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US wine industry: following the Oregon trail

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The US wine industry is frequently thought to be California – an undoubted success story. However, three other regions – New York, Washington State and Oregon – have wine industries facing mixed fortunes. This paper reviews the progress of each, demonstrating how the triple helix model identifies key relationship advantages and problems that explain performance rather better than natural advantages or market conditions. The paper reviews the mixed fortunes of these regions in the US with winemaking in other parts of the world, suggesting that institutions, rather than any other factor, explain differences in performance.

Introduction – the US as a test case for the triple helix

In this special issue, we are comparing different countries' wine industries against each other. We have seen that the triple helix helps to explain success and failure in some regards. Where there is an absence or under-resourcing of institutions, as in the case of the Middle East countries, Eastern Europe and, in some regard, parts of South Africa, the industry does indeed struggle to produce quality wine at high price points, effectively linking quality with an innovation system. On the other hand, we have also seen that most of the cases, whether generally succeeding or failing, stretch the triple helix framework considerably beyond what its architects expect to happen. In particular, we see that the distribution of resources is often not uniform within countries; that vertical coordination with grape growers is often a problem, and that coordination of the three spheres of the triple helix is anything but a straightforward affair. Rather, it depends a great deal on informal and cultural factors as much as formal ones; and that the triple helix itself must evolve in line with changes in the industry and market.

The cases in this paper reinforce these conclusions. In particular, given the vast size of the US market, and the Byzantine regulatory structure for regulation and distribution that largely varies from state to state, there are effectively a number of different wine industries across the states. Virtually every state produces wine in some quantity, according to the US Treasury. Some newcomers, such as Virginia and North Carolina, show possibilities for growth. However, their relatively small volumes reveal they are largely local cottage industries oriented towards local tourism, at least for now. In the context of this volume, then, we focus on the major producers in the US other than California.

We purposely avoided California because of its well-developed and pioneering institutions, such as UC Davis's renowned role in wine research, training and

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extension. The Wine Institute's advocacy and marketing work are already well-documented. In addition, California's wine industry is actually different industries from Napa and Sonoma in the north to Paso Robles and Temecula in the south. This is different from Australia with a more federal system including regional innovation systems. While Napa is well-studied, there are very limited resources on the other wine industries in the US. Therefore, much of the research for this paper depends upon field research (see Acknowledgements section). Given resource constraints, the comparison between states made more sense because the triple helix in California is an unusual case in which multiple wine regions largely share the same central institutions. Thus, our goal in this paper is to focus on comparability, in order to test the ability of the triple helix framework to compare across states, in a way that parallels our comparison in this special issue across countries.

The primary comparison for our study is of New York vs. Washington State vs. Oregon. The comparison is apposite and interesting because New York is one of the oldest and most well-established wine industries in the country, pre-dating California's emergence in the late nineteenth century. New York also has lower production costs for its grapes, and one of the largest markets for wine purchase in New York City. Consider that the City has approximately 8.4 million people, while Portland and Seattle, respectively, have 603,000 and 634,000. It is also close to the other large urban markets of the northeast, from Boston in the north to Philadelphia, Baltimore and Washington in the south. Perhaps more importantly from the triple helix perspective, New York has one of the leading wine research centres in the world in Cornell University, perhaps only surpassed in the US by the UC Davis lab in California.

The intriguing question addressed by our study is why New York, with so many seeming economic and triple helix advantages, lags behind the other two regions in terms of reaching quality production. As we demonstrate below, and in parallel with the other cases in this volume, there is much more to competitive success than simply having triple helix institutions in place; much depends upon the relationships between them and their individual and collective purposes.

The study has undertaken a literature review and investigation of key actors in the three parts of the triple helix. Personal interviews, Skype meetings and emails were used to glean information on the relationships between institutions and individuals at key points.

Comparative performance of three major wine producing states

Ideally, a comparison of the industries could compare the overall returns of the different industries, controlling for the number of firms and volume of production, to give an average return. No such statistics exist, but because wine is ultimately an agricultural concern, we do have good statistics on the production of wine grapes, which for our purposes elucidates the comparative performance of the three industries. Since wine grapes are used almost exclusively for producing wine, they do give us a good proxy for the production profile and potential of the different wine industries. Moreover, there would be consensus in the industry around the fact that the quality of the wine results directly from the quality of the grapes used.

Table 1 shows the vast disparity in the size of the leading industries outside California. New York is the largest, with Washington a close second, while Oregon is at about half that level. Simply put, New York and Washington State have a natural comparative advantage in producing grapes compared to Oregon. If one examines

Table 1. Acreage of wine grapes by US state

	New York		Washington State		Oregon	
Year	Acreage	Rate of change (%)	Acreage	Rate of change (%)	Acreage	Rate of change (%)
2000	31,500		24,000		10,500	
2001	31,500	0.00	27,000	12.50	11,100	5.71
2002	31,000	–1.59	27,000	0.00	12,100	9.01
2003	31,000	0.00	27,000	0.00	13,400	10.74
2004	31,000	0.00	27,000	0.00	13,700	2.24
2005	31,000	0.00	28,000	3.70	14,100	2.92
2006	31,000	0.00	29,500	5.36	15,600	10.64
2007	34,000	9.68	30,500	3.39	17,400	11.54
2008	37,000	8.82	32,000	4.92	19,300	10.92
2009	37,000	0.00	34,000	6.25	19,400	0.52
2010	37,000	0.00	35,000	2.94	20,500	5.67
Average	**33,000**	**1.7**	**29,182**	**3.6**	**15,191**	**7.0**

Source: See Appendix.

the geography of Oregon it becomes clear why, as the main grape-growing regions are close to Portland and south along the coast, as the mid- to eastern part of the state is quite dry and even desert-like in places because of the rain shadow of the mountains near the coast. Washington State, by contrast, has a larger south central valley near the Columbia River in which to grow grapes. The next leading producers, Virginia and North Carolina, are less than a tenth of the size of New York. The rate of change is also interesting, with New York steady, Washington showing a significant increase, but Oregon showing phenomenal growth in terms of the amount of wine grapes grown.

