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To my family, my girlfriend and my friends, who made this happen.

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1 Introduction

Wine is an experience. It is sensual. Wine can make friends, wine can make nights special, wine can make moments feel like eternities.

Although sometimes, wine cannot only be seen as a lifestyle product rather than an investment opportunity.

Wine is something most individuals are familiar with. It is part of our lives, our culture and our identity, especially in Austria and Europe in general. It is consumed and available at a broad range of prices.

Fine wine, on the other hand, is something not everybody buys, sells, or consumes, due to a lack of appreciation or interest in the subject.

Fine wine, however, serves a very interesting function, as an alternative investment, it can be placed in the same category as luxury watches, gold, precious metals, cars, fine art and beyond. Wine can be used as an interesting add-on to an advanced investment portfolio to diversify risk and serve as a long-term investment. If it has not produced a return at the end of the holding period, it can still be consumed with pleasure.

“The traditional approach was one of ‘buy two, drink one free’. Historically, it has been possible to effectively drink free by buying the wine in the primary market opener or in the secondary market at the beginning of a fine wine’s life, holding the wine until it becomes drinkable and then selling part of the investment in order to reduce the book cost to zero.”

(Kumar, 2005, pp. 2-3)

The level of curiosity, especially for highly rated wine, is increasing in Asia, where a new wealthy social class has gained interest in drinking and investing in fine wine to show its wealth and affiliation to a western-oriented upper class. Are there any other strategies to gain revenue by storing fine wine for decades in the cellar to wait for its maturity? Is speculation on a possible maximum rating, which then may increase to be sold afterwards for a larger amount of money, an alternative investment strategy, albeit a risky one? The research question of the thesis asks the following:

Do wine ratings of the most influential wine critics have an impact on wine prices?

My thesis is divided into three chapters. The first chapter explains the selection process of internationally renowned wine critics chosen for the purpose of this thesis. The next chapter reviews the existing literature, in which researchers applied different techniques to check, if ratings influence prices, while the third chapter shows the crucial reduction process of the data set and is the most complex, only looking at maximum rated wines by the selected critics. This reduction process is necessary to exclude other possible factors which may influence the price of fine wine besides the rating effect.

At this point, the research question is asked and conducted. This has been the main challenge of this thesis. This research question has been explored in previous studies using various methodologies, which have found that ratings drive up prices. As this has not been examined exclusively for wines that have received the highest possible rating, this thesis aims to explore this section of the market in more depth.

As I work in the wine industry, I have gained a deep understanding of the market and can therefore confirm that the results of the model are consistent with my observation that maximum ratings (for example in the case of Falstaff for the DACH market) influence the market.

However, due to the exclusion of some critics and platforms as a consequence of the reduction process, a general conclusion which states that maximum ratings of EVERY critic influence price cannot be made. I believe these limitations lend themselves well for future research studies.

With very little knowledge of wine in general (it may be sufficient if you know the very well known, highly rated wines and wineries), you may use the finding of this paper to make a profit by buying certain wine, storing it appropriately, watching the market as well as selling it at the right moment.

For me personally, it was an interesting and crucial experience to apply theoretical knowledge about the financial markets and pricing models to practical life experiences and to see how the two different areas go hand in hand.

2 Choice of Critics

Wine critics were not chosen arbitrarily; the choice was rather based on several factors. To conduct a meaningful study, it is essential that the chosen critics work with numerical scores, which excludes some of the very well-known individuals in the business, such as Hugh Johnson. Johnson's approach is different. He thinks that applying scores to wines isn't necessary or useful (Intardonado, 2006, para. 12-15). According to Johnson, he has "the impression that all good wine is a competition or a race [...]. Each good wine is trying to express something different. And that is not the same thing as competing" (McCoy, 2006, p. 171).

I also restricted the number of wine writers whose scores I used in my data sample. I chose six of the internationally most relevant individual critics or magazines.

In addition, I included a German-speaking magazine. In this case, using Google hits to assess the importance of each critic is not an accurate measure of their importance, since the words "*Falstaff*" and "*Vinous*" have several meanings unrelated to wine. I decided to focus on the number of wines tasted by the critic himself/herself or the platform that published the ratings. Each critic or critic's platform has more than 100,000 tasting notes and ratings from different regions as well as vintages from all over the world available online, which can be interpreted as reflecting profound knowledge. This goes hand in hand with the amount of time each critic has spent in the wine industry. Except for *Vinous*, which was not founded until 2013, all other critics or platforms have more than 40 years of experience in tasting and rating wine. I decided to keep *Vinous* with more than 145,000 tasting notes in the data sample as it merged with another critic, Stephen Tanzer, whose experience dates back to the mid 1980s ("Vinous to acquire Stephen Tanzer's International Wine Cellar", 2014).

Due to the above-mentioned reasons I based my analysis in this thesis on the following sources, which will be discussed below:

1. Robert Parker (*The Wine Advocate*)
2. *Wine Spectator*
3. *Decanter*
4. James Suckling
5. *Falstaff*
6. *Vinous*
7. Jancis Robinson

2.1 Robert Parker

2.1.1 Background

On July 23, 1947, Robert McDowell Parker, Jr. was born in Baltimore in the United States of America. Growing up in a small town called Monkton, with his parents being dairy farmers, Parker was never exposed to wine in his early youth. During these days Parker realized that his sense of smell was extraordinary like his father's (McCoy, 2006, pp. 5-7). The first wine that Parker remembers was a simple, ordinary wine, made by a mass producer, but his love of wine really started when he and his future wife, Patricia Etzel, made their first trip to Europe, to be more precise, to France (McCoy, 2006, pp. 8-15).

Next Parker attended college (where he studied history) and began exploring the wine scene using self-study, buying more and more books on wine, and tasting in groups with other like-minded students (McCoy, 2006, p. 16). After further studies Parker became a lawyer in Baltimore, but from the start, he was more inclined to the wine industry (McCoy, 2006, pp. 25-26). With the rise of a wine-interested middle class and subsequently a bigger market share of French wine in the US as well as an increasing body of literature and wine writers, Parker realized that many wine writers were as the preferably rated wines they would get a case of, after the rating.

As a consequence, Parker started a printed newsletter published twice a month called *The Baltimore-Washington Wine Advocate*, which he wanted to be an unbiased tool to help consumers choose wines (McCoy, 2006, pp. 69-70). As one of a small number of wine critics and wine writers, Parker traveled to Bordeaux at least twice a year after 1978. That gave him an incredible advantage over his peers as he was able to taste the new wines directly at the Châteaux. His first journey of the year was in March, when his wife and he tasted the wines in barrels before the *en primeur* prices were released (McCoy, 2006, p. 16).

In 1979, the newsletter was renamed *The Wine Advocate* ("The origins of The Wine Advocate", 2019, para. 3). With the 1982 vintage in Bordeaux, Robert Parker established himself as a trustworthy critic and taster as he praised the vintage more highly than any of his competitors and was totally right with his assessment, as this vintage came out as outstanding. Some of them even disagreed vehemently. For this reason, retailers started quoting Parker's ratings and tasting notes (McCoy, 2006, pp. 103-108)

In 1984 Parker abandoned his law career to concentrate fully on *The Wine Advocate* (McCoy, 2006, p. 111).

Robert Parker Jr. introduced the 100-point grading scale for wine in 1978 and was the first critic who used it long before it became common (Rivlin, 2006a, para. 12). McCoy (2006) explains the phenomenal effect the newly introduced numerical wine rating had on Americans:

“It was partly an emotional thing for Americans, who shared a collective memory of the scale from years of being graded in school. As a result, a score of 98 had an almost visceral impact; it evoked the same feeling of elation as seeing that score on an exam. A 79, by contrast, was synonymous with disappointment, with not making the grade, with your parents chewing you out for not working harder.” (p. 131)

Parker’s influence and reputation grew rapidly, which is mirrored in a questionnaire conducted amongst retailers about the most popular wine critic, a distinction Parker achieved long before the *Wine Spectator’s* critic (McCoy, 2006, p. 135). Besides, Parker was able to insure his most important asset: his nose. The company’s coverage for “loss of smell” was one million US dollars (McCoy, 2006, p. 140).

