Vertical integration and the development of commercial wine production in Argentina, Australia and California, c1870-1914.

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Commercial wine production in the New World, despite an interest by the early European settlers, only developed in the late nineteenth century in response to growing urban demand, improved transportation and new wine-making technologies. By 1914 the industry was well established in a number of countries, and contemporaries noted that it had developed in very different ways to that in the Old World. In particular, the new large-scale wineries were dependent in a way they were not in Europe on specialist grape producers; wine producers were much more involved in marketing; and wines were often sold under brand names. Important differences also existed among New World producers themselves, especially with respect to the marketing and distribution of wine. In California a handful of merchants created a hierarchical organization, integrating horizontally and vertically, and investing heavily in advertising and brands to sell to distant consumers. This producer’s organization, the California Wine Association, controlled about 80 per cent of the State’s wine sales, making it one of the world’s largest wine businesses. By contrast a British importer, Peter Burgoyne, created a buyer’s organization that controlled two thirds of Australian exports. Finally the Argentine industry was dominated by a dozen or so wine-makers which had only limited success at creating brands and integrating forwards into marketing. These firms, however, sold huge quantities of wine in a market where annual per capita consumption reached 60 liters by 1914, compared to just two in the United States and five in Australia.

This paper explains why these organizational differences appeared. Section one looks at some of the different theories to explain why firms integrate vertically rather than rely on market transactions. It looks at the nature and degree of asset specificity found in the wine industry, and discusses the differences between producer-driven and buyer-driven commodity chains. Section two begins by outlining the nature of traditional viti-viniculture, and the exogenous changes that occurred over the period between 1870 and 1914 which encouraged the rapid growth of the New World industry. The appearance of specialist growers in the region can be linked to the excellent
growing conditions for grapes, which allowed for better quality fruit that kept longer, and the possibility to harvest over longer periods of time. This, together with the growing economies of scale found in wine-making, changed the relative asset specificity of the vineyard and winery, thereby allowing for specialist growers.

Sections three and four look at California and Australia, two economies that combined New World production characteristics, but where beer and spirits were consumers’ alcoholic beverages of first choice rather than wine. One consequence of the new wine-making technologies was that large quantities of homogenous, good quality table wines could be produced, - an essential first step if they were to be marked under a brand name, rather than just vin comin. The large San Francisco merchants cornered the market and became virtually the sole suppliers of table wines when they successfully frustrated attempts by the smaller wine-makers to create a trust themselves, and supply the East Coast merchants directly. By contrast Australian producers’ efforts to remain independent of British importers, and Burgoyne in particular, failed, as did the South Australian and Victorian governments’ attempts to establish state sponsored wine depots in London. Finally, producers in Mendoza, who accounted for over 70 per cent of Argentina’s output in 1914, benefitted from strong domestic market demand created by an immigrant population that came mostly from wine producing counties (essentially Italy, Spain and France). However, these consumers were much less interested in quality than price, making it difficult to brand wines. As a result, firms such as Tomba or Giol y Gargantini, which each produced the equivalent of all Australia’s exports, had weak brand loyalty and Argentina’s exports were insignificant. The paper concludes that the nature of market demand was crucial in explaining the organization of the commodity chain, and in particular the nature of co-ordination between grape produces and wine-makers, and wine-makers and merchants.

1. From the vine to the glass: wine’s value chain

A number of distinct business activities were involved in the creating and selling of wines. Land had to be cleared, vineyards planted, and growers wait three or four years before the first harvest. Grapes then had to be collected, crushed and the must fermented. The wines were then usually matured, blended and classified for sale, and when production took place at a distance from where they were to be consumed, transportation and distribution networks were required.
These different activities made up the ‘value chain’, but the wide diversity of wines produced could result in them being carried out by five or six separate business entities at one extreme, or be integrated into just one or two firms at the other. This paper deals with ordinary table wines (vino común), which in countries where wine consumption was an integral part of the national diet, such as Argentina, Italy, France or Spain, vino común accounted for at least ninety per cent of production, and it ignores the highly specific chains associated with fine wines such as claret, champagne, port or sherry.¹ Yet the production of vino común was organized very differently across countries, with grape growing and wine-making being usually integrated in small family businesses and marketing carried out by other entrepreneurs in Europe, and grape production being a specialist activity and wine-making and marketing more integrated in the New World.

In his classic article, Robert Coase explained organizational differences using what has become known as the transaction cost theory. For Coase, firms exist because the cost of organizing production for the entrepreneur is less than using the market mechanism.² The transaction costs associated with using the market relate to problems of information and commitment, and according to Holmström and Roberts, ‘the most influential work during the last two decades on why firms exist, and what determines their boundaries, has been centered on what has come to be known as the ‘hold-up problem’.³ This occurs when assets are highly specific, and trading partners attempt ‘to appropriate some of the returns that the assets’ owners expected when they invested in them’.⁴ Vertical integration is predicted to be more likely ‘when assets are specific, when transactions are complex, and uncertainty is important’.⁵ Three assets in particular are important for this paper: the vines, the winery, and the brand names under which the wine was sold, and these produced three areas where activities were either fully integrated, or required vertical coordination (or ‘co-operation’ as contemporaries called it): the link between the grape grower and wine-maker; that between the wine-maker and wholesalers; and finally in Australia between the exporter and (British) importer.

¹ For a detailed discussion of these different chains, see (Simpson forthcoming). (Centro Vitivinícola Nacional 1910), p.xx and (Pacific Rural Press), Dec.14, 1901, p.372, for the very limited amount of fine wine produced. As shown below, cheap dessert wines were an important part of Australia’s and California’s production by 1914.
² (Coase 1937) and (Holmström and Roberts 1998), p.73.
³ (Holmström and Roberts 1998), p.74.
⁴ (Roberts 2004), p.91.
⁵ (Lafontaine and Slade 2007), p.653. See also (Klein, Crawford, and Alchian 1998), (Holmström and Roberts 1998) and (Roberts 2004).
The development of commercial wine production in the New World from the 1890s presented small family growers with a major dilemma: whether to specialise in grape production with its associate dependence on the wine-maker, or to invest themselves in wine-making facilities, despite the increasingly barriers to entry associated with the capital and knowledge requirements embodied in the new technologies. The possession of small private wineries offered growers some independence, but they faced both higher production costs and produced poorer quality wines than the new commercial wineries. These new wineries had a much larger capacity than the traditional ones, and required grapes from the equivalent of perhaps twenty or thirty times what a family vine-grower could produce, presenting their owners with a strategic decision as to whether to integrate backwards into grape production, or purchase their needs from independent suppliers.

