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**Uncorked?:  
The Dynamic Interaction Between the Global  
Markets for Wine and Corks**

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**Abstract**

The wine and cork industries are both global in scope. Historically, corks were used to stopper ninety-five percent of wine bottles. Cork production is concentrated in Portugal and Spain. Cork comes from the bark of cork oaks and is harvested in nine-year cycles with individual trees being productive for between 100 and 150 years. Hence, the supply curve in the cork industry is highly inelastic. An increase in the demand for wine in North America and the antipodes as tastes changed to include wine in alcohol consumption led to an increase in the derived demand for corks – which was difficult to accommodate given inelastic supply. This led to a search for substitutes for corks and a change in the narrative to convince consumers that wine sealed with screw tops was not of low quality. Over time, this led to the gradual acceptance of screw tops (and other alternatives to corks) by wineries and consumers. The switch was most dramatic in Australia and New Zealand. The global share of corks declined dramatically. In reaction, the cork industry began to actively try and reverse the trend to screw tops. It invested in improving the quality of cork and in changing the narrative so that consumers would associate corks with being the sustainable source in wine stoppers. After forty years of disequilibrium, a new equilibrium may be being approached.

Keywords: corks, disequilibrium, narratives, screw caps, wine

## Introduction

Several factors contributed to overall demand growth in the second half of the 20th Century. From 1950 to 1980, per capita wine consumption in the United States more than doubled from about 3.5 liters per capita to a little over 8 liters per capita. ... Population growth continued to contribute steadily to total demand. From 1950 to 1980, imports grew from less than 5 percent to more than 20 percent of consumption by 1980, and California continued to supply about 90 percent of domestic production. In total, table wine consumption rose from about 1.36 million hl to about 15.1 million hl. Quality improved as well. From 1950 to 1980, the share of table wine (that is, still wine having less than 14 percent alcohol by volume) in total wine consumption grew from about one-quarter to about three-quarters.

Sumner et al., 2001, p.6

In fact, a closer look into the evolution of the wine industry in recent years tells a very different story; mainly, that cork is facing new competition in the form of substitutes for wine bottle stoppers and that these substitutes may well be the root cause of price deflation.

McCombe, 2010, p. 58

"I still love the ritual of opening wine under cork," says sommelier Cam O'Keefe. "There's just something completely natural and romantic about it."

Bliszczyk, 2017

And after the hoovering we had a glass of wine. It was a screw top, but you don't notice these days, do you? I was just good.

Osman, 2020, p. 123

The wine industry is global in scope. Wine production and/or consumption, to some degree, takes place in almost all countries. Production ranges from winemaking in the home for family consumption to multinational corporations producing on a very large scale. Wine is widely traded internationally with considerable intra-industry trade as consumer tastes are heterogeneous and winemakers strive for uniqueness in their products resulting in a very wide variety of distinct offerings. As a result of the global scope of the wine industry, the cork industry is also global as corks are traditionally and widely used as stoppers in wine bottles. Unlike winemaking, production of cork is concentrated in only a few countries – primarily Portugal and Spain – and subsequently exported into a global market. Cork is a major input to wine production and the fortunes of these two global industries is bound together, but some in the wine industry would like to loosen those ties but the cork industry depends on ensuring its continued

importance to the wine industry. Ultimately it is a battle for the hearts and minds of wine consumers. The interplay between these two global industries is dynamic. Once a shock puts these industries into disequilibrium, the path of adjustment between these industries take place over a very long period. In dynamics, the paths of adjustment can take many forms, degenerate, cyclical or trending toward a new equilibrium (Kerr, 1993; Kerr, 2022). This paper examines this dynamic interaction between these industries since the 1970s.