If we examine the prices of wine grapes, we see a similar pattern in Oregon's superior performance. Table 2 demonstrates that wine grapes are the most valuable in Oregon. The price of wine grapes is more volatile in New York. The increase has been modest in Washington, with prices at about half those of Oregon. While New York originally had more acreage, Washington State approaches it in size by 2010, thus bringing into question advantages of scale. Yet Washington prices are still about three times higher than those in New York. Part of this reflects the fact that many New York wines still use hybrid grapes, which are cheaper and hardier than *vinifera*. The more important thing is that lower priced grapes reflect lower quality, which in turn reduces the price levels, and the returns that can be gained from the sale of each bottle of wine. One could argue that New York's climate forces it to grow inferior hybrid grapes, yet we know from our accompanying case of Ontario that *vinifera* can be successfully planted there, fetching higher prices, as is the case with Ontario ice wine. In the rest of this paper, we tackle what may explain these differences in quality from the perspective of the triple helix framework.

To sum up our analysis, we see that natural comparative advantage in the production of wine grapes via more and cheaper land available in New York and Washington State, and a head start in production in the case of New York, are no assurances of competitive advantage. We would be tempted, then, to say that naturally the *terroir* is superior in the West Coast states. However, as noted, Ontario is able to produce the superior quality *vinifera* grapes, so New York should be equally able. Moreover, from the quality indicators in our introductory paper based on *Wine*

Table 2. Prices of wine grapes by state

	New York		Oregon		Washington State	
Year	Price ($/ton)	Rate of change (%)	Price ($/ton)	Rate of change (%)	Price ($/ton)	Rate of change (%)
2000	298		1400		899	
2001	320	7.38	1480	5.71	897	–0.22
2002	303	–5.31	1470	–0.68	878	–2.12
2003	252	–16.83	1510	2.72	920	4.78
2004	226	–10.32	1660	9.93	925	0.54
2005	216	–4.42	1680	1.20	930	0.54
2006	264	22.22	1750	4.17	942	1.29
2007	273	3.41	1880	7.43	954	1.27
2008	334	22.34	2050	9.04	1030	7.97
2009	366	9.58	1910	–6.83	989	–3.98
2010	389	6.28	2030	6.28	1040	5.16
Average	**294.64**	**3.4%**	**1711**	**3.9%**	**946**	**1.5%**

Source: See Appendix.

Spectator, there is clear evidence that New York lags behind the West Coast states. In fact, it is widely known that New York State wines are rarely found anywhere outside the immediate states, and Washington State wines are found in limited quantities nationally, mainly around one dominant producer, as we discuss below. Meanwhile, Oregon wines are world renowned. We therefore turn now to case studies of each state's institutions to see the extent to which we can discern differences based on the triple helix that might explain these different outcomes. The triple helix in its simplest form would say that the absence of institutions in New York and Washington in the research, production or policy spheres would be the most likely cause of the inability to innovate technologically and so move up the value-added curve to match Oregon's performance.

New York: the loss of first mover advantage

While New York is one of the leading producers of grapes in the country, and capable of producing large amounts of wine, quality is the main concern. In fact, three-quarters of New York grape production went into grape juice in 2004; only 25% went into the wine grapes reflected in Table 1. While 68% of grapes are grown in the Lake Erie region, most of these go into juice and juice products. The Finger Lakes in the central southern part of the state produce 85% of the state's wine (industry websites). Timing should be on New York's side, given its early entry into the wine business.

New York has the oldest wine industry in North America, with winemaking in the Hudson Valley dating back to 1677 (Centonze, 2010). The microclimates around the Finger Lakes region allow for the cultivation of wine grapes through the moderation of temperature swings. Commercial wine growing in that region began in the 1850s, with 25,000 acres planted by the end of the century. In general, independent growers sold grapes to wineries. Production was concentrated in a few large firms – Widmer's Wine Cellars, the Canandaigua Wine Company, Gold Seal Vineyards, the Pleasant Valley Wine Company (Great Western), and the best known, Taylor Wine

Company. However, as US consumer knowledge shifted towards higher quality table wines from dessert wines (with the emergence of California as a major producer), demand for local wine started to erode, even as overall national consumption increased. A number of growers closed in the 1980s, declining from 567 to 445 between 1980 and 1985, a trend that would continue throughout the decade. The period also witnessed the closing down of the production facilities of Gold Seal (Newman, 1992). What we see, rather than an advantage in early timing, is that the industry was unable to adapt to global changes in consumer demand towards higher quality table wine from the 1970s. This 'stickiness' is something that we see in other regions that struggle in adapting to market conditions, as in the accompanying cases of Ontario and Brazil.

The number of wineries has re-entered a growth phase from the downturn in the 1970s–80s. The New York Wine and Grape Foundation reports an increase in the number of annual tourists visiting wineries, from 1.4 million in 1995 to around 5 million in 2008 (author correspondence). According to consulting firm MKF, the only recent statistical source on the industry, as of 2005 there were at least 193 licensed wineries, producing at least 16 million cases of wine annually. The industry is bifurcated with a few very large wineries producing low priced wine for national distribution, specialising in sparkling, specialty and dessert wines, and the rest are mostly small wineries. Among the latter are two groups: a large number of small wineries selling directly to consumers, restaurants and stores, in the $10 price range using native and *vinifera* hybrids; and another group selling *vinifera* wines in the $20 range, often using third party national distributors for up to 50% of their sales. It is important to note that while the number of farm wineries has proliferated, they still account for only 5% of total production (MKF, 2005).