Selling wines required other organizational decisions. In the first instance, New World producers were located at significant distances from their major markets: the East Coast for California; the British market for Australia; and Buenos Aires for Mendoza. Second, in the first two countries, consumers were often unacquainted with wine, and producers had to compete with other alcoholic beverages. Finally, the widespread adulteration and fraudulent labeling of food and beverages in the late nineteenth century was especially common with wine, which created considerable information asymmetries along the chain.

The question of who controlled and benefitted from the value created varied according to the type of wine and the nature of the commodity chain. At the extreme, power in the value chains could be concentrated at two very different points. In agriculture there are often literally millions of producers, with production carried out in many countries, making it easier for importers to dominate the trade by creating standardized products, and investing in branding and marketing. By the late nineteenth century a few very large companies dominated a number of food and beverage buyer-driven commodity chains in the British and US markets (Heinz, Quaker Oats, Cadbury, etc.). By contrast producer-driven chains are controlled by core firms ‘at the point of production’, and include such products as aircrafts and computers. Producer-driven chains are unusual with agricultural commodities, although the limited supply of top-

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7 For the difficulties in establishing buyer-driven commodity chains in the British wine market, (Simpson 2004).
quality land and high production costs created barriers that allowed a highly specialized producer such as Moët & Chandon to control its chain.

In fact, fine wines in nineteenth century Europe were branded in a wide variety of ways, including that of the producer (e.g. Château Margaux), the shipper (Sandeman) or retailer (Victoria Wine Company). By contrast, the major differences in quality found over relatively small geographical areas, and from one harvest to the next, made it almost impossible to create brands to sell cheap table wine (vino común), and instead it was the retailer’s reputation that determined consumer choice. By contrast in the New World, the much greater homogeneity of grape quality and the new wine-making technologies in theory allowed fully fermented wines with similar characteristics to be consistently produced each year from large geographical areas, making the branding of ordinary table wines a realistic possibility. Who put the brand and controlled the value chain is discussed in sections three to five below.

2. Grape growing and wine-making: a tale of two worlds

In the mid nineteenth century the wine industry in both Europe and the New World was small-scale. By 1914 this was still generally true for Europe, but not so in the New World where large industrial wine-producers dominated the sector. Four major exogenous events changed the industry during this half century: the integration of national and international markets; the development of new political institutions and the ability of pressure groups to solve collective action problems and mobilize political power; the appearance of new vine diseases and production shortages that these provoked; and the major advances in the knowledge of fermentation and development of wine making equipment that produced economies of scale and allowed cheap table wines to be produced in hot climates. After discussing how each in turn influenced the business environment, the organization and growth of the New World industry is considered in detail.

Arthur Young noted for France in the late 1780s that the cultivation of the vine depended ‘almost entirely on manual labour …demanding no other capital than the possession of the land and a pair of arms; no carts, no ploughs, no cattle’.\textsuperscript{8} Vines were almost always worked by their owners, as entry costs were low, there were few economies of scale and the vine could be grown competitively on small plots of land

\textsuperscript{8} (Young 1794), 2, p.25. The version used here is the second chapter on ‘vines’ of the Bury St.Edmonds edition.
marginal to other crops. Wage labor was rarely used because output was very sensitive to the quality and timing of labor inputs, and vines could be easily and permanently damaged if the pruning, plowing, and hoeing operations were badly carried out.\(^9\)

In Europe, the weather, pests and vine diseases influenced the size and quality of the harvest, especially in the colder and damper areas of the north. Wine was abundant and excellent one year, but scarce or undrinkable the next. Grapes had to be processed quickly because they were easily damaged or diseased, so family growers also made their own wine. Furthermore, although ‘fine’ wines might improve with age, the great majority of table wines had a very short ‘shelf’ life, and those that had been poorly made or stored, quickly become diseased and undrinkable. In France during the second half of the nineteenth century there were reportedly 1.5 million growers, but most families dedicated part of their labour and land to other activities because of the risky nature of production.

The demand constraints placed on the industry were significantly reduced during the second half of the nineteenth century by a combination of cheap transport, urbanization and rising incomes. The railways helped push Europe’s wine frontier southwards and allowed growers to specialize in the Midi (France), La Mancha (Spain), and Puglia (Italy), regions long known to contemporaries as being especially suitable for the vine. In France, for example, rising living standards led to per capita increasing from 76 liters in 1850/4 to 108 liters in 1890/4, and reaching 168 liters in 1900/4.\(^{10}\) As the distance between the producer and consumer increased, so did the economic power of the merchants, who were able to purchase their wines over an increasingly large area. However, the nature of political institutions and the political voice of thousands of small producers also changed, and in France this enabled them to achieve favourable legislation to establish cooperatives and regional appellations, helping producers to wrest back some of the market power from merchants.\(^{11}\)

The growth in French consumption was all the more impressive because of the devastation wrought by the vine disease phylloxera, which in time killed most of the world’s vines, with the only permanent solution being to replant and graft European

\(^{9}\) (Galassi 1992) pp.78-83 and (Hoffman 1984). Rental contracts were very rare as tenants might be tempted to increase short-term output at the expense of reducing the productive life of the vine, while sharecropping suffered from the high costs associated with dividing the harvest. (Carmona and Simpson forthcoming).

\(^{10}\) (Nourrisson 1990), p.321.

\(^{11}\) (Simpson 2005).
varieties on phylloxera resistant American rootstock.12 During the nineteenth century France was the country worst affected, and output fell from an average of 57.4 million hectoliters in 1863/75, to 31.7 million in 1879/92, before recovering to 52.5 million in 1899/1913. These phylloxera induced shortages caused higher international wine prices and encouraged growers everywhere to plant vines and increase output.13

Although Phylloxera and other vine diseases forced governments to increase expenditure on scientific research, the advances in wine-making were as spectacular as anything achieved in the vineyards.14 In hot climates, fermentation had often ended prematurely, leaving sugar in the wines that made them unstable and ruining them. In 1887 Paul Brame successfully devised a system to reduce the temperature by pumping the must through tubes which were immersed in water, and by the last decade of the nineteenth century and the first of the twentieth saw major investment in new wineries in hot climates incorporating the latest technologies such as refrigeration, continuous presses, aero-crushing turbines, sterilizers, and pasteurizers, which helped create economies of scale in five important areas.15 First, considerable skills were required to control the temperature of the must during fermentation, correct its acidity and use cultivated yeasts to produce a dry table wine which would keep. Second, new wine-making technologies and cellar designs helped cut labor costs, an important consideration in high wage economies such as found in the New World. Third, more wine was extracted from the grapes. Fourth, merchants demanded large quantities of wines of a uniform style which could be repeated each year, which was impossible for small producers to achieve. Finally, some of the large wineries diversified into distilling and the production of brandy and fortified wines, where the economies of scale were even greater.