In addition to his newsletter, Parker continued issuing books on multiple wine regions including the Rhône, Bordeaux, Burgundy, and others. At the end of 1989 the famous critic had a seven-digit income annually (McCoy, 2006, p. 144). Though Parker always wanted to taste every wine personally, he realized that he was unable to cover everything and started building his team of critics in 1996, with the introduction of his first employee, Pierre Antoine Rovani (McCoy, 2006, p. 243).

Over time Parker’s fame grew immensely, which gave him the same standing in the international press as VIPs such as musicians, actors, athletes and royals. In 1997 Robert Parker was admitted to the French Legion of Honor for his service to French wine (McCoy, 2006, p. 245).

Parker is not free of criticism, as people accuse him of favoring a certain style of wine produced in a specific way: get the grapes as ripe as possible and harvest late, which increases alcohol and flavor as well as the quality of the tannins, intensify flavor by using grapes of higher quality and in smaller amounts, extend the time the wine spends on the skins, use malolactic fermentation for more roundness, don’t filtrate, fine or rack the wine, and keep it in (new) oak (McCoy, 2006, pp. 264-265). This creates a certain type of (red) wines which Parker rated highly during his active time. People started calling the process of wineries shifting to this

procedure to gain high scores “Parkerization”. Parker always denied the existence of this process but admitted that he favors a certain style of wine. The current editor in chief at *The Wine Advocate*, Lisa Perotti-Brown, MW argues that this trend was established by consumers, not by Parker. Her argument is that:

“[...] the region of Alsace has one of the highest percentages of wines rated 95-100 by Robert Parker throughout his career, at 14.2%. This is higher than Bordeaux (5.3%), California (10.9%) and the Rhône (6.5%). If Parkerization is purely a consequence of Parker’s high scores, why didn’t we see a massive upswing during the 1980s and 1990s in Riesling and Gewürztraminer plantings and thousands of Alsace lookalikes being produced?” (Perotti-Brown, 2018a, para. 15)

She argues that consumers were looking for a different style to invalidate the accusation of “Parkerization” (Perotti-Brown, 2018a, para. 15).

Parker withdrew in small steps, selling his stake in 2012 for 15 million US dollars, and announced his successor (Shaw, 2012a, para. 1). In 2015 Parker stopped reviewing Bordeaux en primeur wines and finally retired in 2019 (Woodard, 2019a, para. 1-9).

To be unbiased, all expenses are covered by *The Wine Advocate*. Enforcement is strict and prohibits the acceptance of gifts. The wines are tasted in big batches or at the wineries and are typically not served blind. For big tastings, samples are bought or requested from the winery (if necessary), while unsolicited samples are turned down (“The Wine Advocate reports and reviews”, n.d., para. 3-6). Over 450,000 tasting notes and ratings can be found on the homepage (“The Wine Advocate, RobertParker.com & Editorial Calendar”, n.d., para. 4).

2.1.2 Rating Scheme

As mentioned earlier, Robert Parker Jr. introduced the 100-point grading system. He didn’t want to use the 20-point scheme, as that provided too little scope for him (“TWA Rating System,” n.d., para. 2). The 20-point scheme will be explained in more detail later in this thesis. In McCoy (2006) Parker splits his grading into the following categories, which he gives points for “up to 5 points for color and appearance, 15 for aroma and bouquet, 20 for flavor and finish, and 10 for overall quality level or potential” (pp. 63-64). Each rated wine gets 50 baseline points, which then are added up with the points given by Robert Parker.

For insight into the strictness of Parker’s ratings, it should be noted that, after twelve years of tasting, which in Parker’s case meant approximately 100,000 wines tasted, only 19 wines were taken up into Olympus by being awarded 100 points (McCoy, 2006, p. 134). Two different versions appear in the literature, which differ in the following way:

Table 1: *The Wine Advocate* rating scheme¹²

“TWA Rating System,” n.d	(McCoy, 2006, pp. 63-64)
96-100: An extraordinary wine of profound and complex character displaying all the attributes expected of a classic wine of its variety. Wines of this caliber are worth a special effort to find, purchase and consume.	The top rank, 96-100, was reserved for “extraordinary” wines.
90-95: An outstanding wine of exceptional complexity and character. In short, these are terrific wines.	A wine that scored 90-95 was “outstanding”
80-89: A barely above average to very good wine displaying various degrees of finesse and flavor as well as character with no noticeable flaws.	A 80-89 score meant “very good”
70-79: An average wine with little distinction except that it is a soundly made. In essence, a straightforward, innocuous wine.	A 75-79 rating meant “above average”
60-69: A below average wine containing noticeable deficiencies, such as excessive acidity and/or tannin, an absence of flavor or possibly dirty aromas or flavors.	A 65-74 score stood for “average”;
	A 60-64 wine had “noticeable flaws”
50-59: A wine deemed to be unacceptable.	Below 64 “was to be avoided”

¹Source left column: “TWA Rating System,” n.d. Source right column: McCoy, 2006, pp. 63-64.

2.2 The *Wine Spectator*

2.2.1 Background

The *Wine Spectator* was founded by Bob Morrissey in 1976 and can be seen as the closest competitor to Robert Parker's *The Wine Advocate*. Initially, it focused on Californian wine (McCoy, 2006, p. 80). In 1979 the newsletter was sold to Marvin Shanken, who made the magazine very renowned (Laube, 2005, para. 8). Today's print edition, which is issued 15 times a year, reaches millions of readers around the globe ("About Us", n.d. (a), para. 2).

The *Wine Spectator* reviews wines which have been submitted by producers and importers. It also buys wines, if they have not been submitted and are considered "to be tasted" ("About Our Tastings," n.d., para. 3). The wines are tasted blind, while the number of wines tasted per day is limited to 60 per day per critic ("Tasting Format", n.d., para. 1). Expenses are paid by the magazine, including accommodation as well as travel costs ("Ethics Statement", n.d., para. 2-3). On the homepage (after the paywall), more than 385,000 ratings can be found ("Wine Ratings", n.d.).

2.2.2 Rating scheme

As the *Wine Spectator* wanted to compete with Parker, Marvin Shanken agreed in 1985 to implement the 100-point rating scale to be comparable with Parker scores ((McCoy, 2006, p. 147-148).

Table 2: The *Wine Spectator* rating scheme³

The <i>Wine Spectator</i> Rating Scheme	
95-100	Classic: a great wine
90-94	Outstanding: a wine of superior character and style
85-89	Very good: a wine with special qualities
80-84	Good: a solid, well-made wine
75-79	Mediocre: a drinkable wine that may have minor flaws
50-74	Not recommended

2.3 *Decanter*

2.3.1 Background

Founded in 1975, the British magazine represents the oldest consumer-oriented medium in the United Kingdom (“About”, n.d. (b), para. 1). It is focused on wines available in the UK (Veseth, 2011, p. 59). It can be described as the UK counterpart to the *Wine Spectator*. More than 40,000 issues are printed monthly (Resnick, 2008, p. 115). Compared to the American equivalent, the *Decanter* goes more into depth than into width regarding their ratings in each issue (Veseth, 2011, p. 127).

During panel tastings a maximum of 85 wines per day is tasted per individual. They are served blind (Decanter Staff, 2012b, para. 1-4). For the annual *Decanter* World Wine Awards, wines are served semi-blind, which means the taster has some information, such as the price range of the wine and its style as well as its region of origin. Producer information is omitted (Mason,

³ “Wine Spectator’s 100-Point Scale”, n.d., para. 1.

2021, para. 4). No information is available on unsolicited samples or how *Decanter* deals with compliance. The exact number of tasting notes is not stated on the homepage.

2.3.2 Rating Scheme

From 2012 on, the *Decanter* rated wines on the “classic” 100-point rating scheme. Before that it applied the 20-point scheme. To avoid confusing the readers and to make things clear and transparent, a conversion chart was developed (Mercer, 2016a, para. 1).