## **Motivation**

The motivation for this paper is peculiar. It arose out of my academic curiosity, nothing more.<sup>1</sup> In 1986, I was on sabbatical from the University of Calgary in Canada. I was being hosted by the Department of Agricultural Economics at the University of College of Wales – Aberystwyth<sup>2</sup> in the United Kingdom. I decided to take a brief holiday in Portugal. I had never been there before and knew little about the country and its agriculture. The countryside is picturesque, and I enjoyed driving around on rural roads taking in the ambiance. I am an agricultural economist and was curious about the agriculture I was seeing. One of the scenes was relatively open landscapes with cattle grazing under dispersed trees with large canopies. I noticed, however, that these trees had large white numbers painted on their trunks – 1, 6, 8 etc. I wondered why the trees were numbered. Eventually I realized that these were cork oaks. Once I had that revelation, I noticed cork tree bark stacked up in various places. I also realized that the numbers on the trees related to the particular year the bark on an individual tree could be harvested. The bark harvesting rotation is nine years – with all the trees painted with a three harvested in the same year.

Upon my return to the United Kingdom and library resources, I was determined to learn more. I learned more about the agronomic traits and management of the cork oak “forests”. Besides their bark, cork oaks produce acorns which are collected and fed to pigs (Glencross, 1978). Harvesting of the bark is a specialized profession and great care must be taken in removing the bark so as not to damage it. The reason for the nine-year rotation is that is the time it takes for the bark to reach the correct thickness so that it can be used in the manufacture of cork stoppers for wine bottles (Sampaio, 1972). Newly planted trees take approximately 25 years to mature with a first full harvest that can be used as wine stoppers expected in 45 years. The trees can live up to 300 years and bark can be typically harvested until trees are between 100 and 150 years old – approximately five bark harvests. In addition to wine and stoppers for vegetable oils, cork is used as insulation from heat and sound, for flooring, in cricket balls, fishing rod handles and badminton shuttlecocks.

Approximately fifty percent of global production originates in Portugal with another twenty-five percent in Spain. France and Italy produce small amounts of cork as well as Morocco, Algeria and Tunisia (Normandin, 1980; Karmouni, 1979). While cork oaks will grow in other places with a Mediterranean climate such as the Southwestern United States, India, Crimea and the Caucasus, they do not produce bark of sufficient thickness or quality for wine stoppers. Hence, there is little chance for expansion of cork productions to be used as wine stoppers.

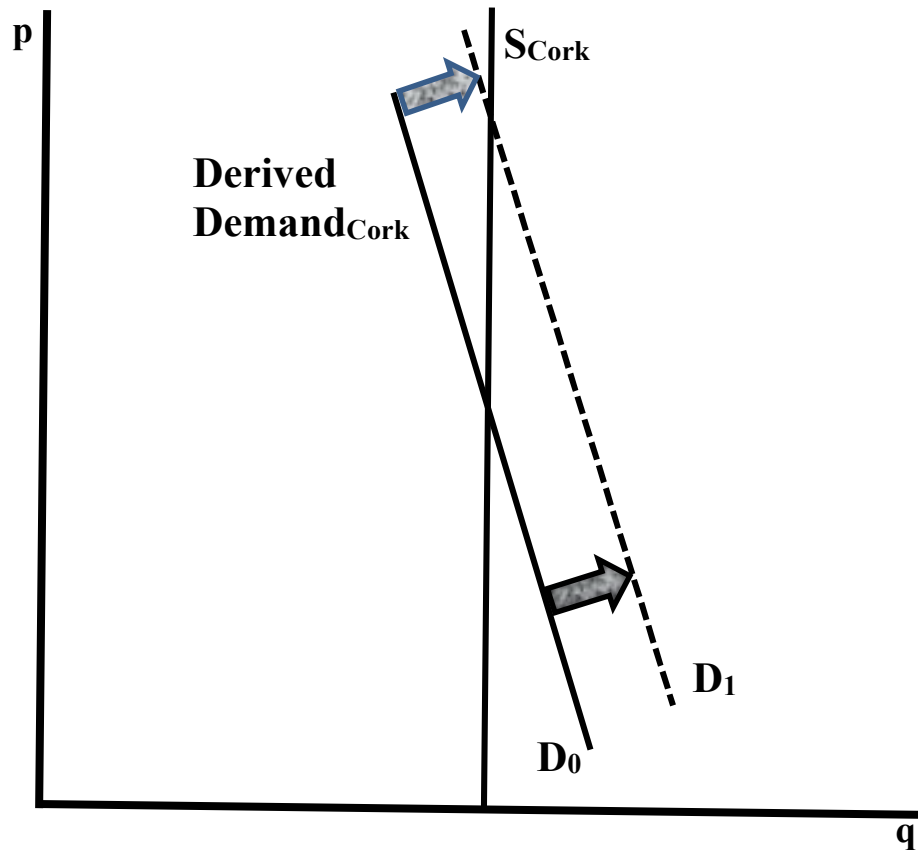
Thus, the market for cork is characterized by a totally inelastic supply – as shown in Figure 1. The supply of cork is not responsive to price in the short run. Supply can only increase if more trees are planted, with a lag of approximately forty-five years. Cork production also may not exhibit a decline in output as prices decline. For example, it is illegal to cut down cork oaks in Portugal except for trees that are no longer productive and only with permission from government forest managers (Barstow and Harvey-Brown, 2017; Diário da República, 2001). Further, bark should not be left unharvested.<sup>3</sup>