These new wine-making technologies led to a shift in the locus of production of cheap table wines from Europe’s centre to its southern periphery. In particular, France’s four Midi departments (Aude, Gard, Hérault and Pyrenées Orientales) and Algeria saw their output increase from the equivalent of less than 15 per cent of domestic consumption in the 1820s to 50 per cent by 1910.16 The new technology was also crucial for the expansion of New World viticulture. In California, wine production

12 For the history of phylloxera, see especially (Campbell 2004), (Paul 1996) and (Pouget 1990).
13 For Spain, (Pan-Montojo 1994); Italy (Loubère 1978) and Algeria, (Isnard 1954) and (Birebent 2007).
14 (Paul 1996) and (Simpson forthcoming), chapter two.
15 (Isnard 1954) pp. 189-90. For similar advances in Australia at this time, see (Simpson forthcoming).
16 Algeria became an integral part of France after 1848, and Algiers, Oran and Constantine were organised as French départements.
increased fourfold between 1891/3 and 1911/4, and in Mendoza the area of vines increased from 22,875 hectares in 1904 to 57,764 in 1912, and production jumped fourfold in the decade after 1904 (Table 1). By contrast, in Australia the new technologies helped capture new markets rather than increase output.17

Table 1

The new wineries required large quantities of grapes and offered greatest returns to producers in hot climates, which explains why they were rare in much of Europe. As late as 1934 some 86.5 per cent of all French wine produced outside the Midi occurred in wineries of less than 400 hectolitres, an amount which could often be supplied from the family vineyard.18 By contrast in the New World, and to a lesser extent in Algeria and parts of the Midi, large wineries already dominated production by the early twentieth century.

In the Midi there were 130 wineries by 1903 with a minimum capacity of 10,000 hectolitres each, the equivalent of one for every 180 thousand hectoliters of wine produced, implying that smaller wineries remained very much the predominant form of production. In Algeria, there were 62 large wineries, equivalent to one for every 124 thousand hectoliters, while in Mendoza the figure was 34 wineries, and one for every 40 thousand.19 Some wineries had a considerably greater capacity than 10,000 hectolitres, and in Mendoza the largest ten firms produced 445 thousand hectoliters or a third of output, while in South Australia the figure was more than two-thirds, although this was a relatively modest 78 thousand hectoliters (Table 2 and 3).20 In Mendoza the number of firms producing more than 10,000 hectolitres jumped from 18 to 96 between 1900 and 1914, by when the three largest produced 350 thousand hectoliters, requiring grapes from an estimated total of 6,000 hectares.21 In California, the Italian Swiss Company had an annual output of 225 thousand hectoliters from eight different wineries in 1911, while the California Wine Association’s huge ‘Winehaven’ complex in Richmond had

18 (Galet 2004), calculated in (Simpson forthcoming).
19 (Gervais 1903), my calculations and (Barrio de Villanueva 2008), cuadro 1. The Midi’s harvest is given as 23.4 million hectoliters for this year.
20 Four of these Mendoza firms had two wineries.(Barrio de Villanueva 2008), cuadro 1 and for South Australia, (Whittington 1903), p.71.
21 (Barrio de Villanueva 2009), pp.5-7. I assume a yield of 60 hectolitres per hectares.
storage for 378 thousand hectolitres, (equivalent to about 25 per cent of California’s output), and its wine-manufacturing facilities were for 140 thousand hectolitres.22

Table 2 and 3

The considerable quantities of grapes that the new wineries required could be produced either by the wine-maker integrating backwards into grape production, or brought from specialist growers. Unlike the new wine-making technologies there were no significant economies of scale to be exploited with grape growing, allowing family producers to remain competitive everywhere. However, while in the Old World grape and wine production remained integrated, in the New World they had often become specialist activities by 1900.23 In California the Pacific Wine and Spirits Review noted at this time that most growers sold their grapes to wine-makers, ‘except to a limited extent in some of the older districts’, whereas previously nearly every vineyard had had its own fermenting house and storage cellar. Thomas Hardy, a leading producer in South Australia, wrote as early as 1882 that ‘the manufacture of wine is now almost wholly gone into the hands of those who make a business of it, and do not follow it merely as a secondary pursuit’.24 While in Mendoza producers bought around three-fifths of their needs from specialist grape growers by 1900.25

These organizational differences between Europe and the New World can be explained by the nature, and changes, in the asset specificity of vineyards and wineries. In Europe, grapes had to be processed quickly, especially if they were diseased, and growers could not risk having to find buyers at short notice. By contrast, in the New World climatic conditions made the vines much easier to grow, harvest failures and disease were rare, and the grapes had high levels of sugar and were of a consistent

23 This was generally true even in the Midi (and Algeria), where the new wine-making technologies produced what one writer termed la viticulture industrielle (Augé-Laribé 1907). For a discussion on how transaction costs associated with using wage labor on wine estates was reduced. (Simpson 2005).
24 (Pacific Wine & Spirits Review)(December, 1906), p.43 and Aeuckens, 1988, p.148. By 1900 for example, Hardy’s had 500 acres of vines and brought grapes from 500 or 600 more, the property of some 30 or 40 independent growers. Hardy also noted that ‘I reckon we have done more in advancing the science of wine-making during the last five years than we did in twenty years before’ (Victoria 1900), pp.38-9.
25 This figure refers to 1908. (Centro Vitivinícola Nacional 1910), p.17.
quality. In California and Australia, the ‘three way’ grape allowed some growers to
decide after the harvest whether to sell them for wine, raisins, or the table, while
Argentine growers could leave their grapes on the vines for three or four months before
selling them.

This suggests that specialist grape growers in the New World were perhaps less
vulnerable than winery owners to problems of hold up, despite the fact that the latter
frequently colluded to set prices. This was especially true in Australia and California
because of the better quality wines they produced, as wine-makers needed a guaranteed
supply of adequate grapes when markets recovered. Alternative and often attractive
employment opportunities existed for grape producers, especially in the large, diverse
local economies of San Francisco and Melbourne, although Mendoza was over a
thousand kilometres from Buenos Aires. By contrast, Mendoza’s growers benefitted
from significantly greater yields because of irrigation, and market downturns, at least
before 1914, were short, so that many growers carried low levels of debt.