We have seen that the overall price of wine grapes is lower in New York, reflecting lower quality than Washington State, which produces comparable quantities. We have also seen in our first paper that New York wines are not considered to be of the same quality in industry reports as the widely exported Washington State and Oregon wines. The mere fact of using hybrid grapes for much of wine production is problematic for claiming quality production in a general market that is almost exclusive to *vinifera* grapes. Therefore, what we see is the stickiness of lower quality, mass production in New York. When other industries on the West Coast created a quality revolution in California in the 1960s, and in Oregon and Washington in the 1970s, New York did not. The paper now looks at the triple helix as an explanatory theory for how these changes developed.

Research sphere strong

New York's underperformance is a curious case as it seems to have all of the key elements for success, according to the triple helix framework. In terms of research, Cornell University is the central research organisation and is located in the Finger Lakes region. It has both undergraduate and graduate programmes in oenology and viticulture, provides extension services, and manages the NY Agricultural Experiment Station in Geneva, which dates back to the beginning of the century. The station provides clones of different varieties to local farmers, including imports that it screens for viruses. Scientists there work with US Department of Agriculture Research Service scientists, also posted in Geneva, where the National Clonal Repository for grapes is housed. The university considers itself to be one of the top

viticulture and oenology programmes in the world. In 2000, under a state and university partnership grant, with help from industry, it opened up a new Vinification and Brewing Technology Laboratory. From 2003, it offered two undergraduate majors: a food science major with a specialisation in oenology and a plant science major with a specialisation in viticulture and a minor in oenology. With state approval, it transformed these into a viticulture and oenology major. In 2009, a new state-funded $5.4 million Cornell Lake Erie Research and Extension Laboratory was opened in Portland NY. So, the real question is why world class research is not being translated into clear industry gains as the triple helix would predict.

Industry and policy struggle to adapt to changing markets

Despite this huge asset in the research area and the advantages of an early start, the wine industry has struggled to take off. According to industry sources (gleaned from interviews), the New York wine industry was in crisis in the early 1970s. Wine tastes had changed towards drier varieties, and the emergence of California as a national producer and marketer reinforced this trend. Because of climate, 75% of grapes are devoted to labrusca (hybrid) varieties, limiting quality (Centonze, 2010). As noted, this limitation appears unnecessary given the breakthroughs of *vinifera* cultivation in Ontario, the neighbour to the north.

In response to these problems, policymakers have seemingly been proactive in recent years in improving the industry's fortunes. One response by wineries to the crisis of the 1970s was also policy-led, namely the move from native to hybrid species, and to further consolidate the hold of dessert wine markets that California producers were abandoning. According to Newman (1992), the Taylor Company and the New York State Agricultural Experiment Station, a branch of Cornell University, were the proponents of this upgrading shift, with Taylor providing low cost hybrid vines to growers and Cornell assisting through technical advice. As a result, hybrid acreage increased seven times between 1966 and 1980 (Newman, 1992). Yet, Tables 1 and 2 show that hybrid grapes are still not as valuable as the *vinifera* grapes that create the tastes and the European varietals most consumers associate with quality wine.

According to sources (author interviews), the largest producer and anchor of the industry, Taylor, had been a family-owned company, with paternalistic ties to grape growers. In fact, Taylor emerged from the purchase of the Pleasant Valley wine company, which dates back to 1860 in New York. In 1976, Taylor was bought by Coca Cola, cutting these long-term relationships. Lobbyists for the industry marched to Albany, noting that it was in danger of dying. The resurgence of the New York wine industry is traced by most analysts to the 1976 Farm Winery Act. Farm wineries are defined as those producing less than 150,000 gallons per year. The Act legalised direct sales. Subsequent legislation in the early 1980s allowed winemakers to sell wine coolers in grocery stores, which helped to ease the grape surplus. The winery deregulation act of 1984 also allowed wineries to open up to five other locations for direct sales. This has led to collaboration among some wineries in outlets. This produced a notable increase in the number of wineries, as seen in Table 3. As of 2005, fully 82% of wineries were farm wineries (MKF, 2005), yet these account for just 5% of output. The resurgence, therefore, is focused on small-scale production. Thus, there is likely to be much more difficulty in knowledge diffusion, and potentially

Table 3. Number of New York wineries over time increasing, but limited to farm wineries

1900	1970	1980	1990	2000	2010
2	3	23	37	49	183

Source: NY Wine and Grape Foundation.

major problems with technological upgrading. In fact, according to industry informants, most of the farm production is limited to local sales.

Two pioneers, Constantin Frank and Charles Fournier, demonstrated that *vinifera* grapes were viable in New York in the early 1980s, despite long-standing doubts about its winter hardiness by the dominant Cornell University researchers. Fournier was a winemaker at Gold Seal winery, which began to sell *vinifera*-based champagne in the 1980s (author interviews). Some interviewees note a recent influx of new winemakers, some from California and more from Europe, principally Germany, which could strengthen knowledge about *vinifera*. Yet local industry sources still indicate strong resistance to change in the industry. The question, then, is not about obstacles in the level of technology or knowledge available, but why, despite the knowledge of how to move to better quality wine, it has not taken place.

On the surface, the policy piece of the triple helix seems to be in place. Besides the legislation noted above, in 1985 the New York State Government created the New York Wine and Grape foundation to fund applied research and market local wines. This came as a result of direct lobbying by the industry. In 2005, the state created the New York Wine and Culinary Center, a non-profit company, to showcase New York food and wine. The foundation is the key coordinating body for the cluster, with the state and private sector matching resources. Most of the foundation's activities are concerned with promotion. However, it does administer a research fund with industry input. Cornell University receives most of the research funds.