Cork harvests vary considerably due to weather conditions such as drought and heat, but not due to changes in prices. Hence, it is appropriate to depict cork supply as being price inelastic.

In the early 1980s there were few substitutes available for cork stoppers for wine. In markets such as those in North America, Australia and New Zealand only the lowest quality of wine was stopped with simple screw tops. The demand for cork stoppers for wine is a derived demand from the wine industry. Given the few substitutes at that time the derived demand for cork stoppers for wine was quite inelastic. In Australia, for example, cork stoppers accounted for ninety-five percent of the wine closure market Symons (2017) All of this suggested that prices in the cork market could be very volatile.

I also perceived that the derived demand for cork stoppers for wine was shifting upward at a relatively rapid rate as consumers in the US, Canada, Australia and New Zealand were broadening their tastes for alcoholic beverages from beer and spirits to include wine (Anderson, et al., 2017; Sumner et al., 2001). This represented a major shift in wine demand and, hence, the derived demand for cork stoppers. I surmised that “something had to give” as the price of cork increased. I simply did not, however, have sufficient information to write the paper.<sup>4</sup> I packed away the files I had accumulated and promised myself to return to the paper someday. That was more than thirty-five years ago.

Figure 1: The Market for Cork Circa 1986



### Wine's New Hope

I was correct, “something had to give.”<sup>5</sup> The source was a little surprising. With the derived demand rising, “Winemakers in Australia and New Zealand were unhappy about what they said was the inconsistent quality of cork stoppers ...” (Anon, 2011). It may be that Portuguese cork producers attempted to fill orders from far away, and relatively new markets, like those in the antipodes, with lower quality product. According to Bliszczyk (2017):

Those next in line for top quality cork were Europe's best and oldest winemakers, and at the back of the queue were secondary wine markets such as Australia, which found themselves left routinely with inferior product. This led to countless batches of wine being spoiled by bad cork.

As a result of lower quality, “[f]aults with a cork can allow too much oxygen into the wine, detrimentally affecting the aromas and flavours” (Antony, 2020).

Oxidation occurs through the ingress of oxygen into the wine bottle, either past or through the cork itself, allowing the wine to spoil. This produces a

very distinctive flavour easily identified by most consumers (Mortensen and Marks, 2002, p. 3).

While oxidation occurs as a result of the natural variability of a biological-based product, there do not appear to be reports of increased oxidization in other major wine producing regions lending credibility to claims that wine producers in the antipodes were receiving lower quality product. Any rise in the price of corks was not mentioned, only declining quality.

In any case, problems with cork quality led to a major effort to find alternative means of closing wine bottles among Australian wine producers. The perceived problem was that screw top caps had a strong association with low quality wines among both wine retailers and consumers. This was the case both within Australia and in Australia's export markets. The Australian wine industry wished to expand its export markets considerably and resistance to a move to screw caps was a major concern. To overcome this resistance required a change in the narrative regarding the desirability and efficacy of corks. Consumers (and others in the supply chain) needed to be convinced that they might have a bad experience with wine stopped with corks – and thus be more accepting of alternatives.