However, the separation of grape growing and wine-making created new
coordination problems. Market volatility was common in all wine regions because if
high prices encouraged the planting of new vineyards, market conditions might be very
different when these became productive three or four years later. The high fixed costs
along the commodity chain implied that grape prices in Mendoza for example could
double or halve from one harvest to the next, while wine prices in the Buenos Aires
market fluctuated much less. The fact that grape production and wine-making were
usually integrated in a single business in Europe, resulted in producers expanding
capacity in both areas in response to market upturns. In the New World this was not the
case, and growers and wine-owners faced different investment incentives. The creation
of new vineyards required relatively little capital and small holders could plant vines
working during periods of low seasonal demand for wage labor. By contrast, the high
capital cost of the new wineries implied that investment was linked to credit

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26 In Victoria, for example, new vines became productive after three rather than the four or five years in
Europe, and the hot climates reduced considerably the incidence of vine disease (and consequent
expenditure on chemicals), and allowed high quality grapes rich in sugars to be produced each year.
(Castella 1886), p. 17.
27 (Pacottet 1911), p.78.
28 La Prensa 10 abril 1914, p.9, for example, noted that the growers who suffered most were the new
producers whose vines had just started producing. Those who were sharecroppers (contractistas) were
also partly protected because they received a fixed salary.
29 La Prensa 12 abril 1914, p.11.
30 When sharecropping contracts were used such as in Mendoza, landowners could increase their area of
vines without the cost of wages.
availability. This separate ownership of vines and wine-making facilities often led to an unbalanced growth between the two sectors, because when large wineries failed to purchase grapes from independent producers because of low prices, aggregate wine supply was not diminished. Therefore the new capital intensive wineries required not just a secure supply of grapes, but also a market for their wines.

Another major problem was fraud. Fraud had always been present in food and beverage markets, but it changed significantly over the second half of the nineteenth century because of the growing physical separation between producers and consumers, and the development of new preservatives that allowed manufacturers to mask food deterioration and lower costs, often making food adulteration imperceptible to consumers. As Marc Law notes, science increased the complexity of products, and ‘creating opportunities for cost-saving deception by some firms through adulteration of their products in ways that consumers could not easily perceive’.31 Firms were naturally reluctant to invest capital in state of the art wine-making facilities, brand names and advertising if they were going to have to compete with ‘wines’ made from a variety of concoctions and sold in ‘fancy bottles’ at considerably lower prices. We shall now look at how New World producers responded to problems of quality and asymmetric information in the three regions.

3. California

There were four major players in the Californian wine industry in the late nineteenth century: grape producers, wine-makers, San Francisco shippers and the East Coast bottlers and distributors.32 The rapid growth of the national market demanded coordination between businesses so that the high levels of capital investment in vineyards and wine making equipment were not left idle. Faced with falling prices and widespread adulteration of wines, the small wine makers established the California Wine-Makers Corporation (CWMC) in 1894 which entered into a five year agreement to sell their wine to the California Wine Association (CWA), another combine created in the same year by the leading West Coast wine dealers. By 1897 the CWMC represented 80 per cent of California’s wine-producers while the CWA had 80 per cent of the wine.33 However, post-contractual opportunistic behavior led to a ‘wine war’

31 (Law and Libecap 2004), p.3.
32 This section is a summary of (Simpson 2008).
33 (Peninou and Unzelman 2000), p.79.
between the two organizations, with the CWA supposedly refusing to pay the prices previously agreed, and the CWMA selling large quantities of wine directly to a New York merchant rather than through the San Francisco merchants, and in violation of its contract. After its legal defeat in 1899 the CWMC disappeared, leaving the field to the CWA. 34 According to a recent history, the CWA between 1894 and Prohibition would ‘cultivate more vineyard acreage, crush more grapes annually, operate more wineries, make more wine, and have a greater wine storage capacity than any other wine concern in the world’. 35 This was horizontal consolidation and vertical integration – from grape growing to distribution – on a massive scale, and led André Simon to write in 1919 that ‘in the old world, wine-making is an art; in America, it is an industry’. 36

Consolidations to escape price competition were common in the United States in the capital-intensive, mass-production industries in which ‘firms were closely matched and in which expansion had been rapid on the eve of the Panic of 1893’. 37 The heterogeneity of wine makes the possibilities of collusion in the wine market difficult, but by integrating forwards and controlling distribution, the CWA was able to guarantee that the wine was not adulterated, which provided the necessary market stability for it to invest in brand names, and provided a guarantee for consumers that the wines were not adulterated. 38 The objective of the CWA was not to produce fine wines but to develop a mass market for stable and unadulterated ones. As one academic wrote, the company ‘never sold a bad bottle of wine’, but neither did it sell a ‘great bottle’. 39 Percy Morgan, for many years the CWA’s chairman, noted in 1917 that forward integration helped create new markets for California’s wines:

Until the coming of the California Wine Association only a few wineries tried to deliver their original packages direct to the consumer and build up a following for their label. The large dealer almost always sold California wines in bulk to distant jobbers who either bottled them with a domestic or foreign label known to their particular localities, or sold them to retailers who pursued a similar course. Moreover, these distributors and retailers had neither the knowledge not the facilities to age and handle wines properly. Only a large firm with capital could

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34 Attempts to establish another growers’ combine to control a minimum of 80 per cent of the crop also failed. (Pacific Rural Press), July 8 1899, p.30.
35 (Peninou and Unzelman 2000), p.33. However, Percy Morgan himself recognized the advantages of small, independent grape producers. (Morgan 1902), p.95.
36 (Simon 1919), p.105.
37 (Lamoreaux 1985), pp.45 and 87.
38 Wines were sold under labels such as Brun & Chaix, De Turk, Greystone, Italian Swiss Colony. (Pinney 2005), p.8.
select from millions of gallons, blend to standards, market under labels that could gain the confidence of the public, and stand back of the label wherever sold.40

There is little doubt that the CWA used its market power to fix grape and wine prices, but the rapid growth in the industry between 1894 and 1914 also suggests that all sectors of the industry benefited. Indeed, family growers in California probably suffered less during the turbulent 1900s than any other wine growing region in the world, and the CWA’s dependence on them was recognized by Percy Morgan:

… it is not from these great tracts that the larger portion of the tonnage for wine purposes will be derived. It is from the small vineyardist, cultivating from ten to fifty acres (four to twenty hectares); cultivating and looking after his lands individually, and thereby obtaining from 30% to 50% more tonnage to the acre than is possible from the great vineyard tracts, that the very remunerative results will accrue.41