Table 3: *Decanter* rating scheme⁴

Decanter wine scores chart				20 pt score	100 pt score	Rating	Medal
STAR RATING	100 POINTS	MEDALS	20 POINTS				
Exceptional	100	Gold	20	20	100	Outstanding	Gold
Exceptional	99	Gold	19.75	19.75	99	Outstanding	Gold
Exceptional	98	Gold	19.5	19.5	98	Outstanding	Gold
Outstanding	97	Gold	19.25	19.25	97	Outstanding	Gold
Outstanding	96	Gold	19	19	96	Outstanding	Gold
Outstanding	95	Gold	18.5/18.75	18.75	95+	Outstanding	Gold
Highly recommended	94	Silver	18.25	18.5	95	Outstanding	Gold
Highly recommended	93	Silver	18	18.25	94	Highly recommended	Silver
Highly recommended	92	Silver	17.75	18	93	Highly recommended	Silver
Highly recommended	91	Silver	17.5	17.75	92	Highly recommended	Silver
Highly recommended	90	Silver	17.25/17	17.5	91	Highly recommended	Silver
Recommended	89	Bronze	16.75	17.25	90+	Highly recommended	Silver
Recommended	88	Bronze	16.5	17	90	Highly recommended	Silver
Recommended	87	Bronze	16.25	16.75	89	Recommended	Bronze
Recommended	86	Bronze	16	16.5	88	Recommended	Bronze
Commended	85	Commended	15.75/15.5	16.25	87	Recommended	Bronze
Commended	84	Commended	15.25	16	86	Recommended	Bronze
Commended	83	Commended	15	15.75	85+	Recommended	Bronze
Fair	82	null	14.75	15.5	85	Recommended	Bronze
Fair	81	null	14.5	15.25	84	Recommended	Commended
Fair	80	null	14.25/14	15	83	Recommended	Commended
Fair	79	null	13.75	14.75	82	Fair	Commended
Fair	78	null	13.5	14.5	81	Fair	Commended
Fair	77	null	13.25	14.25	80+	Fair	Commended
Fair	76	null	13	14	80	Fair	
Poor	75	null	12.75/12.5	13.75	79	Fair	
Poor	74	null	12.25	13.5	78	Fair	
Poor	73	null	12	13.25	77	Fair	
Poor	72	null	11.75	13	76	Fair	
Poor	71	null	11.5	12.75	75+	Poor	
Poor	70	null	11.25/11	12.5	75	Poor	
Faulty	69-50	null	10.75	12.25	74	Poor	
				12	73	Poor	
				11.75	72	Poor	
				11.5	71	Poor	
				11.25	70+	Poor	
				11	70	Poor	
				10.75	69	Faulty	
				10.5	68	Faulty	
				10.25	67	Faulty	
				10	66	Faulty	

⁴ Source left chart: Mercer, 2016. Source right chart: Decanter Staff, 2012.

2.4 James Suckling

2.4.1 Background

American-born James Suckling worked for the *Wine Spectator* from 1981 until 2010 and shaped it immensely (“Senior Editor James Suckling Retires from Wine Spectator”, 2010, para. 1). He did so by relocating himself to Europe (Paris and London), which gave him an in-depth view of the wine regions as well as increased accessibility to the wines he rated for the magazine (Lechmere, 2010a, para. 12). He launched his own website in 2010.

For his merits in Italian wine, Suckling was awarded a Cavaliere dell’Ordine della Stella d’Italia in 2017. Today Suckling resides variously in Hong Kong, Italy and California. He also works as a consultant for a large cruise-ship company as well as for a wine bar in Hong Kong. Suckling says he usually does not taste blind. Due to his long career in the business, 120,000 or more ratings can be found on his homepage (“About Us”, n.d. (c), para. 6-17).

2.4.2 Rating scheme

Starting during his time at the *Wine Spectator*, Suckling was a supporter of the 100-point scheme, which he still uses to grade wines, as he thinks that this is the most obvious and accessible approach (“About Us”, n.d. (c), para. 4).

Table 4: James Suckling Rating Scheme⁵

James Suckling Rating Scheme
95-100: (A+), it is a must-buy and a bottle that I want to drink in its entirety!
90-95: A wine that I rate 90 points or more is outstanding (A). It's a wine I want to drink a glass of and is an outstanding purchase.
88-90: If I rate a wine less than 88 points, it might still be worth buying but proceed with caution.
I certainly wouldn't recommend spending your money on anything rated lower (than 88).

2.5 Falstaff

2.5.1 Background

Falstaff was founded in 1980 by the journalist Hans Dibold and the profoundly experienced taster and journalist Helmut Romé. Romé sold his stake in the magazine to Wolfgang Rosam (Moser, 2016b, para. 2-8). The first issue of what can now be considered the leading wine, food & gourmet magazine in the German-speaking world had a printing of 15,000 copies. The change of ownership took place in 2010. Wolfgang Rosam and his wife are continuing to improve the magazine from day to day, leading to an annual total print volume of 150,000 today in Austria, Germany (introduction in 2010) and Switzerland (introduction in 2014) (“About Us”, n.d. (d), para. 2-4).

Their ratings include not only wines, but also bars, restaurants, hotels and cafés as well as wine shops (“Falstaff Verlags-GmbH”, n.d., para. 1).

On the homepage ratings can be found for more than 120,000 wines. (“Alle von Falstaff bewerteten Weine”, n.d.).

⁵ Source: “About us”, n.d. (c), para. 5.

No information was available regarding the tasting strategy (blind tastings, etc.) or concerning paid expenses, travel, etc.

2.5.2 Rating scheme

The team around Peter Moser, head of wine journalism at Falstaff, tastes the wines and rates them on the well-known 100-point grading scheme. Peter Moser describes his point of view regarding the grading scheme as follows: “Das übersichtliche 100-Punkte-System ist der praktische Kompass durch die Weinwelt” (“Mangelndes Wissen um Wein-Qualität lässt leicht zur falschen Flasche greifen: Falstaff-Punkte geben seriöse Orientierung”, 2020, para. 2).

2.6 Vinous

2.6.1 Background

Vinous was founded in 2013 by Antonio Galloni, whose wine-rating roots date back to 2004. After his introduction to the industry, he was hired by Robert Parker to rate the wines of various regions, including Champagne, Italy, California and Burgundy (“About”, n.d. (e), para. 2).

After Galloni, a former banker, declined to take over *The Wine Advocate* in 2012, he chose self-employment as a logical consequence by founding *Vinous* and stepped away from *The Wine Advocate* in 2013 (Woodward, 2013, para. 1).

In 2014 the tasting notes of *The International Wine Cellar* and the platform as well as all the ratings and tasting notes of the profound wine critic Stephen Tanzer were included in the *Vinous* database as a consequence of the other company’s acquisition. In addition, Neal Martin, the former lead critic at *The Wine Advocate* after Parker’s retirement, joined *Vinous* (Schatzker, 2018b, para. 1-2).

Vinous is unbiased, as the company rejects sponsoring, accommodation or the cost of travel. All expenses are paid by the company, though it can occasionally happen that a simple lunch or dinner is accepted by the staff to maintain high efficiency (Galloni, n.d., para. 3).

The individual wines are often tasted several times, partly at wineries, partly at tastings. The *Vinous* team also buys samples when necessary, because they have not been sent by the

winemaker or wholesaler on its own. As circumstances of the tastings differ, not all tastings are conducted blind (“Reference Materials”, n.d., para. 5).

More than 145,000 ratings and tasting notes can be found in the catalogue on the *Vinous* homepage (“Vinous Acquisition of Stephen Tanzer's International Wine Cellar - Frequently Asked Questions”, 2014a, para. 7).

2.6.2 Rating Scheme

Vinous argues that their choice of the 100-point scale is necessary to reflect an accuracy and unambiguity that can’t be achieved by a different system. But while the authors feel attached to this scale of grading, they also note that their tasting notes provide the reader serious, in-depth information that cannot be expressed by a single number awarded to the wine (“Reference Materials”, n.d., para. 3).

The tasting notes and ratings by Stephen Tanzer were included into the *Vinous* pool of ratings. There is general agreement on the grading, although it tends to differ a bit at the lower end of the scale.