Triple helix cannot explain failure

All of this has the makings of a strong policy basis for a needed upgrading in terms of improving the quality of New York wine, to follow the path set out by the West Coast from the 1960s. In fact, we see that all three spheres of action are in place and dynamically interactive, as the triple helix recommends. However, author interviews reveal strong resistance to change on the part of all three spheres. On the research side, there does not seem to be any consensus about moving to *vinifera* or other long-term research means to upgrade the industry. On the industry side, there is equal resistance to increases in levies or major regional branding efforts as the volume producers appear to feel well-entrenched in their mass production profiles, while the new entrants are so small that they are focused mainly on local tourism.

The execution of policy has also limited the possibility for moving forward. First, the Wine and Grape Foundation is on shaky grounds. Its budget comes from an annual line item that is voted on in the annual state budget. As a result, the funding it receives varies widely from one year to the next, with overall declines occurring in the last five years, making long-term planning and consistent activities strenuous. For the most part, promotional activities are limited for budgetary reasons to within the state. There is some discussion now about a levy system on the sale of grapes that would then be funnelled back into research via the foundation, which would include juice and jam production. However, some wine grape growers have not yet

recognised the value of such efforts. Thus, wineries are not receiving a steady enough increase in quality grapes to improve their wines on a larger scale (author interviews). Thus, we see that resistance to creating the means for collective action for improvement extends not only horizontally across small producers, but also vertically to grape growers. Since other grape uses, notably jam and juice, are more important outlets, it is hard to organise wine grape growers as a separate group.

The publicly available MKF consulting report (2005) pointed to several other weaknesses that, according to interviews, continue today. The second is the lack of clear profile or reputation. The third is a lack of consistent quality grapes, also noted by interviewees. The fourth is constrained access to finance. The last is related to New York's limitation of wine sales to liquor stores, which reduces the number of outlets and possibly overall consumption, whereas in other states, such as California, wine can be purchased at a variety of outlets. As observers of the wine industry know, finding shelf space is a major obstacle for wine producers, and liquor stores are much more limited in space, as well as the level of convenience and access to products for consumers. One industry source notes that efforts to allow for grocery store distribution, which would vastly improve the prospects for the industry, are being blocked by a lobbying effort financed by the retail liquor stores. Grocery stores, which stand to gain, are poorly organised and internally divided. The wine industry itself appears to have some divisions, with some of the larger producers taking strong opposition stances, probably to preserve their position in the shelf space under current conditions. There are reports of threatened retaliation by the liquor stores for wineries who lobby against them (author interviews).

Some within the industry have been trying to promote the development of high quality Riesling, which has won some awards at the international level, and there have been locally-sponsored competitions and promotions. However, there is no consensus about specialisation, and grapes for expansion into Riesling are in short supply. Without specialisation, the triple helix knowledge system is unable to focus on producing wine that is distinctive and of high quality, seen quite clearly in comparison with our other cases. What we see in the case of New York, then, is the breakdown of coordination of the triple helix spheres, exacerbated by a lack of steady financial support. If we compare New York's situation with that of New Zealand or Australia (see accompanying papers), we see an inability to create the sources and elements of success in those triple helices: a strong regional brand; a triple helix system with directed research around a long-term goal of excellence, quality and consistency, based upon a universal levy; and a focus on becoming the best in a key varietal. What we see here, in contrast to our other cases, is the failure of strong institutions. Industry is not capable and the state so far has been unwilling to create a public authority which would lead to collective goods and the means to move the industry forward. Oregon and Washington State provide important contrasts in this regard.

Oregon

The Oregon case is a beacon of success for small wine producing regions. Oregon shows that several more intangible elements beyond the triple helix are needed for competitive success, including steady finance, social capital (coordination of institutions in practice as well as theory) and specialisation in production leading to regional reputation as a collective good. This, in turn, reinforces collective action, and in

that sense parallels the New Zealand case. These are elements that we have seen in success cases that are missing in failure cases, such as New York. What they bring, most likely, is a kind of glue of consensus that allows the triple helix to function effectively for collective gain, and to evolve in line with markets. That is, the triple helix theory is missing the coordination elements that seem to be as important as the three helices themselves.

Policy follows industry breakthroughs

Like Washington State, Oregon wines date back to the nineteenth century, on the basis of immigrants making wine in small batches. As legal production resumed after Prohibition in the 1930s, much of the wine was based on fruits in general, rather than *vinifera* grapes. There was a general sense that it was unlikely that the Oregon climate would lend itself to high quality wine production. In the 1960s, the Oregon wine industry began to organise itself into a modern industry. UC Davis graduate Richard Sommer opened Hillcrest Vineyard near Roseburg in 1961, with the first vintage going for sale in 1968. He focused on Riesling. In 1965, Charles Coury arrived from California, bringing new varietals, including plant materials from INRA, an agricultural research station in Alsace, where he had spent a year studying. In the same year, David Lett, a graduate of UC Davis and former student in Burgundy, founded Eyrie Vineyards and began planting Pinot Noir. Areas outside France had struggled to create consistent high quality Pinot Noirs up to that point (author interviews).

