</td>
</tr>
<tr>
<td></td>
<td>190</td>
<td>223</td>
<td>522</td>
</tr>
<tr>
<td></td>
<td>210</td>
<td>223</td>
<td>206</td>
</tr>
</tbody>
</table>

The deadweight losses corresponding to area $AFC$ in Figure 1 are summarised in
Table A2.

Table A2: Dead-weight Losses in Figure 1 for Selected Varieties of Grapes: 1978-79

<table>
<thead>
<tr>
<th>Variety</th>
<th>Assumed market clearing price</th>
<th>Assumed minimum price</th>
<th>Dead-weight loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/t</td>
<td>$/t</td>
<td>$'000</td>
</tr>
<tr>
<td>Shiraz</td>
<td>120</td>
<td>161</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>130</td>
<td>161</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>140</td>
<td>161</td>
<td>25</td>
</tr>
<tr>
<td>Cabernet Sauvignon</td>
<td>170</td>
<td>223</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>190</td>
<td>223</td>
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</tr>
<tr>
<td></td>
<td>210</td>
<td>223</td>
<td>2</td>
</tr>
</tbody>
</table>

It is clear that the estimated dead-weight losses are small relative to the possible
transfers involved.

Using a similar methodology, an estimate of the transfers and dead-weight losses
identified in Figure 5 was obtained. The following assumptions were made:

(i) Production and consumption of wine ($X_t$) is 250 ML.
(ii) An average retail price of wine is $3/L. Unfortunately accurate data on actual retail prices for wine are not readily available.

(iii) The cost of grape inputs contribute 10 per cent of the retail price of wine.

(iv) The average minimum price of grapes used in wine production is 20 per cent above the average price which would have ruled in the absence of the minimum price.

(v) Assumptions (iii) and (iv) imply that $P_w$ in Figure 5 is $2.94/L.

(vi) The price elasticity of demand for wine at point $A$ is unity.

These assumptions imply that area $P,AFP^*$ could be around $10m and area $P^*FCP_w$ around $5m. The dead-weight loss, area $ABC$, is around $100,000.

A similar set of assumptions was made for Figure 7:

(i) As imports represent only a small proportion of total consumption, $X_f$ was assumed to be 250 ML.

(ii) $P_f$ was assumed to be $3/L.

(iii) Grape inputs contribute 10 per cent of the retail price of wine.

(iv) The average minimum price for grapes used in wine production is 20 per cent above the average grape price in the absence of the minimum price.

(v) Assumptions (iii) and (iv) imply that $P_p$ in Figure 7 is $2.94/L.

(vi) The point price elasticity of supply at point $B$ is 0.2.

In this case, area $P_f,ABP_p$ is $15m, an amount equivalent to the total transfer, area $P_f,ACP_w$, in Figure 5. However, in this case, the entire transfer is borne by wine producers. The dead-weight loss is about $30,000, less than that estimated in Figure 5 because of the absence of a consumption dead-weight loss in this case.
References