A second problem with corks is tainting resulting bottles being corked. Cork taint was first identified in 1981 (Sefton and Simpson, 2005). A substance known as TCA (2,4,6 trichloro-anisole) that can be found in natural cork is the main cause of corked wine (Mortensen and Marks, 2002). TCA is a mould that infects cork. According to Mortensen and Marks (2002, pp. 3-4):

Cork taint diminishes the 'fruit quality' in wine rendering it at best unappealing and at worst undrinkable. This type of mould is invisible and is not to be confused with the mould that one sees on top of the cork that occurs sometimes through minor leakage. Because it is invisible consumers naturally blame the wine and not the cork. This is a real concern for wine producers who are trying to protect their wine's reputation.

In fact, a wine that is moderately tainted is of most concern to wine producers. In this case, the wine tastes flat or uninteresting and the consumer understandably will often not consider the cork as the culprit. The consumer believes what they are drinking is representative of this particular wine and will base further purchasing decisions on this perception. A badly tainted cork emits a distinctly 'off' smell and in this case the consumer is more likely to blame the cork than the wine.

To change the narrative<sup>6</sup> consumers needed to be convinced that the blame for a tainted bottle of wine lay with a problem with corks and not the winemaker. A typical example of changing the narrative in the popular press is from the BBC (McAuliffe, 2017):

As a result of a tainted cork, the wine smells and tastes unpleasant - all musky and mouldy.

After the initial disappointment, you then have the worry of trying to get your money back from the wine shop or supermarket.

Or you may face an awkward conversation with a supercilious wine waiter, whose boss might not take kindly to reimbursing you, especially if it was an expensive bottle and the taint isn't too prominent.

Figures for how many cork-sealed wine bottles are affected by cork taint are hotly disputed, but a 2007 study put it as high as one in 10.

With reputations on the line, and money lost on wine tipped down sinks, it is not surprising that winemakers around the world are continuing to ditch corks for metal screw-cap openings on their bottles. So much so that cork went from sealing 95% of wine bottles globally in the 1990s, to just 62% in 2009.

The same article goes on to say:

Mr Taylor is managing director of Taylors Wines (known as Wakefield Wines in the UK), based in South Australia's Clare Valley. In 2004 it was the first major Australian winery to decide to seal all its wines under screw-cap.

"We were finding we had TCA and random oxidation problems with up to 10-15% of our wines, and we were able to eliminate that overnight," he says.

The message to consumers was: "You will have no risk of a 'corked' wine experience if you purchase wine with a screw cap."

Of course, if you were going to offer an alternative to corks, one would have to come up with one that was at least as good as corks – and preferably one that was an improvement. Once the decision to try and move away from corks was made, initially a number of alternatives were developed and tested. This included for example:

Synthetic corks: These are corks made out of plastic in the shape of a natural cork. While synthetic corks don't have any issue with TCA, there is a concern that the plastic might impart a slight chemical flavour into the wine. So they are not recommended for long term storage. They are also not environmentally friendly unless they are recycled (Antony, 2020).<sup>7</sup>

The other alternative was screw tops. The Australian industry eventually coalesced around the Stelvin screw cap. According to Mortensen and Marks (2002, p. 4):

The most significant threat to the cork wine stopper has been the Stelvin screw cap wine seal. Following the acceptance of a screw cap closure in use over spirits, liqueurs and aperitifs, a French manufacturer, Le Bouchage Mecanique (L.B.M.) decided in 1959 to develop a quality table wine closure that would replace the cork stopper. By the late 1960s L.B.M. had developed the "Stelvin" that was claimed to be at least comparable and in many

respects superior to the traditional cork product. The Stelvin was made of aluminium, was corrosion resistant, and had a treated and chemically inert wad facing that was completely compatible with wine.