In conclusion, the heavy investment by the CWA in production facilities and brands raised entry costs for other table wine producers. A limited amount of competition came from a handful of small independent wineries which began to specialize in fine wines in the Napa region, while at the other extreme San Francisco’s Italian community often preferred to buy grapes which they used to produce home-made wines, a practice which became even more important under Prohibition, when the area of vines actually doubled.42 Competition came not so much from other wine producers, but rather the large breweries and distillers. California’s wine production increased by a factor of four between 1891/3 and 1911/4, but dessert wine production multiplied by a factor of nine and dry table wines by just a third.43 Dessert wines were less likely to deteriorate, whether left on retailers’ shelves or consumers’ decanters, and because they were often sweet, found greater acceptance among North European immigrants. For the CWA, there were important economies of scale in both their production and marketing, and fortifying wines using domestic grape brandy avoided the $1.10 a gallon brandy tax. This made fortified wines the cheapest form of alcohol in the market, allowing the CWA to profitably distil their poor wines and compete with other alcoholic beverages.44

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41 (Morgan 1902), p.95, which reproduces an earlier article in the Sacramento Bee.
42 (Lapsley 1996), pp.67-8, (Heintz 1990) , and  (Pinney 2005), p.18. Under Prohibition it was illegal to sell wine, but legal to possess and consume it.
43 (California. State Agricultural Society 1915) , p.139.
4. Australia

The Australian wine industry was the only one in the New World with an important export trade, accounting for about a fifth of national production in the period 1909/13, and with virtually all being sold to the United Kingdom.\(^\text{45}\) The high quality of these dry, unfortified red wines allowed them to be marketed using brand names, a feature virtually unknown among European producers of *vin ordinaire*. However, the quantity of wine involved was relatively small, peaking in 1902 at 4.5 million litres, equivalent to just half the output of Argentina’s largest producer at this time.

In California the high entry costs to marketing wines on the US East Coast before Prohibition were reduced by the CWA, a producer-led commodity chain. By contrast, it was a market-led chain which was created to sell Australian wines in London.\(^\text{46}\) Australia’s high internal tariffs before Federation in 1901 made commercial producers look to the British market some 20,000 kilometers away, even though freight costs were approximately three times greater than those facing French exporters.\(^\text{47}\) In addition, the long sea voyage and the extremes in temperature resulted in all wines, especially the young ones and those ‘that have not been thoroughly well made’, to undergo a ‘very considerable and detrimental change’.\(^\text{48}\) Imported wines required several months rest on their arrival, and faulty or young wines were often permanently ruined. These quality changes caused major problems for the trade. One prominent London West End merchant who reportedly imported sixty hogsheads of South Australian wine because of its growing popularity claimed it was so ‘ill-fermented’ that it resolved never to import any more direct from Australia.\(^\text{49}\) For this particular late nineteenth century market to work, trusted agents were required at both ends of the chain: in Australia to check that only well made wines were shipped; and in London to determine the appropriate remedies to correct the wines on their arrival.

Trade was dominated by two major London houses that specialized in Australian wines: Walter Pownall, and in particular Peter Burgoyne, who claimed in 1900 that over the previous thirty years ‘fully 70 per cent of the wine exported from Australia to

\(^{45}\) (Australian Vigneron), March 1902, p.236.

\(^{46}\) Australia exported at this time to the United Kingdom dry red table wine that was referred to as a ‘Burgundy type’, which was somewhere ‘between the heavily fortified wines on the one hand, and light wines, such as clarets and hocks on the other’. (Australian Vigneron), March 1902, p.236.

\(^{47}\) (Australian Vigneron), July 1892, p.48. (Victoria 1900), p.12 for Australia’s internal tariffs.

\(^{48}\) (Australian Vigneron), July 1892, p.47.

\(^{49}\) (Australian Vigneron), October 2 1893, p.114.
England had passed through his hands’. In 1893 Burgoyne bought the Mount Ophir vineyard (Victoria), and investment in new wine-making facilities from the turn of the century led one commentator to report that ‘it would be difficult to find in any part of the world a winery in which California labor saving appliances and the most approved European methods of securing the best treatment of the wine are so completely adopted’. Large quantities of grapes and wine were brought also from other producers to be blended to create a standard product that was exported after nineteen months. Burgoyne’s agents selected wines in Australia, while in London the firm had around 4,500 hogsheads of wine in bond, and a similar quantity at the Pelham Street premises in 1912. Wines were sold by the cask and the bottle, using the Ophir (Burgoyne) and Emu (Pownall) brands. ‘Burgoyne’s Australian Wine’ placards were found ‘on every railway station in England’, and the Company claimed to have invested £300,000 in advertising. The chain was completed when from the turn of the twentieth century Burgoyne started a retail trade in Australia itself.

The rapid advances in these wine-making technologies, the stranglehold enjoyed by Burgoyne over the British market, the slow growth of the industry and large quantity of poor wines still being produced, led to both the South Australian and Victorian governments holding parliamentary enquires into how to organize the industry at the turn of the twentieth century. In particular these discussed the potential advantages from establishing district cooperative wineries for small growers, ‘central cellars’ in Adelaide and Melbourne to blend and create standard wine types, and a London depot to compete directly with Burgoyne. We shall look at each very briefly.

The degree of vertical specialization in grapes and wine-making found in South Australia was not as advanced elsewhere in Australia. The advantages of specialization was a topic that was hotly debated and even Arthur Perkins, the Government Viticulturist for South Australia spoke of ‘two separate classes with antagonistic interests - vignerons on the one hand, wine-makers on the other’. By contrast, Raymond Dubois the Principal of the Viticultural College at Rutherglen in Victoria argued that only the new wine-making technologies could produce quality table wines.

50 (Australian Vigneron), September 1900, p.115.
51 (Simpson forthcoming).
52 Contemporaries distinguished between two types of wines being produced - ‘very good red, full-bodied wines’ for export, and poorly made, often diseased and fortified wines for the domestic markets. See for example (Victoria 1900), pp.33,34, 38 etc.
53 For New South Wales, see the (Australian Vigneron), January 1891, pp.155-6, and March 1902, p.236.
54 (Australian Vigneron), January 1899, p.169. Perkins believed that the separation had caused low grape prices, which produced slow growth.
wines, and the State’s poor wines were the result of using poor equipment and methods on small vineyards.\textsuperscript{55}

In fact a major part of the problem in Victoria stemmed from the fact that 2,382 growers cultivated 1,123 hectares of vines in 1900, with just 72 holdings being of more than 20 hectares.\textsuperscript{56} Many of these growers had responded to the State incentives of a bonus payment of £5 per hectare, but their lack of wine-making skills and capital resulted in poor quality wines being produced. Growers planted vines but did not build cellars and attempts at creating four subsidized district wineries failed, in great part because of poor incentives. To work, growers needed to take responsibility in running the cooperatives, providing their own capital and being prepared to reject substandard grapes or wines. However, the small growers lacked capital and grape production was often just one of several activities in which they were involved. By contrast, a state-sponsored private enterprise that was willing to respond to the interests of small growers, whether in the form of district wineries or a central winery in Melbourne, faced opposition from established businesses.\textsuperscript{57}