Table 5: *Vinous* vs. International Wine Cellar rating scheme⁶

<i>Vinous</i> / Antonio Galloni	International Wine Cellar / Stephen Tanzer
96-100: Exceptional. A profound and emotionally moving wine that exemplifies the very best attributes of its kind. These are the world’s great, iconic wines.	95–100: Extraordinary
90-95: Outstanding. A wine of remarkable personality and breed that is well worth seeking out.	90–94: Outstanding
85-89: Excellent. A strong wine with true character that provides highly enjoyable drinking. This is the sweet spot for values and everyday wines that won’t break the bank.	85–89: Very good to excellent
80-84: Average. A wine with no flaws, but no distinction.	80–84: Good
75-79: Below Average. A wine with at least one noticeable flaw	75–79: Average
Below 75: Not worth your time	70–74: Below average

⁶ Left column: “Reference Materials”, n.d., para. 3. Right column: “Stephen Tanzer”, n.d., para. 3.

2.7 Jancis Robinson

2.7.1 Background

After studying mathematics as well as philosophy at Oxford University, where she started loving wine, Jancis Robinson made her entrance into the wine business. At the end of a long stay abroad she focused on writing about wine and food, which led to her first job at a British magazine (“Jancis Robinson – the long version,” n.d., para. 1-2).

In 1984 she passed the very difficult Master of Wine exam (“Jancis Robinson MW”, n.d., para. 1). In over 65 years only a few hundred people around the world have passed it (“Excellence, Interaction & Learning,” n.d., para. 1).

Robinson is known around the globe for her publications and her expertise. (Steakley, 2020, p. 18). Jancis Robinson has written a column for *The Financial Times* since 1989 (“Jancis Robinson”, n.d., para. 1).

Jancis also wrote for the *Wine Spectator* in the early 1990s. For 15 years, she curated the wine program as a consultant for British Airways. In 1994 she issued one of the most well-known wine books, *The Oxford Companion to Wine*, which is regularly updated. In the mid 2000s Robinson also started advising the Queen regarding her wine cellar (“Jancis Robinson – the long version”, n.d., para. 7).

Robinson receives the majority of the samples sent to her without requesting them. She “filters” the samples, as she is keen to write about interesting wines for her readership. Not all the wines are tasted blind by her and her team. Robinson is not completely dead set against lunch or dinner invitations, which in her opinion do not bias her ratings. On the other hand, she rejects invitations to other kinds of events. Robinson also notes that, sometimes, if no other accommodation is available, she accepts an invitation to sleep over at a winery. Regarding travel, she doesn’t accept invitations, and when there are exceptions, she mentions it on her homepage (Robinson, 2009a, para. 3-33).

Behind a paywall, more than 200,000 ratings and tasting notes can be found on Robinson’s homepage (“How we score”, n.d.).

2.7.2 Rating scheme

Jancis Robinson is known for using a 20-point grading scheme, which she applied from day one. Though she doesn't regard it highly as a means of assessing a wine, below is her grading scheme (Robinson, n.d., para. 1-2). The 20-point scheme for grading wine was introduced in 1959 by a professor at UC Davis ("What are Wine Scores?" n.d., para. 7). Initially, this system was intended to identify and single out faulty, badly produced wines (Gray, 2012, para. 18).

Table 6: Jancis Robinson rating scheme⁷

Jancis Robinson Rating Scheme
20 – Truly exceptional
19 – A humdinger
18 – A cut above superior
17 – Superior
16 – Distinguished
15 – Average, a perfectly nice drink with no faults but not much excitement
14 – Deadly dull
13 – Borderline faulty or unbalanced
12 – Faulty or unbalanced

⁷ "How we score", n.d., para. 1-2.

3 Literature Review

At the end of my literature review, I have been unable to find any papers, books or statistics that applied *regression discontinuity in time* in terms of the impact of expert ratings on wine prices. By expanding the research, I have been able to find a vast amount of literature dealing with the topic of the influence on wine prices in general, where subsections of the papers that I studied deal with the influence of critics in various ways. Other papers find influences on wine prices by critics, but they use completely different methodical approaches. Various methods are mentioned below, but with no claim to comprehensiveness. Hedonic regression approaches can often be found. This regression measures the impact of certain variables on prices. It is interesting to note that the minority of the issued papers worked with auction prices, instead of using wholesale prices or *en primeur* prices.

In one of the earliest research papers, Di Vittorio & Ginsburgh (1996) based their study of hedonic regression on 30,000 wines from auctions and found a clearly visible correlation between expert ratings and wine prices, though this study doesn't look specifically at the influence of ratings on prices. Their finding is consistent with Landon and Smith (1997), who focused on wines from the Bordeaux region with ratings from the *Wine Spectator*.

Jones and Storchmann (2001) found evidence that “[w]ine prices are also shown to be largely determined by the rating level they achieve” (p. 131). This evidence was analyzed using a hedonic model, which included auction price data of Bordeaux wines.

Schamel and Anderson (2003) also used a hedonic regression pricing model for wines originating from New Zealand and found a significant impact of ratings on prices by using ratings from local critics. The authors focused on a consumer-based point of view and the fact that an individual person is willing to pay more for highly rated wines. Regarding New Zealand wines, the results are in keeping with Bicknell et al. (2005), who showed the highly significant influence of the maximal rating of a New Zealand critic on wines from that country.

By looking at a single grape variety, Cabernet Sauvignon, from a single region (California) and from a single vintage, Miller et al. (2007) showed that ratings in their hedonic pricing regression are influential and increase the release price of the wine.

The well-known paper by Ali and Nauges (2007) found a small and limited, though significant, effect of the two American top dogs: Robert Parker's *Wine Advocate* and the *Wine Spectator*. The ratings of both publications influence prices. The findings were conducted using a GLS regression.

Ali et al. (2008) used a different method, again finding a positive (but small) influence of the ratings of experts on prices. This time a difference-in-difference model was used—due to the absence of Robert Parker at the *en primeur* tastings in 2003—so the author was able to compare 2002 as a year with a treatment (Parker rating) with 2003, a year without a treatment (no Parker rating).

Kugler and Kugler (2010) applied hedonic methodology to the Swiss market and find only a small positive effect that the ratings of Robert Parker have on Bordeaux wines specifically. In their findings, this was not true for Parker's rival, the *Wine Spectator*.

Friberg and Grönquist (2012) found evidence that, in the case of a positive wine review in a Swedish newspaper, demand for the reviewed wine increased significantly, while the contrary effect did not occur, as a bad review decreased demand for a certain wine. Staying in the Scandinavian countries and applying a hedonic regression model, the relatively unexplored field of sparkling wine in terms of academic research regarding pricing is explored by Bentzen and Smith (2008), who found evidence that expert ratings correlated with the prices of Champagne.

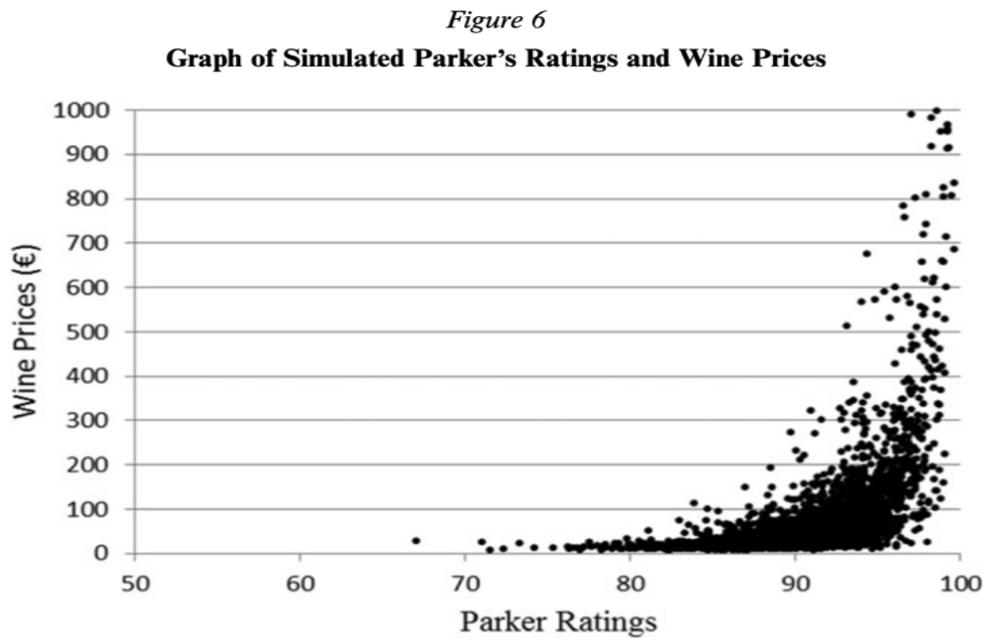
Cuellar and Claps (2013) found a positive relationship regarding the numerical rating in *The Wine Spectator* issues for Cabernet Sauvignon and Zinfandel, two red grape varieties from Napa Valley and Sonoma.