The Stelvin appeared to be a major breakthrough. It delivered two major benefits - it eliminated the problem of oxidation and the risk of cork tainting. And, importantly, it still allowed the wine to develop over time.

In 1970 Australian Consolidated Industries (ACI) obtain the Australian right to manufacture Stelvin screw tops. In 1973, ACI enlisted the Australian Wine Research Institute into a testing and evaluation program for their screw tops. Wineries donated approximately 3,000 bottles of wine to be used in the evaluation (Mortensen and Marks, 2002). The evaluations were positive and between 1976 and 1980 twenty million bottles were capped using Stelvin screw tops.

Australian wine makers began to collude to foster the switch to Stelvin screw caps and to reduce the risk of being a lone winery to have switched.<sup>8</sup> According to Mortensen and Marks (2002, p. 10):

However, the most well publicised endorsement of the Stelvin seal occurred in 2000 when a group of prestigious winemakers made a pact, one that we will argue below was instrumental in crossing the chasm.

A group of 16 well-known Clare Valley winemakers made a joint commitment to bottle at least part of their year 2000 release of Riesling using the Stelvin closure. The group included Knappstein, Richmond Grove's Watervale Riesling, Mount Horrocks, Taylors and Jeffrey Grosset's Polish Hill. The Clare Valley group attracted widespread and international attention. Of particular note was the involvement of several well-known premium wine makers such as Jeffrey Grosset. In addition, ten of the Clare Valley group put together a 12-bottle collection of Rieslings, all sealed with a screw cap. This special offer was marketed through one of Australia's largest wine retailers and attracted considerable attention.

This, in turn, spurred wine makers in other countries to introduce screw caps. Foremost of these were wineries in New Zealand and the US (Mortensen and Marks, 2002). The move away from corks and to the use of aluminum screw tops spread across "New World" wine producers but was not much in evidence in the "Old World" industries. The ability to work together to foster the change likely lies in differences in industrial structure. According to Roberto (2003, p. 1):

There are substantial differences in the structure of the wine industry around the world. For instance, there are 232,900 wine producers in France and the top 10 brands control only 4% of the market. In contrast, four firms control over 75% of the Australian wine market. Overall, one can see a marked difference in industry structure when comparing the "New World" producers (e.g. Australia, Chile, United States) to the "Old World" firms (European producers). These structural differences are driven by



institutional heterogeneity and contrasting patterns of historical development.

Although the industry in Europe is highly fragmented, it still dominates the global wine market. Three countries, France, Italy and Spain, produce approximately fifty percent of production. For an individual winery in Europe to switch to screw tops is very risky given consumer resistance to alternatives to cork. There are simply too many competitors for consumers to choose from. In Italy, for a time, the government required certain qualities of wine be capped using corks.<sup>9</sup>

In Australia and New Zealand, the combination of wineries coming together to offer screw tops and heavy marketing meant that consumers were enticed into trying wines with screw tops – and were won over relatively easily. Antony (2020) reports:

If you want to start an argument between wine professionals, just mention a preference for cork over screw cap or visa versa. For many consumers in Australia or New Zealand, this may seem like a strange argument when around 90% of all wine sold in Australia is under screw cap (often known by the brand name Stelvin). It may seem logical to use screw caps as they're easier to open and reseal, whilst better preserving the freshness and aromas of a wine.

Although the transition was slower and less dramatic in the very large US market, screw tops made considerable inroads, including in some of the major US producers. The switch, of course, did not simply involve changing out corks for screw tops, bottles had to be re-designed and manufacturers, new machines installed and reliable supplies of the new metal stoppers secured. Despite these “switching costs”, by 2009 metal screw caps had garnered fifty percent of the market (Symons, 2017). Eventually, even a small number of European wineries made the switch, but the vast majority stayed with corks.