The control of the British market by Burgoyne was deeply resented by many, and as early as 1894 the South Australian government had created a wine depot in London to provide an alternative outlet for domestic producers. Only good wine was exported, which was refreshed by the Depot on arrival, and the manager entered into an agreement with a London merchant to sell the wine. The Depot had only limited success however, as it could not blend the wines to create a standard product because it did not legally own them, and therefore had to match each individual shipment with a different purchaser. In addition the opposition to the Depot from Burgoyne and the London trade press was immediate and vitriolic, and led to a trade boycott by merchants in the United Kingdom.\textsuperscript{58} Although the depot claimed to have sold South Australian wine to over 4,000 customers by 1900, ‘including most of the best wholesale houses in London and the provinces, large wine merchants, and grocers, as well as a number of high-class

\begin{footnotes}
\item[55] Romeo Bragato, the Victorian Government’s viticultural expert, reported that ‘one of the chief drawbacks of the industry ... is the fact that a man who grows grapes thinks he can also make wine’ (Victoria 1900), p.21 and 33.
\item[56] (Victoria 1900), p.5.
\item[57] (Victoria 1900), see especially the reports by Thomas Blayney and Rome Bragato.
\item[58] (Proceedings of the Parliament of South Australia 1901), p.68, 2297. Thomas Hardy noted that ‘the large buyers would not touch the depot’. By 1900 it had lost £26,000 ‘mainly in connection with the wine trade’. (Proceedings of the Parliament of South Australia 1901), p.iii.
\end{footnotes}
restaurants and clubs, who are now retailing the depot wines’, and sales had increased three fold over five years, these remained just a fifth of what Burgoyne handled.59

Many, such as Thomas Hardy and Arthur Perkins, believed that a central winery should be created for the purpose of buying, blending and maturing young wines for export to the London market.60 Burgoyne responded to the debates by threatening to buy wines only after their arrival in London rather than in Australia, so that the leading domestic producers themselves opposed the Depôt, as otherwise they would have had to send their wines to London at their own cost, and accept whatever merchants were willing to pay for them on arrival. As a result, the South Australia Depôt was wound up, and the Victorian never established. In 1911 Burgoyne (2700 thousand litres) and Pownall (750 thousand) still dominated exports from South Australia and Victoria, although the British retailer Gilbey (625 thousand) was now in a close third.61

As in California, the large Australian producers became increasing interested in dessert wines for the advantages that they offered, and by the interwar period Burgoyne’s influence disappeared with the growth in the British demand for this type rather than dry table wines, and large vertically integrated wine companies sold wines through state organized depots.62 As a result, the technical achievements of producing high quality vin ordinaire were forgotten. By the mid 1960s half of Australia’s and California’s production was dessert wines, and it has only been in recent decades that the relative importance of table wines has returned to what it was in the late nineteenth century.

5. Argentina

The population of Argentina multiplied fivefold to eight millions in the half century before 1914, with a high percentage being immigrants or their descendants originating from Italy, Spain or France. Unlike Australian or Californian producers, those in Argentina enjoyed a market where consumers were accustomed to drinking wine rather than beer or spirits. Growing conditions for grapes in Mendoza, which accounted for four-fifths of the nation's production in 1902-3, were exceptional, and

59 (Proceedings of the Parliament of South Australia 1901), p.iii.
60 (Proceedings of the Parliament of South Australia 1901), p.iv.
61 (Australian Vigneron), 1912 January, p.25 and February, p.71. Figures are only approximate. The attempts by both Gilbey and Lipton, the giant British retailer with a reportedly 3,000 outlets, in getting financial backing from the Victorian government in exchange for establishing a depot in Melbourne to collect wines for the British market were unsuccessful.
62 (Faith 2003).
once the region was connected by rail with Buenos Aires (1884), and wine-makers learnt the art of fermenting their wines properly in the hot climate, the possibility of firms selling large quantities of good quality branded wines in a rapidly growing market appeared endless. With the exception of Algeria, Argentina’s wine industry grew more and faster than anywhere else in the world between 1885 and 1914. Yet contemporaries found little to praise as the industry suffered two major recessions in a decade in the early twentieth century, wine quality remained poor, and per capita wine consumption was less than half the figure found in France.

The 1901-3 crisis highlighted a number of structural problems facing the industry. Most wine produced and consumed in Argentina was strong, young and coarse, and inferior to those produced in Australia or California. Pioneers of change such as Eugene Hilgard or George Husmann in California, or Thomas Hardy and Arthur Perkins in South Australia, did not have their equivalents in Mendoza. However just as in France, Italy or Spain, Argentina producers were responding to a different type of market, where consumers bought their wines according to price and alcoholic strength. The industry by this date was dominated by a dozen or two large firms, with the Tomba winery being the largest producing 91,250 hectoliters (almost seven per cent of Mendoza’s total), and equivalent to approximately 1,500 hectares of vines in full production, followed by Giol y Gargantini winery with 58,255 hectoliters, and Arizu with 57,022 hectoliters. The large wineries reacted to the decline in demand in 1902 by refusing to buy grapes from small producers, who were forced to open old cellars and sell the wine immediately after fermentation because of their lack of credit and storage facilities. As a result, supply was not diminished and the poor quality of many wines made adulteration easy. Argentina was unusual among wine-consuming countries in that a high share of national production was concentrated in a single geographical area, which resulted in the leading producers having considerable political backing from Mendoza’s provincial government, but much less from national politicians. The collapse in prices, the abysmal quality of the wines in 1902, and the threat of some politicians in Buenos Aires to reduce tariffs on Chilean wine imports, pushed the large

63 For example, while Australia was sending unfortified wines to Britain, an Argentine commission discussed whether spirits needed to be added when they were sent to Buenos Aires. (Arata 1904). Wines were rarely matured for more than a month or two, and virtually all was sold within the year. (Kaerger 1901) cited in (Barrio de Villanueva 2009), p.16. See also (Simois and Lavenir 1903), p.127 and Arata (1903), p.202.