Oczkowski and Doucouliagos (2015) conducted a meta-regression on a large number of hedonic regressions used in papers in the past. All had the same objective, i.e. to explain the relation between rating (or quality) and price. The two authors found a small positive correlation, which was in keeping with earlier studies.

Masset et al. (2016) found a strong correlation between the ratings of the American taster Robert Parker and the asking price of the wine. Masset et al. (2015) found that high scores in *The Wine Advocate* could raise prices by up to 7 percent.

Cyr et al. (2017) once again found a correlation between (high) ratings by the critic Robert Parker and (high) wine prices of the Bordeaux region in a six-year ranging sample period. They found unequivocal upper tail dependence, which can be seen in the graphic, which shows the correlation between the wine prices and the ratings of Robert Parker.

Figure 1: Wine prices for given Parker points⁸



Also using the hedonic price model, Jen and McCluskey (2018) used observations from the *Wine Spectator*. The authors implied that not only the points mattered, but also particular wordings. As soon as certain keywords were found in tasting notes, significantly higher wine prices could be observed, whereas different keywords could lower the price of a wine.

Using a “simple” log-linear regression model, Babin and Bushard (2019) showed that *Wine Advocate* ratings (Robert Parker himself is not actively tasting anymore) influenced release prices of wines. The paper also showed that the price effect of the *Wine Advocate* ratings was greater than that of the *Wine Spectator* ratings.

Fried and Tauer (2019) applied a two-tier stochastic frontier to upgrade the classic hedonic pricing model. The data used samples of Riesling (a noble white grape variety of German origin) from the United States of America and again found the influence of expert ratings on wine prices.

⁸ Cyr et al. (2017) p. 263.

4 Data & Data Reduction

A highly critical point is the reduction of the sample to exclude potential covariates and make the data comparable. A short overview of the process is given in this paragraph, while, in the subsequent sections, each step is going to be explained in detail. Due to the large amount of data, certain observations from each critic are going to be excluded according to various restrictions.

The following process must be done manually, checking every individual wine to fulfil the qualifications, to enter the model and fit appropriately.

- 1) Only include maximum rating wines of individual critics
- 2) Wines from Bordeaux, France only
- 3) Red wine only
- 4) Critics vs. platforms
- 5) *En primeur* wines
- 6) Old wines
- 7) Rating time frame
- 8) Multiple maximally rated wines

4.1.1 Data Reduction

4.1.1.1 Maximum rating

The ratings of the individual critics can be found on the respective homepages. All the data used in this thesis was activated through (paid) subscriptions. To find the possibly greatest impact of the critic's ratings on prices, only the top-scoring wines were used. In the case of *The Wine Advocate*, the *Wine Spectator*, *Vinous*, James Suckling, *Decanter* and *Falstaff*, only wines that scored 100 points are included in the sample. In the case of Jancis Robinson, only the top-rated wines with 20 points are used.

New York wine-merchant David Sokolin raised an important issue for the sample data. As he mentions, Robert Parker used to publish "unofficial" tasting notes in *The Wine Advocate* print

edition back in the day, but they appeared only in certain publications of Parker (Sokolin, 2008, pp. 66-67). As the website <https://www.robertparker.com> brings together tasting notes from various sources written by Parker, we can ignore this issue, for the sake of the internet.

Worth mentioning is the fact that some wines were tasted a couple of times and upgraded to the “perfect score” and either remain at this status or were downgraded again. This is especially the case for Robert Parker. In the sample, it is not differentiated between wines that received the maximum rating multiple times by the same critic and wines that have been upgraded to the maximum rating or have been downgraded (again) after a maximum rating.

4.1.1.2 Wines from the Bordeaux region only

As the aim is to find price movements due to maximum ratings according to auction results, there is the need to find the most commonly traded wines in auctions. According to David Sokolin, this condition is satisfied by (red) wines from the Bordeaux region in western France as “[...] it is such a force in the market, representing the highest-volume, most accessible, most liquid and most profitable wine region anywhere. [...] Bordeaux is the region most tracked by reviewers [...]” (Sokolin, 2008, p. 39).

Furthermore, wines from this specific region have been chosen, as there is a long track record of quality and status of the wines (Taplin, 2019, p. 128).

4.1.1.3 Red wines from the Bordeaux region only

High-quality white and sweet wines from the Bordeaux region are excluded from the sample, as the volume of production doesn’t yield large enough quantities to provide sufficient data points. The noble-sweet wine of Château d’Yquem, which today is owned by the LVMH group, is also excluded (“Château d’Yquem, Sauternes Premier Cru - Wines & Spirits – LVMH”, n.d.). The decision to include only red wine was made for reasons of homogeneity, though d’Yquem could be referred to as a “liquid” wine with regard to its cases produced each and every year on average as well its continuity in appearance in auctions worldwide (Stimpfig, 2011).

Worth mentioning is the fact that Jancis Robinson’s sample included a large number of sweet wines, which had to be excluded.

4.1.1.4 Critics vs. platform

Before their self-employment, some of the critics used to work for other companies: in the case of James Suckling for *The Wine Spectator* from 1985 until 2010, or Antonio Galloni for *The Wine Advocate* from 2006 to 2013. Ratings published by their former employers are not allowed to be published on their new platforms. James Suckling did not start rating independently until 2010, though his earlier ratings are still available at *The Wine Spectator* homepage (behind a paywall).

As some publications or individual critics work with a team of professionals to rate wine from different countries or even regions due to the vast number of samples that need to be tasted and rated, it was necessary to differentiate in greater detail to further reduce the sample. Thus the individual persons who tasted and rated the samples are mentioned by name.

Starting with Robert Parker it seems clear that *The Wine Advocate* started as a one-man-show, and even the wording “Parker Points” clarifies that, in his case, it is about his person and not about *The Wine Advocate* as a publication. Years after the introduction of the format, however, Parker hired employees, who were in charge of covering certain geographical areas and winegrowing regions or countries. Even after his retirement the points awarded by *The Wine Advocate* are still called Parker Points.

This is completely different for the *Wine Spectator* as, from the early days on, a large team rated wines from all over the world, and consumers relied on *Wine Spectator* points regardless of the author of a specific rating. It should be mentioned, however, that a large part of the sample of red Bordeaux wines was rated by James Suckling.

The same holds for *Decanter* and *Falstaff*, as it is more about the publication than the individual critic.

As the name implies, this is again different for James Suckling, who works on his own, which means that the sample can't be reduced further.

Jancis Robinson works with a team of great tasters, though it is her publication, so we use only those ratings that were written by her personally.

Even though Antonio Galloni is the undisputed mastermind who founded the platform *Vinous*, the ratings are more about the platform than about the individual taster. For this reason, the sample from *Vinous* has not been reduced, as it is about the publication and not the individual critic.

In summary, the following restrictions apply: Wines not rated by Robert Parker personally for *The Wine Advocate* as well as wines not rated by Jancis Robinson herself have been dropped,

while the sample sizes for *Decanter*, *Falstaff*, James Suckling and the *Wine Spectator* remain constant.

4.1.1.5 No en primeur wines

The *en primeur* system in Bordeaux, gives the final consumer the possibility of buying wines that have not yet been bottled. This is basically the wine market's equivalent of the futures market in finance. In this case, the intermediary, the so called *négociant*, buys from the wine-producers and sells to wholesalers and retailers in different continents and countries, who then resell the wine to final consumers even before it is bottled. This is a relatively new phenomenon, which originated in the late 1960s when the châteaux took over the bottling themselves. Before this time, the *négociants* undertook this task. Basically, it has been their business to buy wines from the châteaux in bulk (in wooden barrels holding the volume of 225l – the well-known *barrique* – usually made from oak wood) and bottle and age the wine appropriately (Lewin MW, 2009, pp. 123-125).