In the end, once it was clear that, while still evident, consumer resistance was less than had been feared, cost arguments also began to be heard. Roberta (1996, p. 24) reports: “These metal closures are also considerably less expensive than real or synthetic corks – as little as one tenth the cost in some cases.” The combination of lower costs and weakening consumer resistance led to the slow but persistent erosion of the global market share of cork. McAuliffe (2017, p. 2) states:

With reputations on the line, and money lost on wine tipped down sinks, it is not surprising that winemakers around the world are continuing to ditch corks for metal screw-cap openings on their bottles. So much so that cork went from sealing 95% of wine bottles globally in the 1990s, to just 62% in 2009.

In the arguments among wine aficionados about relative quality of wine stopped with corks versus wine stopped with metal screw tops, it was eventually conceded that for even higher quality wines there was no discernable difference for wines that would be consumed over the short run. In the case of wines that were to be “laid down” so they could mature, it was still argued that cork, with its “breathability”, which allowed small amounts of air into the wine over time, produced a better product. It is a contentious claim. In any case, only a very small proportion of wine is “laid down”. The argument remains largely unresolved.

Although the growing global wine market has helped the cork industry as it has been able to garner a goodly share of new markets, the switch to screw caps (and other alternative stoppers) clearly had a negative impact on the industry. By the turn of the century the prospects for the Portuguese cork industry appeared bleak.

### **Cork Strikes Back**

From the surge in wine consumption in the 1980s until the middle of the first decade of the twenty-first century the reaction of the cork industry was largely defensive in the face of the arrival and increasing adoption of screw caps and other alternatives to corks. They attempted to deny the degree to which taint affected wine. They worked hard at denying the advantages of screw tops. They played up the association of high-quality wine and cork stoppers among consumers. These strategies had some success among traditional European wine makers and consumers but were largely a failure among “New World” wine makers and their consumers both in their home markets and export markets. Some “New World” wineries segmented their markets using screw tops in their home markets but continued to market wines stopped with corks for export – particularly for European destinations.

While those who farmed cork, being relatively small operations, could do little to counteract the slow slide in the industry’s market share. There was some consolidation in the cork processing industry, however, particularly in Portugal.<sup>10</sup> As a result, the major cork processors began to tackle the problem that was a major impetus for foreign wine makers to switch to screw tops – 2,4,6 trichloro-anisole (TCA) residing on corks causing taint. A major effort was launched to be able to identify when TCA is present and to remove corks where it was found. Symons (2017) reports:

... the bigger reason is research to find new and better ways to clean cork and eliminate TCA, meaning far fewer tainted bottles. Portugal alone invested more than 700 million Euros in research and development over the past decade, resulting in new production methods that have greatly reduced issues with TCA.

Amorim,<sup>11</sup> for example, uses robots, lasers and ranks of chromatographic analysis machines to detect just a few parts of TCA per trillion. Very few tainted corks now make it through the new 'ND Tech' process.

McAuliffe (2017, p. 6) reports: "Progress in cork processing methods mean that some cork producers are now able to give guarantees, and traceability, to insure the drinker against increasingly infrequent "corked" bottles." According to Carlos de Jesus, Director of Marketing at Amorim:

Amorim is leading efforts to prevent any TCA infected corks getting into the system.

It does this using a process it calls "NDTech", whereby it uses hi-tech sensor machines to weed out any bad corks.

Mr de Jesus adds: "We can do that analysis not in minutes... but in seconds. We can now give an individual guarantee, cork by cork."<sup>12</sup>

McCombe (2010, p 66) reports that:

The result has been a marked reduction in the presence of cork taint, which was confirmed in a May/June [2009] edition of *Vineyard & Winery* magazine by Dr. Butzke, professor of enology at Indiana's Purdue University, who stated that "TCA was no longer a major issue from both a consumer and winemaker perspective".

The resolving of the cork taint issue should remove much of the incentive for wine makers to switch to screw tops and thus slow the loss of market share to alternative wine stoppers. The hope is also that removing corks infected with TCA from shipments will encourage some wineries to return to cork stoppers for their up-scale wines. In many cases, wineries would have preferred to continue to use corks but switched because of the costs associated with the incidence of corking in their wine bottles. By using corks, they did not have to contend with losing customers who associated screw tops with lower quality wine. Corks are acceptable to almost all consumers while screw caps are not. Of course, there are switching costs associated with returning to cork stoppers as different bottles are required and different machinery. The strategy appears to have had some success.