64 There were reportedly 1,742 wineries in operation in 1902 compared to 1,082 in 1899, and 1,010 in 1907. (Barrio de Villanueva 2009), cuadro 6. For the presence of small wineries in California, see (Pinney 1989), p.362.
producers and local government into action. A national commission was created to investigate the industry’s problems, and this included provisions for inspecting wine cellars, and destroying diseased and adulterated wines.65

The difficulties facing the industry led to some large producers contemplating not just the creation of an independent regulatory agency to control adulteration, but also a trust which would restrict supply by buying surplus wines when necessary.66 However, there were major obstacles to the creation of a wine trust such as California’s CWA, not because the institutional regime in Argentina was different to that in the United States, but rather because wine was considered by national politicians as a basic dietary necessity.67 Opposition to a monopoly therefore came not just from grape growers, but also from politicians in Buenos Aires who from time to time threatened to reduce tariffs on Chilean ‘pure wines’ in exchange for allowing livestock exports.68 Higher prices caused by a monopoly would also have threatened Mendoza’s comparative advantage, because it would have encouraged viticulture in other states, just as Mendoza’s high taxation did in the interwar period. Finally, a trust which did not include all the major wineries risked problems associated with public goods and the free rider, namely independent local producers who did not contribute to the costs of regulating the market, increasing their output to benefit from the higher prices. The Argentine industry had low entry barriers because of the poor quality of most wines. By the autumn of 1903, the promise of higher grape and wine prices following the February harvest ended the debates, and the industry enjoyed another decade of rapid growth.

Wine quality undoubtedly improved in the decade after 1903, but producers lacked the market discipline found in Australia and California, who had to sell to occasional, rather than habitual, wine drinkers. A handful of firms did begin to sell branded wines in the last year or two of the nineteenth century, and the number increased to 36 during

65 Elías Villanueva was Mendoza’s provincial governor and the eleventh most important wine producer, and when his manager refused permission for the destruction of 1,000 hectoliters of spoilt wine, this led to a second visit by the Commission, when some 500 hectoliters were finally removed. See especially (Barrio de Villanueva 2008a), p.336.
66 For the various projects discussed, see especially (Barrio de Villanueva 2006), pp.190-8 and (Mateu 2007), pp.14-15.
67 In the wider Argentine economy, as in the United States, industrial supply ‘moved toward “trustification”…, capital concentration and big business’ during the first decade of the twentieth century. (Rocchi 2006), p.9.
68 The leading Mendocino newspaper described a trust as both ‘ridiculous’ and ‘impossible’ Los Andes, 21 agosto, 1901, p.4, while the Buenos Aires newspaper, La Nación, warned of the dangers of a ‘cooperative’ organized by ‘speculators’ among wine-producers, which claimed to protest the interests of the industry, consumers, and government. Cited in Los Andes, 15 enero, 1903.
the first decade of the new century, resulting in a much greater percentage of ordinary table wines being sold under producer names in Buenos Aires than in Paris or Madrid. Consequently unlike France, as one contemporary noted, there was no strict division between industry and commerce, and Mendoza’s large wineries used their own intermediaries to sell their wines directly to consumers in the large centers of consumption.

Despite the growing use of brands, contemporaries bemoaned the fact that there was little to distinguish between the wines of the major producers, in part because of the widespread use of the malbec variety. Product uniformity, and collusion between the leading producers, led to minimal price differences between the leading houses, although brands did offer some guarantee that it would be the consumer, rather than an intermediately, who added the water. Table 4 lists some of the leading wineries and their brands, and shows that these were sold in Mendoza for about a third more than the ‘vinos de traslado’. These were wines which were produced in small wineries by independent growers, and sold immediately after fermentation to be blended with the produce of the big houses to meet their orders. The large wineries therefore adjusted their supply to meet the demand for their branded wines in the final market both through grape and wine purchases. Unfortunately the golondrinas did not drink branded wine in Italy, and they were unwilling to pay a high premium for it in Argentina. Consumer loyalty was too weak to protect the industry during the next major downturn in the market.

After a decade of rapid growth, exogenous factors led to GDP collapsing by ten per cent in 1914, and credit facilities disappearing overnight. Once again Mendoza’s large wine producers failed to buy grapes from independent producers, and these reopened wineries and flooded the Buenos Aires market with wines that were still ‘hot’ after fermenting, leading to a collapse in prices for both branded and unbranded products. The leading wineries attempted to shift the adjustment costs to other sectors. Attempts to control wine prices did not work well in Mendoza, both because of problems of free riders, but also because higher wine prices would feed back into higher

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69 (Barrio de Villanueva 2003a), pp.39 and 42. and (Richard Jorba 1998), p.306. One of the functions of the CVN was to facilitate producers’ registering brands,
70 (Alazarqui 1911), p.85. José Trianes wrote that ‘Para vender lo que venden aquí dos docenas de los llamados vitivinicultores se necesita en Francia un centenar de comerciantes con un centenar de millones de francos en efectivo que han de comprar el producto de algunos millares de cosecheros’. (Trianes 1908), p.26.
71 (Galanti 1900), pp.26-27, (Simois and Lavenir 1903), p.200, (Galanti 1915), p.34 and BCVN, dic. 1910, p.1671. For the 1930s, see Trianes, cited in Mateu & Stein, p.157
demand for grapes and lead to a renewed growth in planting producing even greater overproduction a few years later. Instead, leading wineries colluded to keep grape prices artificially low, at a little more than a peso per 42 kilos between 1914 and 1919, when in 1912 and 1913 it had been 4.5 and 3.5 pesos respectively. This price was hardly enough to cover variable production costs in the vineyards, and thereby reduced the incentives to increase the supply of grapes by new plantings.  

Instead of a trust along the lines of the CWA, the leading producers looked to the Provincial government to stabilise the sector using government funds. A number of schemes were debated, but the Mendoza law of 1916 (ley 703) was the most controversial, as it created a ‘cooperative’ which allowed the leading wineries access to taxes to remove unwanted production from the market. Past attempts to create voluntary organizations to control supply had failed because insufficient producers were willing to participate, so a punitive tax was levied on the production of those who remained outside the scheme. This ‘cooperative’ was run by the large wineries, but its life proved short, as the Supreme National Court determined it unconstitutional because a Provincial Government could not create a monopoly.

Conclusion

New World producers responded very differently to coordination problems along the value chain. In California, a high degree of vertical and horizontal integration led to the creation of a wine trust that controlled a large part of the whole industry, while in Argentina the leading producers agreed compulsory inspections of wine-making and merchants’ properties to establish a minimum, albeit low, standard for quality. Australia, by contrast, faced external discipline provided by British importers. Despite these considerable achievements, the future prospects for the industry by 1914 were not good. In California, after several attempts to reorganize itself, the CWA