Every single year, the final customers have to rely on the taste and experience of wine critics, who are able to taste the wines from the barrel. It is an educated guess whether the wine, when finally released, will be worth the price paid for it in the *en primeur* system. A suitable comparison for tasting and evaluating these wines is judging whether if a foetus is going to be highly intelligent.

For this reason, wines that were rated while they were still aging in barrels have been excluded from the sample. The *en primeur* prices are released after the very first published ratings by renowned critics. This so called “*en primeur*” week with the tastings of the wines from the previous year's harvest happens in March in Bordeaux, France (Ali et al., 2008, p. 159).

Our methodology wouldn't work in this case, as auction or even simple price data was not available before and after the *en primeur* rating.

For this reason, we only include ratings that were published at least three years after the harvest of the wine. Exemplary ratings for 2010 Bordeaux wines were included in our sample only if the rating was published in autumn 2013 or later, otherwise the RD methodology would not have worked.

4.1.1.6 No old wines

Continuing with the reduction of our sample, we exclude wines produced before the vintage year 2000. This limitation is necessary due to the existence of scarcity, as the number of bottles produced gets lower over time due to consumption of the product (Jones and Storchmann, 2001, p. 121). As Masset (2016) states, it seems understandable that “[o]ne expects a positive relation between age and price due to increasing scarcity and improvement in quality throughout the aging process” (p.12).

This holds especially for red Bordeaux wines, which are often abrasive in their youth because of the amount of tannin. This substance is extracted during winemaking by fermenting the grapes including their skins and sometimes even the stems and can be found in the skin and the seed (“Tannins | JancisRobinson.com”, n.d.). Macerating and fermenting extracts color and tannins whose concentration is especially high in the red wines of Bordeaux, which are made from the varietals Cabernet Sauvignon, Merlot, Cabernet Franc, Petit Verdot, Malbec, and occasionally Carménère (“Bordeaux blends | JancisRobinson.com”, n.d).

According to the facts mentioned beforehand, some wines from before the year 2000 cannot be considered old in terms of their aging potential and quality, but due to their declining amount traded due to consumption.

As the reduced *Wine Spectator* sample included mostly very mature wines from the late 19th century to the 1960s, no wines rated by this platform were left for consideration. The same applies to the reduced rating sample of Jancis Robinson, where which includes ratings for wines as early as 1893.

4.1.1.7 Rating time frame

In the next step the time frame of ratings for each critic or platform is individualized. The rating period is restricted and ends in 2018 for all wine critics. This is to give perfectly rated wines time to change either in an upward or downward direction. As auctions do not happen every single day (and the secondary wine market in general is quite illiquid), it is necessary to allow the wine prices to develop over quite some time after the rating (Masset et al., 2016, p. 1).

The logical year for starting the rating time frame is 2003, which is consistent with our assumption about *en primeur* wines as well as the assumptions in the previous paragraph. This has the advantage of including potential top ratings for the outstanding vintage in 2000 until the end of the chosen rating threshold (“2000 Vintage: Bordeaux,” n.d.).

The last year for *The Wine Advocate* is 2015 and for *Jancis Robinson* 2014, the last years in which top-scoring red wines Bordeaux were identified. Given our restrictions, no top-scoring wines were identified later than that.

James Suckling's rating time frame was from 2010 to 2018, 2010 being the year he founded his company.

The same holds for *Vinous*, which was founded in 2015. We included wines rated from then until 2018.

The *Decanter* sample only includes observations from the year 2018, as no earlier ratings that met our restrictions could be found online.

The *Falstaff* data extends from 2010 to 2018. No Bordeaux that met our restrictions was rated by *Falstaff* before 2010.

It is worth mentioning that the platforms providing the data sometimes state the date of tasting and the date of publication separately. We did not take a possible time lag between tasting and publication into account and only use the date the rating was published because the information was not available to the public before that date.

4.1.1.8 Multiple maximum ratings on same wine

As certain wines are tasted more often and rated on a consistent level, we exclude “double” ratings by the same critics. Some wines, however, were able to acquire a maximum rating from multiple critics. Only the first appearance of a maximum rating by a specific critic is included in the sample.

4.1.2 Auction Data

As the findings focus on the secondary market, well-documented auction data has been used. I tried to gather data from the three most prestigious auction houses, *Christie's*, *Sotheby's* and *Acker* (formerly known as *Acker, Merrill & Condit*). The choice relates to the number of sales in 2020 as well as the availability of data.

For these reasons Acker with sales in 2020 accounting to 125 million USD was given priority (“The World’s Leading Wine Auction House Acker Merrill & Condit Rebrands as ‘Acker’ Ahead of Bicentennial Anniversary - Wine Industry Advisor”, 2019).

Christie's is the second auction house whose data is included in the sample, though it was not possible to find the 2020 revenue of the wine department. Christie's lots were checked individually by me, as the search engine on the homepage works is not efficient or accurate enough to include lots automatically and produces low-quality results.

As Christie's holds live auctions around the globe, the lots are sold in a variety of currencies, including USD, GBP, HKD, CHF and EUR.

As auction result prices at *Acker* are always shown in USD, it was necessary to exchange the currency in which *Christie's* lots were sold into USD, to make the prices comparable and merge the data of the two auction houses. This was achieved by using the daily spot rates of the currencies, which can be found online easily via excelrates.com. ("Download historical exchange rates to excel", n.d.).

Both auction houses whose data is included in the sample for the corresponding wines present hammer prices including the online buyer's fee. That fee is constant in the case of *Acker* (24%) but varies in the case of *Christie's* according to the auction location (between 20% and 25%) ("Frequently Asked Questions - Acker Wines | Fine Wine Auctions & Wine Shop Since 1820", n.d.) ("Financial Information: Buying at Christie's", n.d.).

It is furthermore assumed that the buyers are informed about the fees and include this knowledge in their bidding strategy. Lots that were sold in GBP have been excluded from the sample as the majority of them are sold "in bond." This is common for original wooden cases ("OWC") bought en primeur and stored at a warehouse immediately after purchase. The term "in bond" indicates that neither the duty nor the VAT has been paid (Douglas, 2021).

Sotheby's offers multiple auction sales of wines and spirits each year, but was excluded as the data (lots with hammer prices) is not fully and correctly available either online or via direct contact.

4.1.2.1 *Acker*

Before its transformation into an internationally respected auction house and wine shop, *Acker, Merrall & Kondit* was founded as a package store in 1820.

The house has a short tradition of holding wine auctions, which started in 1998 in New York. The company's rise to the top can be partly explained by the inexistence of a fee on the seller side as well as its good feel for the market. The now renamed auction house *Acker* started auctioning early in Asia. Today *Acker* is the biggest wine auction house according to revenue

and operates online, in the United States of America as well as in Hong Kong (“About Us - Acker Wines | Fine Wine Auctions & Wine Shop Since 1820”, n.d.).

4.1.2.2 *Christie’s*

Founded in 1766 by James Christie, the British auction house with headquarters in London is one of the world’s leading auction houses, for both in-person and online sales (“About Us: The History of Christie’s | Christie’s”, n.d.).

Christie’s auction portfolio ranges from the fine arts and musical instruments to furniture, watches and carpets as well as wine and spirits and many other business areas (“Christie’s | Specialist Departments”, n.d.). Today auctions are conducted in various places including Hong Kong, Milan, London, New York and Zurich just to name a few (“Christie’s Salerooms & Offices | Christie’s,” n.d.).

4.1.2.3 Price comparison

The auction data is obtained from the *Christie’s* and *Ackers’* homepages and adjusted in the following manner: Using several sources, including wine merchants and research, only “full” lots are considered. In the wine industry, normal-sized bottles of fine wine are sold in wooden cases of 12 bottles each. The same is true of magnum bottles, which hold 1.5 liters of wine, except that they are usually packed in wooden cases of six bottles. The New York based wine merchant David Sokolin argues that these standardized lots “will be easier to trade and be more valuable to [...] buyers than a single 750ml bottle” (p. 113). The before-mentioned argument that wooden cases are more valuable is in keeping with the findings of Di Vittorio and Ginsburgh in 1996, who find that wooden cases have a small effect (3%) on higher prices when comparing the price per bottle from an OWC with a single standard bottle.