Auliffe (2017, p. 5) reports, for example, that Grgich Hills Estate in California's Napa Valley is now using corks for over seventy percent of its production:

Ivo Jeramaz, Grgich's vice president of grape growing and production, says: "These days our research points to three to five corks per 1,000 being affected by TCA, not three to five per 100, so it's far less than it used to be."

He adds that "top notch expensive wines" need natural corks, "just as you wouldn't drink it from a paper cup"

There does not, however, seem to be any indication of a “return to corks” in Australia or New Zealand.

The cork industry has also been working on changing the narrative. It has been doing this by portraying itself as being the sustainable option in the eyes of wine consumers. Cork is sustainable in that one does not cut down the trees when harvesting cork – the bark is stripped from the living tree that then regrows its bark layer over the next nine years. Cork also acts as a store of carbon and remains so even if it ends up in a landfill while decomposing and slowly releasing its carbon.

... the cork production cycle “contributes to the sustainability and preservation of an ecosystem, as well as to a better environment” .... In terms of the forest’s impact as a CO<sub>2</sub> retainer, the Portuguese forested area retains 4.8 million tons annually .... Furthermore, in a life cycle study conducted by Price Waterhouse Coopers, it was found that, compared to natural cork stoppers, plastic stoppers release 10 times more CO<sub>2</sub>, while aluminum screw caps release 26 times more than their cork counterparts .... It may even be argued, because of the CO<sub>2</sub> retention properties of cork trees and the conservation role of the cork industry, that cork production has negative aggregate CO<sub>2</sub> emissions. The same P.W.C study indicates that the figure could be as large as -147 kilos of emissions per 1000 cork stoppers ... (McCombe, 2010, p. 67).

Changing the narrative so that consumers (and wineries) come to perceive wines sealed with corks as the environmentally friendly option can have significant benefits. Wine makers wishing to market themselves as an environmentally conscious firm are likely to choose corks over the alternatives (McCombe, 2010). Further, large cork producers such as Amarim are actively burnishing the image of cork by:

partnering with the World Wildlife Foundation (WWF) to fund the “provision of free technical guidance to forest producers” .... Second, they are establishing recycling programs such as ReCork America, which is “focused on obtaining used and surplus corks from winery tasting rooms, bottling lines and quality assurance laboratories,” all in an effort to redirect used corks into the production new products and not into landfills .... (McCombe 2010, p. 67).

An example of the new narrative in the popular press – the BBC – is:

The Portuguese cork industry is also keen to stress its environmental credentials, particularly the fact that trees are not cut down to harvest the cork. Instead the cork is stripped from beneath the bark, and then grows back over a nine-year period.

Michael Colangelo, vice president of New York-based PR firm Colangelo & Partners, which is promoting Portuguese cork in the US, says: "Many people still don't understand the sustainability of cork, in that it's like

shearing a sheep - you don't kill the sheep to get the wool." (McAuliffe, 2017. pp. 6-7).

The efforts of the cork industry appear to have had some success in stemming the decline in its share of the wine stopper market, and possibly reversing the trend. According to Symons (2017):

The major wins for cork have been in Europe, China, and the United States. The US has bounced back to 60 per cent market share. China is going heavily cork as it's seen as more prestigious, with exports to that nation soaring by 22 per cent in 2016 alone. Many French wineries are also switching back to cork from screw caps. Laroche Wines made headlines in 2005 when it adopted screw caps for all its Chablis, including the high-end Grand Cru, but last year the winery giant went back to ND Tech cork stoppers from Amorim for all its finer wines.

This has been driven by consumer choice. A study by Nielsen Scanning Statistics found for the top 100 premium wine brands in the US, cork stoppered wines saw a 42 per cent increase in sales between 2010 and 2016, compared to just 13 per cent for alternative closures. They also commanded 39 per cent higher median sales prices.