In 1970, the state had five wineries, with 35 acres in production. A wave of wine-makers began migrating from California at this time. According to interviewees, 'a lot of these early guys were *garagistes*, who had other day jobs, such as engineers'. However, they had a strong love of wine and that drew them to start trying to produce their own. A general agricultural policy shift unintentionally laid the foundations for industry success in the following years. In 1973, Oregon passed a landmark land-use law, imposing limitations on urbanisation and protecting agricultural land. Interviewees note the importance of this law in preserving land for wine production that otherwise might have been developed into residential and commercial use. This was well before the explosive growth of Portland from the 1980s that would have threatened winery land. In 1978, the first marketing brochure was published; 1979 was a pivotal year, when Eyrie Vineyards' 1975 Pinot Noir was placed in the top 10 at the Gault-Millau French Wine Olympiades, and was rated the top Pinot Noir, surprising most of the wine world (author interviews). Initial industry success opened the way for triple helix responses to develop formal institutions to aid in the development of the industry. This reveals that the triple helix is not always a deliberative policy process. Rather it can occur as an industry grows. In this case, policy for the industry hardly existed, and research was rather limited. Thus, industry pushed for the creation of the triple helix institutions, showing the validity of the framework as a way of understanding sources of competitiveness, though it also reveals another *lacuna* in the theory in regard to how such institutions are created.

Industry calls for triple helix support

With no real triple helix framework, innovation came initially from knowledge transfer from abroad and then local adaptation. Like our other case study, New Zealand,

Oregon is a small producer and thus unable to adequately resource basic research and development of the wine industry. Unlike New Zealand, Oregon was able to find a solution in the absence, at least for now, that avoided domination by large investing companies. By 1980 there were 34 wineries and 115 growers with 1100 acres. The Oregon Wine Advisory Board was established in 1983, and the regional appellations for the Willamette Valley and Umpqua Valleys were created. In 1989, Willamette Valley Vineyards, headed by visionary founder Jim Bernau, became the first publicly traded winery in the state. Key to these improvements were close ties between Oregon State University and French experts, such as Raymond Bernard at ONIVINS in Dijon, giving Oregon vintners access to clones unavailable to competitors in California. French investment was behind the founding of the Argyle winery around this time. In addition, the Drouhin family of Burgundy, with deep roots in winemaking in France, purchased 100 acres in the North Willamette Valley in 1987, starting the Domaine Drouhin Oregon winery (industry websites).

According to interviewees,

> there was a lot of experimentation at this time. We didn't know what would work and what wouldn't. We did find out quickly that Napa techniques wouldn't work up here. We tried a lot of different varietals and techniques. There was a true entrepreneurial spirit here and we especially struggled with reducing inconsistencies.

One of the pioneers interviewed notes that when he first arrived in the early 1980s, there was a lot of Riesling, including wines made from imports from Washington State. Because Napa techniques did not work, interviewees said that there was a lot more borrowing from Europe, especially given the influence of Drouhin on the first pioneers. The French investment brought knowledge, techniques and enhanced the early reputational potential for the Oregon brand of Pinot Noir. According to one interviewee (see the Appendix), there remain close ties with Burgundy, including personal relationships and training.

Pinot Noir became the breakthrough varietal for Oregon, just as Sauvignon Blanc was for New Zealand, and Shiraz for Australia. One interviewee notes, 'Pinot gives us a common identity. More importantly, it forces us to focus on quality'. He traces success in Pinot to three basic factors: first, the exceptional and really unique level of coordination and cooperation. He notes that the larger wineries see it as their mission to promote learning in the smaller ones, to preserve brand reputation. Brand reputation is everything, according to this expert, who notes that all successful wine regions, including Burgundy and Bordeaux, have an emphasis on one or two varietals. The second factor is the Oregon *terroir*, and the third the fact that costs are higher than neighbouring California and Washington, pushing strategy towards a quality *vs.* quantity emphasis. Concern about market saturation through scaling up Oregon production is limited by the fact the Oregon produces only 2 million cases per year, for just 5% of US wine consumption as of 2012. Thus, like New Zealand, Oregon is a price taker. However, in this case, Pinot Noir is considered a premium brand and production is more difficult, thus creating barriers to new suppliers.

Oregon's triple helix

Despite a *phylloxera* scare, necessitating changing rootstocks in the 1990s, the industry continued to grow. Growth led to a strengthening and formalisation of triple helix

institutions. In 1993, the Oregon Wine Marketing Coalition was formed. In 1995, the state legislature passed several favourable laws, including legalising direct to customer shipments, and in-store wine tasting. Oregon State created a professorship in fermentation science. The legislature created the semi-independent Oregon Wine Board in 2003, replacing the Wine Advisory Board. The Wine Board distributes research funding and includes researchers from the US government's Agricultural Research Service and several extension officers. The Board runs conferences to help disseminate new technology and knowledge. Oregon's Wine Board is the key coordinator of the cluster, and brings together the sectoral innovation and marketing system via research and training at OSU (industry websites).

As in our other triple helix success cases, reliable financial flows are an important part of the equation. The Wine Board is supported by a mandatory levy on the production of wine grapes ($25/ton) and sale of certain wines ($.02/gallon). Most small producers are exempt from the latter tax. The Wine Board shares an office with the Oregon Winegrowers Association, which is supported by voluntary membership fees and focuses on lobbying. Their combined annual budget is $875,000 (Full Glass Research, 2011). The 2004 movie *Sideways* created a winery boom in both Washington and Oregon based on its celebration of Pinot Noir (author interviews). This again cannot be considered a creation of the triple helix institutions, but rather a market opportunity that Oregon was well poised to seize.