The same holds for larger formats, where concerns such as storage potential and availability apply (Di Vittorio and Ginsburgh, 1996, p. 5). “Half-standardized lots” containing six normal-size bottles or three magnums may also be bottled in wooden cases. In addition to the findings in the literature that magnums fetch higher prices than two standard bottles, a Wilcoxon signed-rank test was conducted representatively for all the wines that were left in the sample. Developed by Frank Wilcoxon in 1945, the non-parametric statistical test is able to detect differences in paired samples for n (Wilcoxon, 1945, p. 80).

The sample chosen is Château Latour 2000.

For the lots to be comparable in time, the respective lots of standard bottles and magnum bottles have to be sold on the exact same date. If multiple lots were auctioned on the same date, the highest hammer price including buyers' fees for the standard bottles and the lowest hammer price including buyers' fees for the magnums were taken into account. To make the samples valid, only data from one auction house (Acker) was considered to eliminate differences due to varying buyers' fees.

Table 7: Prices for standard bottles vs. magnum bottles / 2 for Châteaux Latour 2000 in USD⁹

Date	price per standard bottle	price per magnum bottle / 2
22.04.06	\$587.5	\$783.33
24.02.07	\$697.08	\$746.88
25.10.07	\$1,058.75	\$1,210.00
28.05.10	\$1220	\$1,321.67
16.10.10	\$1118.34	\$1,220.00
05.11.10	\$1,525	\$1,321.67
12.02.11	\$1,220	\$1,321.67
27.05.11	\$2,033.34	\$1,321.67
09.12.11	\$1,118.34	\$1,321.67
13.12.13	\$1,025	\$1,025.00
24.03.18	\$930	\$930
07.09.19	\$868	\$930
07.02.20	\$826.67	\$878.335
13.06.20	\$775	\$981.665
11.09.20	\$878.33	\$930
26.09.20	\$826.67	\$878.335
08.10.20	\$878.33	\$930
07.11.20	\$878.33	\$930

It can be seen in the table that, in two out of 18 cases, the price of a magnum bottle is equal to the price of one standard bottle. In two out of 18 observations the price of two standard bottles exceeds the price of a magnum. In the remaining 14 of 18 observations of the cases the price of the magnum is substantially higher than the price of two standard bottles. The same findings can be seen in the boxplot for the same data mentioned above.

⁹ <https://www.ackerwines.com/wine-analytics/?wine=2000%20Chateau%20Latour> (12.06.2021).

Figure 2: Boxplot for Châteaux Latour 2000 – standard bottle vs. magnum bottle / 2, in USD¹⁰



The same method of testing as before is applied to the data. The variables “price per standard bottle” as well as “price per magnum bottle / 2” can be interpreted as paired samples. A standard confidence level of 95% is used. H_0 says that the prices of a standard bottle and a magnum / 2 do not differ significantly. Conducting the Wilcoxon signed-rank test in R results in the p-value 0.02314, which is equal to 2.314%. As $H_0 < 0.05$, we find that our null-hypothesis does not hold, which means that prices of standard bottles and magnum bottles differ significantly. For this reason, auction prices for magnum bottles are omitted from our samples.

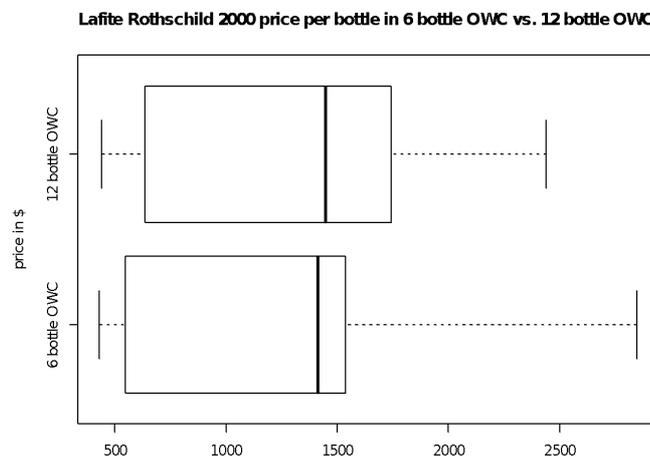
There are various reasons why magnum bottles fetch higher prices at auctions and on the wholesale market in general. First, wine that was bottled in magnums tends to age more slowly. This is due to the following reason: The bark of the cork tree doesn’t seal a bottle 100%. Continuous exchange of oxygen gradually occurs between the outside and inside of the bottle. The ratio of wine to surface exposure to oxygen compared to the liquid content of the bottle is better compared to standard bottles. In a magnum bottle the complex chemical processes happen more slowly. There is twice as much wine available to interact with the oxygen (Meltzer, 2004). Second, not every wine is sold in magnum bottles, and the sales volume is lower compared to standard bottles, which is due to lower production of large bottles. This obviously drives the price higher by creating a scarcity premium. Third, the cost structure is different because the bottling plant has to be shifted to the different sized bottles. Both this process, as well as the empty magnum bottles (cost of the raw material) are expensive (Outreville, 2013, p. 5). Additionally, special packaging (due to the different dimensions of the bottles) and shipping expense (according to weight, a magnum bottle is heavier either empty or

¹⁰ <https://www.ackerwines.com/wine-analytics/?wine=2000%20Chateau%20Latour> (12.06.2021).

full, compared to two standard bottles) differ from the standard procedure, and that adds extra cost (“Why would a magnum cost more than two regular bottles, but a split also cost more than half a regular bottle? | *Wine Spectator*”, 2014). Again, a Wilcoxon signed-rank test is conducted comparing the different sizes of the OWC – the original wooden cases, which consist of either six or 12 standard bottles. H0 for this test is that the price per bottle in the six-bottle OWC and the 12-bottle OWC do not differ significantly. The sample wine chosen is Château Lafite Rothschild 1990. If multiple lots of a 12-bottle OWC or six bottles are auctioned at the same time, the date is omitted to control for potentially falling prices in wine auctions, which was observed by Ashenfelter in 1989 (p. 30), the only observations included are dates, where only one six-bottle OWC and one 12-bottle OWC were sold. The p-value reported by the Wilcoxon test is 0.2495, which is similar to 24.95%. Due to the reason that $p > 0.05$ or 5% respectively with a 95% confidence interval, the null hypothesis cannot be rejected. This leads to the conclusion that the price per bottle in a 12-bottle OWC and a six-bottle OWC do not differ significantly, which permits us to include both lot sizes as data points in the sample. These findings can clearly be seen and interpreted in the boxplot below.

Figure 3: Boxplot for Châteaux Lafite 2000 - 6 bottle OWC vs. 12 bottle OWC, price per bottle in USD

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With this reduction of our sample and the assumption that all these lot sizes were sold in wooden cases, we can neglect other factors that can influence the price of wine in auctions, such as condition of the label, capsule as well as fill levels of individual bottles (“fill level | JancisRobinson.com,” n.d.). These factors mentioned beforehand can be summarized as the

¹¹ <https://www.ackerwines.com/wine-analytics/?wine=2000%20Chateau%20Lafite%20Rothschild> (12.06.2021).

provenance factor. Some sources mention a reduction for imperfect bottles of up to 20% of its value, especially in Asia ("What's in a price? - World Of Fine Wine", 2011). As every lot included in the auction at the respective auction houses is inspected visually, potential counterfeit bottles will not occur.

These assumptions allow us to calculate the same average price for each bottle in an OWC, which would not have been possible if the conditions of single bottles had been taken into account.

4.2 Model

4.2.1 Regression Discontinuity ("RD")

"Regression discontinuity (RD) analysis is a rigorous nonexperimental approach that can be used to estimate program impacts in situations in which candidates are selected for treatment based on whether their value for a numeric rating exceeds a designated threshold or cut-point" (Jacob et al. 2012, p. iii).