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72 The area of vines officially increased during this period, but this appears to reflect the poor quality of official statistics rather than growers increasing the area.
73 The leading growers enjoyed close links with the Provincial Government, and the industry produced as much as a half of the province’s tax revenue, and still accounted directly for sixty per cent of Mendoza’s gross industrial output in 1914. (Richard Jorba 2008), p.7, writes that viticulture allowed the province ‘an important degree of independence’ with respect to the Federal Government, and (Coria López 2008), anexo viii. Local industries were also highly dependent on the sector. See especially (Pérez Romagnoli 2006)
74 This was set at eight pesos per hectoliter of wine and six pesos per quintal of grapes, when market prices the previous year had been just six and three pesos respectively. (Mateu 2007), p.16.
75 Attempts by growers before 1914 to create cooperatives such as those found in the Midi found little support with the Provincial government as they would have threaten the grape supplies of the large wine producers.
disappeared with Prohibition. After Prohibition, when the industry effectively had to start again from scratch, integration occurred once more, but this time it was out of state firms that moved into California and bought up the wineries.76 By contrast, in Australia the narrowness of the domestic market made export performance especially important, and these peaked as early as 1902 (although a second peak in 1911 was only marginally lower). The growth in British demand for dessert rather than dry table wines in the interwar period was not anticipated by Burgoyne, and led to the firm’s demise, while large vertically integrated wine companies exported dessert wines through state organized depots.77 By the 1960s dessert wines accounted for a half of all Australian and Californian production, and it has only been in recent decades that the relative importance of table wines has returned to what it was in the late nineteenth century. Dessert wines were easier to brand than dry table wines and by the late twentieth century large scale vertically and horizontally integrated companies in Jerez or Porto diversified their products, just as Seppelt did in Australia, and the CWA in the USA before Prohibition.78

By contrast in Argentina the industry suffered severely from the 1914-1919 crisis, and domestic companies failed for decades to increase much above 60 litres per person per year, and population growth slowed as immigration dropped. The dependence of the Mendoza government on the sector had its disadvantages because, although many of the governors were themselves wine producers, the importance of wine a source of revenue encouraged the government to diversify away from the crop. National politicians threatened to reduce import taxes when they thought that Mendoza’s producers were colluding, or when quality deteriorated because of fraud. Finally, under Peron, the national policy to supply plentiful cheap wines for the expanding middle and lower classes in urban markets restricted profitability.79

76 (Lapsley 1996) and (Pinney 2005).
77 (Faith 2003).
78 (Lopes 2007).
79 (Stein 2007), p.102.
Table 1
Leading wine producing countries before 1914

<table>
<thead>
<tr>
<th>Wine production in millions of hectolitres</th>
<th>% of total in 1909/13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1865-74</td>
</tr>
<tr>
<td>France</td>
<td>55.4</td>
</tr>
<tr>
<td>Italy</td>
<td>23.6</td>
</tr>
<tr>
<td>Spain</td>
<td>17.1</td>
</tr>
<tr>
<td>Austria-Hungary</td>
<td>3.2</td>
</tr>
<tr>
<td>Portugal</td>
<td>2.1</td>
</tr>
<tr>
<td>Greece</td>
<td>0.2</td>
</tr>
<tr>
<td>Germany</td>
<td>2.5</td>
</tr>
<tr>
<td>Russia</td>
<td>3.3</td>
</tr>
<tr>
<td>Rumania</td>
<td>0.1</td>
</tr>
<tr>
<td>Bulgaria</td>
<td></td>
</tr>
<tr>
<td>Other European</td>
<td></td>
</tr>
<tr>
<td>European total</td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>0.2</td>
</tr>
<tr>
<td>Argentina</td>
<td>n.a.</td>
</tr>
<tr>
<td>Chile</td>
<td>n.a.</td>
</tr>
<tr>
<td>USA</td>
<td>0.1</td>
</tr>
<tr>
<td>Russia (Asia)</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>0.7</td>
</tr>
<tr>
<td>Tunisia</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>n.a.</td>
</tr>
<tr>
<td>Other countries</td>
<td>5.1</td>
</tr>
<tr>
<td>Non-European producers</td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>113.5</td>
</tr>
</tbody>
</table>

* Refers to European Russia

Table 2

Leading wine-makers in South Australia, 1868, 1876 and 1903

<table>
<thead>
<tr>
<th>Vineyards</th>
<th>1868</th>
<th>1876</th>
<th>1903</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity produced</td>
<td>% of SA production</td>
<td>Quantity produced</td>
</tr>
<tr>
<td>Largest three</td>
<td>1,637</td>
<td>4.4</td>
<td>4,546</td>
</tr>
<tr>
<td>Largest five</td>
<td>2,546</td>
<td>6.9</td>
<td>6,428</td>
</tr>
<tr>
<td>Largest ten</td>
<td>5,231</td>
<td>14.2</td>
<td>9,966</td>
</tr>
<tr>
<td>Total State vintage</td>
<td>36,919</td>
<td></td>
<td>22,422</td>
</tr>
</tbody>
</table>

Quantities in hectoliters

Sources: (Bell 1993), Table 3 and (Whittington 1903), 1903, p.71

Table 3

Leading Wineries in Mendoza, 1903

<table>
<thead>
<tr>
<th>Winery</th>
<th>Quantity produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomba y hijos</td>
<td>91,150 hectolitres</td>
</tr>
<tr>
<td>Gio y Gargantini</td>
<td>58,235</td>
</tr>
<tr>
<td>Balbino Arizu hijos</td>
<td>57,022</td>
</tr>
<tr>
<td>Testentaría Honorio Barraquero</td>
<td>54,754</td>
</tr>
<tr>
<td>Germania S.A.</td>
<td>38,614</td>
</tr>
<tr>
<td>Borel y Calise</td>
<td>36,153</td>
</tr>
<tr>
<td>Miguel Escorihuela (2 wineries)</td>
<td>34,646</td>
</tr>
<tr>
<td>Trapiche S.A. (2 wineries)</td>
<td>22,784</td>
</tr>
</tbody>
</table>

Table 4
Selected brand names and wine prices in June 1910

<table>
<thead>
<tr>
<th>Winery</th>
<th>Brand</th>
<th>Price – centavos per litre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mendoza</td>
</tr>
<tr>
<td>Domingo Tomba</td>
<td>Tomba</td>
<td>0.27*</td>
</tr>
<tr>
<td>Giol &amp; Gargantini</td>
<td>Toro</td>
<td>0.27</td>
</tr>
<tr>
<td>Sociedad Bodegas Arizú</td>
<td>Arizú</td>
<td>0.275</td>
</tr>
<tr>
<td>Honorio Barraquero</td>
<td>Baco</td>
<td>0.25*</td>
</tr>
<tr>
<td>Sociedad Germania</td>
<td>Cigüena</td>
<td>0.24</td>
</tr>
<tr>
<td>B.y C. del Bono</td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>Herwig &amp; Cia.</td>
<td>Perdiz</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Red wine in general ‘sobre wagon’ | 23 – 27

Vinos de ‘traslado’ from winery | 15.0 – 17.0

* New barrels

Source: BCVN, junio 1910, p.1516
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