The Oregon Wine Research Institute (OWRI) was set up in 2010 as a partnership between the wine industry and Oregon State University (OSU), where it is housed. The OWRI distinguishes itself by focusing on business along with science. Its board includes 12 industry representatives and seven ex-officio researchers from OSU. The OWRI states (as of 2011) that it is working to develop a new five-year plan for the sector. The first director, Neil Shay (an agricultural scientist), was appointed in August 2010. OWRI is supported by the Oregon Wine Board, including some partial funding for positions and for small research projects. There is an extension officer who works closely with industry to solve problems and to help newcomers. There is some discord regarding the functions of OWRI among the stakeholders, and the director position is now in flux. The research allocations of the OWB seem quite limited and there is an industry perception that OSU has not adequately funded the centre. Since the levy is fixed by legislation, it cannot rise, even in response to inflation. Several interviewees state that they think it is now too low, especially to provide adequate funds for research. The original plan was to divide the levy into three equal parts: administration of the OWB; marketing by the OWB; and research. The annual levy is reportedly around $1.2 million per year, but the research allocation has been around $250,000. This amount is inadequate, and basic scientific research seems to be neglected. However, industry representatives state that extension services are even more important, and equally underfunded. There are also some complaints by Southern Oregon that they do not receive enough attention in terms of research or extension.

Oregon is facing the challenge of maintaining its high quality niche in Pinot Noir, amidst the pressures of new competitors, such as New Zealand, rapid growth with a rush of investors new to winemaking who have recently entered into the Oregon industry, and increasing land costs. The recent wave of corporate investment, including the purchase of the central Erath winery by Chateau Ste. Michelle and Argyle by Kirin, has thus far not changed the culture or local management, but there is reportedly increasing competition for local outlets (such as restaurants) and some

pressure on high end price points. There appears to be some discord between the dominant Willamette Valley producers and the growing region of southern Oregon, where the *terroir* is less suitable to producing Pinot Noir, and growers have struggled to find their niche. One interviewee stated that the lack of a focal point (i.e. a consensual varietal) makes it harder to gain recognition. Thus, we return again to the importance of specialisation for allowing triple helix coordination to create collective action.

Conclusion – remarkable success, but also some concerns

One could also point to the risk of putting all of Oregon's eggs into the Pinot Noir basket. Should climate or demand change significantly the industry would be at risk. Interviewees state that the volume produced in Oregon *vs.* the growing demand for Pinot Noir led them to conclude that such risks are remote. While some efforts have been made to try out other varietals, notably Pinot Gris, according to sources the different demand profile and price points have not incentivised any serious movement in this direction. As we see in the case of New Zealand Sauvignon Blanc, specialisation in high quality production of one varietal has its benefits, but does not seem to spill over into other varietals. Perhaps the small size of the market prevents consumer knowledge from easily associating one region with more than one type of wine. Evidently this creates vulnerabilities as well as strengths.

However, multiple interviewees came back to a very interesting core of Oregonian success – the spirit of cooperation. According to one source, part of this is the knowledge-intensive nature of producing good Pinot Noir, which pushes everyone to share ideas, and the fact that everyone recognises the collective reputation of the Oregon brand. The *phylloxera* threat of the 1990s further led to the recognition of the need to share vineyard management techniques. Moreover, the need for high quality grapes pushes winemakers and growers into long-term relationships, especially since 'everybody knows everyone in the (Willamette) Valley and reputation is everything'. One source estimated that 50% of grapes are estate grown, a high proportion compared with most other wine regions. Estate grown refers to grapes grown by a winery on its own land, as opposed to purchasing from the market or grape growers, thus creating transaction costs that can impede consistent quality grapes and create principal–agent problems between the wineries and the grape growers as we see in the cases of New York and Ontario.

But there is more. Referring to the experimental days of the 1970s and early 1980s, one interviewee said, 'We always shared knowledge. If there is someone new, we help them out. We trade ideas'. He cited a monthly technical meeting in which he and other winemakers share ideas; it is open to anyone. Another said, 'When we first started out, everyone would sit in the same room – it was a firehall – and share ideas'. Another said, 'In Oregon, it's always been the "circle the wagons" culture of cooperation and helping each other out'. This sentiment was echoed by another, 'In Oregon, we have always had the sense of being at the frontier – you either cooperate or (you) die'. The vision of the pioneers led to the consensual adoption of the levy system, which is strongly supported. Another pointed to the annual Steamboat meeting (which is closed to the media) at which winemakers take turns criticising each others' products and techniques, and 'no one can have a thin skin, because we don't hold back'. Still another said that when she entered the business, she learned a lot from her neighbours. When her winemaker suddenly died, her

neighbours came in and helped her until she could find another. Numerous interviewees said that they frequently shared equipment with others in the industry. All in all, Oregon shows that, in a small industry, success depends on a sense of shared collective success; it is built upon personal relationships and developing a reputation for a specialised product. As we noted at the outset of this paper, and in our other successful cases of New Zealand and Australia, the triple helix vastly underestimates the role of consensual and informal personal relationships in moving the triple helix institutions towards collective action. Triple helix also misses the central role of financial flows and specialisation of knowledge around becoming the best producer of a certain price inelastic product because it does not focus enough on the question of competitiveness.

Washington State

Washington is a good example, in its contrast to Oregon, of how comparative advantage and having the triple helix alone are not enough to create a highly competitive industry. Washington State's wine industry not only has considerably more land than Oregon, but it also had a strong head start in its development. Grape plants had an early start in Washington State; some date planting back to the 1870s when fur traders brought *vinifera* to the region. In 1934–35, the National Wine Company (NAWICO) and Pommerelle fruit wines were established to serve local markets, selling mostly fruit wines, often currant and blackberry based. The wines were protected from outside competition, particularly from California, by state regulations until 1969. The Washington Wine Producers' Association was established in 1935, and reorganised in 1939, to promote the industry (Kaag, 2008, p.28). In 1951, NAWICO began planting grenache *vinifera* grapes in the Columbia Valley. In 1954, NAWICO and Pommerelle merged to become American Wine Growers, which later became Chateau Ste. Michelle. However, in 1959, there were only nine licensed wineries in the state. In 1962, total grape acreage was 6343 acres, of which only 280 acres were *vinifera*, the rest being native labrusca, unsuitable for fine wine (Kaag, 2008). These aspects reinforce the idea that comparative advantage alone without support institutions or industry organisation is inadequate to create a competitive industry.