According to Bliszczyk (2017):

... of the 36 billion bottles of wine produced worldwide each year, between 65 and 80 per cent of them are closed with cork, according to the UN's Food and Agriculture Organisation.

This is below the ninety-five percent of the closure market that the cork industry accounted for in the early 1980s, but a new equilibrium may be being approached after the shock to wine consumption arising from changing tastes in North America set the cork (and wine) industries on dynamic and interactive paths of adjustment.

## **Conclusions**

The wine and cork industries are both global in scope. The wine industry is dynamic and subject to major cultural shifts. The cork industry is dependent on wine demand and characterized by a very inelastic supply curve. As a result, changes in the derived demand for cork lead to volatile prices for cork. The increase in wine demand, that occurred as taste changes in North America and the antipodes evolved from cultures based largely on beer and spirits to ones that also included wine, led to problems with cork quality which spurred a search for alternatives to corks for stopping wine. New technologies and their adoption followed. A number of alternatives to corks were developed with aluminum screw tops becoming the most important. A battle for the perceptions of consumers followed as wineries tried to overcome resistance to screw

tops. New narratives were developed. The global market share of corks declined as more and more New World wine producers began using screw caps to stopper their wine.

This decline in cork's global market share led, in turn, to an attempt to reverse the decline in market share of corks. This dynamic response had two strategic elements: (1) finding a technological solution to reduce the incidence of "corked" bottles and (2) change the narrative so as to portray corks as the environmentally sustainable choice for wine stoppers. Both were successful as the decline in market share has been reversed. A new equilibrium may be being approached. Wine and corks are examples of the types of long-term dynamic interactions that can arise between industries. This dynamic interaction played out over forty years. Another major cultural shift in the wine industry is occurring as Chinese consumers are beginning to include wine in their purchases. One of the reasons for this shift in tastes is the perception that wine is associated with prestige. The cork industry will want to ensure that wine closed with corks is positively associated with the prestige that is being sought.

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## Endnotes

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<sup>1</sup> With no grant writing/chasing or training of graduate students.

<sup>2</sup> Now Aberystwyth University.

<sup>3</sup> It may be possible to reduce cork stopper output to some degree by shifting some cork bark to non-stopper uses such as cork flooring and insulation depending on market conditions.

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<sup>4</sup> I was also heavily involved in research and giving advice regarding the negotiation and implementation of the Canada-US Trade Agreement (CUSTA), the precursor of the North American Free Trade Agreement (NAFTA).

<sup>5</sup> The rapid increase in wine demand (and derived demand for cork) was not sustained as consumption in North America, in particular, tailed off to some degree (Sumner, et al., 2001). It was, however, sufficient to kick off a search for substitutes.

<sup>6</sup> See Yang and Hobbs (2020a) and Yang and Hobbs (2020b) for a discussion of the importance of narratives.

<sup>7</sup> There were also: “Amalgamated corks: These are made of cork pieces that have been pulverised and then treated to stop the formation of TCA. The pieces are reformed into a single piece, just like a regular cork, only better. These enclosures have all the benefits of cork with the reduced chance of TCA. One of the best known brands is Diam” (Antony, 2020). These alternatives to natural corks were introduced by the cork industry, in part, to overcome the inelastic supply of natural cork.

<sup>8</sup> The experience of some early adopters of Stelvin was a lesson learned regarding the risks of choosing to innovate alone: “Pewsey Vale Riesling sales took a hiding and the move to Stelvin almost killed the brand as a prestige product. Bowing to consumer pressure, the 1984 Pewsey Vale Riesling was returned to cork... “ (Bourne, 2000, p. 31).

<sup>9</sup> This ran from 1993 until it was somewhat relaxed in 2012.

<sup>10</sup> While Spain is the second largest producer of cork globally, it has a very large domestic wine industry which remains largely cork stopper based. Portugal, the largest cork producer, has only a small population and, hence, is the major exporter.

<sup>11</sup> Amorim is the largest cork processor in Portugal.

<sup>12</sup> As reported in McAuliffe (2017, p. 3).