Researchers drive industry takeoff

Efforts at technological development are behind the change in fortunes. Unlike Oregon, local researchers played a crucial role. In the 1950s, Walter Clore of Washington State University conducted a series of trials on the suitability of various *vinifera* varietals. In 1962, a group of professors from the University of Washington, inspired by Clore's work, began a commercial venture, founding Associated Vintners, which later became Columbia Winery. However, like Oregon, knowledge transfer by outside experts played a crucial role in upgrading industry fortunes once the Clore group had demonstrated the viability of a wine industry. Clore's efforts attracted the attention of wine historian Leon Adams, who travelled through the area in 1966 and was impressed with the quality of the Grenache. Adams in turn introduced pioneering oenologist Andre Tchelistcheff to Chateau Ste. Michelle in 1967. He had recently retired from Napa Valley's Beaulieu Vineyards. Tchelistcheff helped guide Chateau Ste. Michelle's early efforts and mentored modern winemaking in the state. In 1974, Ste. Michelle was bought by US Tobacco, which brought an

important infusion of capital for upgrading, creating a demonstration effect in the region (Veluzzi, 2007).

Cynthia Kaag's dissertation argues for the fundamental role that technology transfer systems played in Washington State University's (WSU) success as a quality wine producer. Klaag states that WSU scientists and researchers 'were the main force behind creating the knowledge base necessary for the Washington grape and wine industry to grow from a few hundred acres of vines, producing undistinguished grapes for undistinguished wines, to a major state industry' (Kaag, 2008, p.22). Thus, triple helix is correct in linking knowledge development as a precursor to competitive advantage, yet it does not theorise either about how, or the sequence in which, the three helices emerge. In the case of New York, Cornell does not lead to a triple helix, while in Oregon, OSU's active research follows the industry lead sequentially. Evidently, how a triple helix arises is a topic worthy of further investigation.

Kaag singles out Walter Clore as a pivotal figure who not only pioneered the science, but also acted as a key node for information flow between scientists, government and industry. Clore arrived at WSU as an agricultural researcher in 1934. Kaag states that Clore was the leading force in the transformation of vineyard practices – trellising, training, pruning and watering in relation to mechanical harvesting, vine maturity and cold hardiness – to suit the climate of the state. Most significantly, Clore's vision for the potential of premium *vinifera* grapes and fine wines led directly to field trials of varieties at many locations around the state and to the involvement of WSU in the production, evaluation and amelioration of wines. Clore was responsible for recruiting Charles Nagel, a Ph.D. in microbiology from UC Davis, in 1964, who became a seminal figure in improving wine quality.

Essential to this story are the ongoing major efforts by Clore's WSU group at extension via relationships with grape growers, winemakers, trade and industry groups, public policymakers, and outside expertise. Clore at one point in the 1970s took a leave of absence to study techniques in Germany relevant to cold climate oenology. Two particularly important innovations were speeding up maturity to harvest long before freezing weather, and finding the right varietals for particular micro-climates. In addition, the group worked closely with the WSU Department of Agricultural Economics to develop business and financing models for the industry. Kaag (2008, p.23) states that the work that these economists did 'helped convince banks to loan money to grape growers, despite the several years between planting and profits'. WSU scientists and extension specialists worked together to create a variety of mechanisms for disseminating information, including bulletins, circulars, memos, personal and professional presentations, and personal correspondence. Easily-comprehendible, one-page information sheets were widely used by growers. WSU extension agents played an essential role in passing on basic research in useable formats to growers, and offered personalised problem solving services to them, including site visits. In turn, industry associations, such as the Concord grape growers, agreed to fund research (supplemented by federal and state grants), and to help set research priorities for WSU. By the 1980s, this had led to a levy on both wine and grapes as a source for ongoing funding for the industry, supported by both grape growers and wine industry associations (Kaag, 2008). Thus two pillars of the triple helix came into motion even without policy leadership.

With improvements in competitiveness, WSU pushed for repeal of protectionism from outside wine imports. Of crucial importance was legislative change via the opening up of competition through the California Wine Bill of 1969, which lifted

import barriers. The bill finally passed in 1969, exposing local producers to fierce competition and pushing them (after some shakeout, leaving just two wineries in 1971) towards the marked quality improvements that, in turn, fed the explosion in growth in the 1970s (Kaag, 2008). Up to that point, 'the majority of Washington wineries focused on producing cheap, fortified, sweet wine, showing little interest to compete and gain market share on the basis of quality' (Veluzzi, 2007).

The quality investments paid off. According to the Washington State Wine Commission website, 'the rapid expansion of the industry in the mid 70s is now rivaled by today's breakneck pace, where a new winery opens nearly every 15 days'. Production patterns have varied by decade in response to demand, with Rieslings and Chardonnays dominating in the 1970s, Merlot in the 1980s, and Cabernet Sauvignon and Syrah in the 1990s. Cabernet has now become the signature brand of Washington State, according to wine industry experts. Thus, when we contrast Washington State's medium level performance with that of New York State and Oregon, we see on the one hand a consensus around a signature grape and, more importantly, a levy system to help lubricate the quality upgrading process. Why, then, is Washington State not performing as well as Oregon? In the next section, we suggest industry concentration may be the answer.

Policy follows research and industry lead

As in the case of Oregon, the formal creation of the triple helix institutions follows, rather than precedes, industry takeoff. The Washington Wine Commission, a unified marketing and trade association, was created in 1987 with ties to the state Department of Agriculture. The Commission coordinates the industry, including R&D, extension, marketing and training. All wineries are part of it. It is funded by levies on grapes and taxes on wine sales. There are 13 board members, who are appointed to their positions. Twelve board members are from industry, and another from the Department of Agriculture. The Washington State Liquor Control Board regulates the sale of alcohol. Its board has three governor-appointed members.

The Washington Wine Institute is the organisation representing industry interests. The Washington Association of Wine Grape Growers is its counterpart. Both are based on voluntary membership. There is also a Washington State Grape Society that is an industry association. The executive director of the Wine Grape Growers also runs the Washington Wine Industry Foundation, which offers scholarships for training and works with the federal Department of Agriculture to fund R&D. The board members are from industry, which provides most of the funding. The foundation is non-profit. The Walter Clore Center is a conference and exhibition centre for the industry, and is also non-profit.

In 1999, the Washington Wine Quality Alliance (WWQA) was established to lead the development of industry standards in winemaking and labelling. In 2003, the Washington Wine Institute and its educational partners celebrated the state's $2.3 million investment to create new two-year and four-year degree programmes and research and development funding. As described below, Washington State University (WSU) has played a pivotal role in the cluster's fortunes. WSU has a Department of Viticulture and Enology. R&D is also funded by the Washington Wine Commission. WSU runs certificate programmes and a BA in Integrated Plant Studies. There are 29 faculty affiliated with the department. Central Washington University also offers a certificate programme.

The Washington Wine Commission is the key sectoral and marketing system coordinator. Behind this is the work of WSU to promote R&D and extension. Improvements in quality have their roots in deliberate efforts by cluster institutions, particularly WSU, made possible by the coordinated efforts to fund R&D at WSU. Chateau Ste. Michelle won best American winery in 1988, and *Wine Spectator* named five Washington wines among its top 100 in 1989 for the first time, ushering in a reputation for quality.

According to interviewees, a few firms, particularly Chateau Ste. Michelle, dominate the governance of the sector. The end result is that policy is weak because Ste. Michelle manages the exports for the industry. Extension and applied research are also weak. Despite WSU's role in developing the sector, the remoteness of its central campus in Pullman from the Walla Walla and other Washington regions seems to be creating communication problems, putting in doubt how well the research and industry pillars of the triple helix can be coordinated. WSU has a local campus, but research is still largely conducted in Pullman, over two hours drive away.

There is an influx of recent investment and 'flying winemakers' (international consultants) into the area, including interest by Gallo, which sees potential there. There are reports of private investment in developing a local rail line in order to improve distribution to Eastern US markets. The idea is to establish the reputation of the Walla Walla region in terms of producing world class wines. However, there is no consensus yet on which are the best varietals. A new project, called 'Long Shadows', has been bringing in top winemakers from around the world to create a series of world class wines in different styles from local grapes. Again, this has been led by the former CEO of Ste. Michelle.

Washington is an intermediate case. Formally, it has all the triple helix institutions in place, as well as a levy system and specialisation that we have seen in our other success cases. Its low costs should provide comparative advantage. Yet, we see that Washington state's fortunes appear to be dominated by its major company and exporter, Chateau Ste. Michelle, with its global holdings, a company that would not want strong local rivals. Though this eases collective action problems in terms of coordination, it also seems to reduce the chances for setting up policies that can collectively grow the industry to greater exporting prowess.

Conclusion

Oregon and Washington State have well-developed institutional support systems, and through specialisation in certain varietals, have developed an international reputation for quality. The curious case is New York. Despite the international reputation of the work of Cornell University, its wines are known more for native varietals of low quality. It is odd that they have not yet picked up on the ice wine specialisation that has made Ontario wine famous. The lack of supporting regulation, a well-organised industry lobby, and the need for improvement in supply chains (quality grapes) appear to be the key weaknesses, though there are signs of change. Most importantly, New York lacks a levy system that would allow its potentially world class research system to improve quality. The lack of a levy system, in turn, reflects a lack of consensus within the three spheres of the triple helix. As in the case of Ontario and South Africa, what we see in New York and Washington State is that underperforming triple helices can be difficult to reform, thus the triple helix underestimates the political nature of interaction because of its reification of knowledge flows.

Taken all together, and reinforced by the accompanying cases of Australia and New Zealand, we can conclude clearly that quality production in the wine industry requires so much more than the triple helix institutions. Focus on specialisation helps to create long-term consensus, and a regional brand. Industry growth, even with limited research support, can actually lead, rather than follow, policy in the triple helix if knowledge transfer from other wine regions and investment take place. However, we also note that industry concentration can reduce the collective benefits of the triple helix. Oregon seems to have factors (invisible in the triple helix framework) that allow for successful coordination of the three spheres – namely personal social capital and horizontal cooperation across firms of different ages and sizes – that Washington State lacks. Recall that part of what a wine consumer wants is to sample variety. Thus, Oregon offers consistency through its varietal of choice, Pinot Noir, but also the possibility of variety of brand in its more democratic structure. While the triple helix institutions have undoubtedly aided Oregon wine in marketing and research, the more intangible factor of social capital and cooperation across like-sized firms seems to be the secret source of its success. These findings parallel the intangible aspects we noted in the accompanying Australian and New Zealand cases, where personal relationships and tacit understandings were central to their success. The absence of these factors in South Africa, Ontario, Brazil and San Juan, Argentina appears to explain their struggles. Thus, we need to think more carefully about social capital and consensual strategy as the concepts behind the operational features of central financing and product specialisation that allow us to distinguish between well- and poorly-functioning triple helices.

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Appendix 1. Sources for statistical tables

New York

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