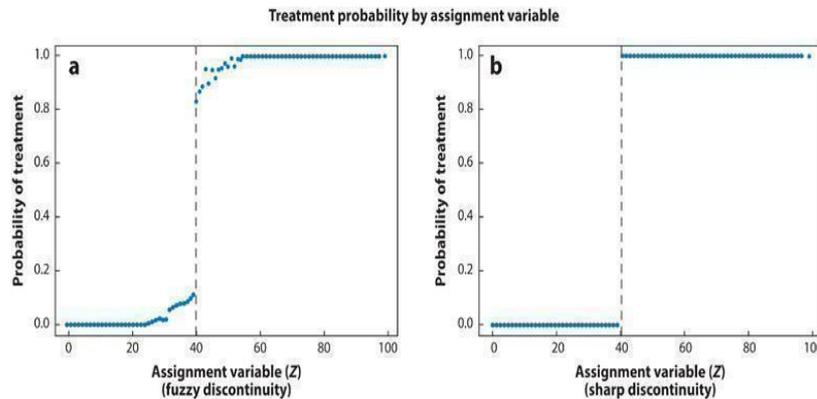
In 1960 Thistlewaite and Campbell for the very first time mentioned that equivalence before the treatment is necessary and therefore concluded that the change is because of the treatment (Thistlewaite and Campbell 1960, p. 309). This cutoff, or so-called threshold, assigns the given data points into "treated" and "not treated" (Cappelleri and Trochim, 2015, p. 152).

4.2.2 Regression Discontinuity ("RD") in Time

A special case of the RD design is the regression discontinuity in time. In this case, the regression discontinuity approach is extended, as instead of age, ratings, etc., time is the running variable applied in the x-axis (Hausman and Rapson, 2018, p.8).

The aim of our work is to find out if the auction prices shortly before and after the respective rating changed significantly. The first step is to find out if the data and the model are deterministic or not, in order to understand if a sharp regression discontinuity design (SDD) or a fuzzy regression discontinuity design should be applied.

Figure 4: Difference between sharp- and fuzzy regression discontinuity¹²



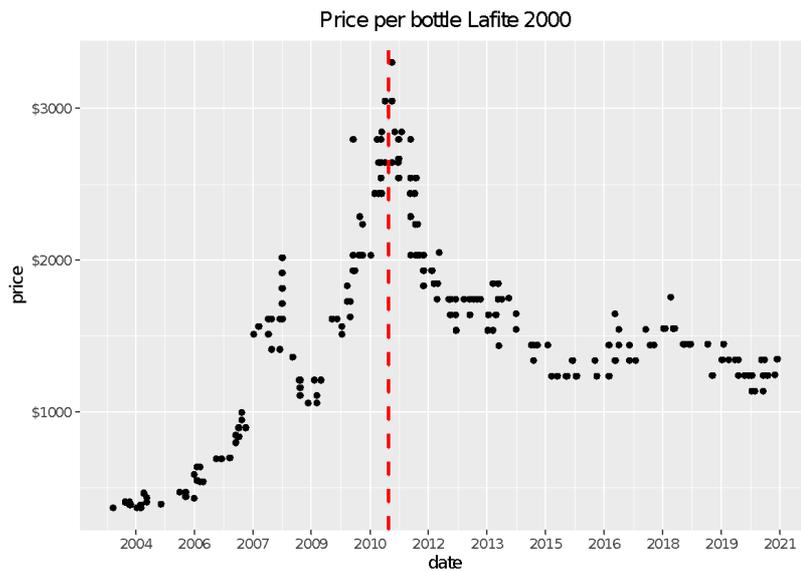
In a regression discontinuity framework, it is necessary, if that is not observable, to find out whether the data falls below the rating threshold or not, which is similar to randomization. This is given due to the unknown date of the rating beforehand (Hausman and Rapson, 2018, p. 6). The individual wine, which is “treated with a rating,” occurs only on one side of the threshold. Due to this fact it is clear that, in our case, the model is treated as a sharp regression discontinuity design, as the wine can only be rated or not. There is no possibility of just rating it “a bit”. As for the remaining wines the distribution between pre- and post-rating data points seems even; regression discontinuity in time is a proper option to use as the methodology (Chen et al. 2009, p. 588). Though Imbens and Lemieux in 2007 (p. 22) mention that it is possible to vary the binwidth in the pre- and post-treatment phase, a symmetrical time window was chosen in this case. As repeatedly mentioned in the literature, wine can be interpreted as an illiquid investment according to Masset et. al. (2016) as well as Fogarty (2005). For this reason, a delay in response of the market to the rating is expected. Further it doesn’t make sense to narrow the bandwidth down to 30 days because that would reduce the number of observations dramatically. *Wine-Searcher.com* is probably the most common wine price search engine on the internet. It asserts that “[w]ine prices react much more slowly to social and economic forces[...].” (“How wine prices change”, n.d.). For this reason and inspired by Hausman and Rapson (2018, p. 9), a bandwidth of two years before and after the rating, which is an ad hoc approach, is argued as follows. The further away the observations are from the rating, the more bias these outliers can induce in the results. Other authors mention that expanding the time window “is unlikely to add

¹² Craig et al. 2017, p. 18.

additional precision or validity” (Chen and Walley, 2012, p. 70). Further, we are also interested in the “short term-effect.” This goes hand in hand with the assumption of De Paola et al. (2013, p. 972), who mention that SDD (sharp regression discontinuity design) is used to measure effects close to the threshold. It is mentioned that additional covariates can be included, though it is not necessary. In the model here, no covariates are added, as no other factors drive the price of wine in as short a time frame as the given four years according to the assumptions and exclusion process. One of the only possible covariates could have been a price increase due to scarcity over time, which also can be neglected due to the limited bandwidth used. It possibly had to be included for larger time frames (Hausman and Rapson, 2018, p. 9). Once again, the number of wines has to be reduced if the number of data points is too small due to a lack of auctioned lots before or after the rating, or both. To be specific, in our case we require at least five auction data points, each before and after the rating of the critic respectively, as an ad hoc approach. Alternatively, the specific wine needs to be omitted if the rating took place before the first auction happened.

As mentioned in the literature, wine as an investment is not as volatile as alternative investments, such as stocks, but still reacts to crises and market movements (Masset and Weisskopf, 2010, p. 15). Consistent with the findings mentioned before, it can be seen that the crisis in 2007 and 2008 also affected the auction prices for certain wines in the sample. Overall, this is not a problem in general, though it matters whether the four-year observation period of a wine overlaps with the consequences of the crisis and its aftermath, as otherwise it can’t be assured that an increase or decrease after the rating of the wine critic is only due to the rating and not to the global economic situation. The influence of the financial crisis and the economic downturn can be clearly seen in the scatterplot below, where the vertical red line indicates the treatment date.

Figure 5: Auction data, price per bottle - Châteaux Lafite 2000, in USD¹³



This results in the elimination of wines, leaves the sample with eight wines remaining. Finally, the influence of the rating on the wine price is isolated, as all other possible influencing factors and confounders, which could have been controlled for, have been excluded within our reduction and assumption. With this argumentation the rating effect is causal on the auction price per bottle. The following formula is used to look for statistically significant findings for the remaining wines in the sample.

$$Y_t = \beta_0 + \beta_1 * date + \beta_2 * rating$$

In this model Y_t (the dependent variable) represents the price per bottle of a certain wine in the 2J time window. β_0 represents the intercept, while $date$ represents the respective auction dates over time. The statistical software includes the variable $date$ as numerical automatically in the regression model. The variable $rating$ can be interpreted as the rating by the individual critic, which is a binary dummy variable, programmed as $rating = 0$ at the time before the rating and $rating = 1$ at the time after the rating (Imbens and Lemieux, 2007, p. 3; Hausman and Rapson, 2018, p. 6).

$$x < t \rightarrow rating = 0$$

$$x > t \rightarrow rating = 1$$

¹³ <https://www.ackerwines.com/wine-analytics/?wine=2000%20Chateau%20Lafite%20Rothschild> (12.06.2021).

rating $\in \{0, 1\}$.

As Hahn et al. in 2001 show, the formula can be rewritten the following way: y_{1i} = price per bottle with rating, y_{0i} = price per bottle without rating.

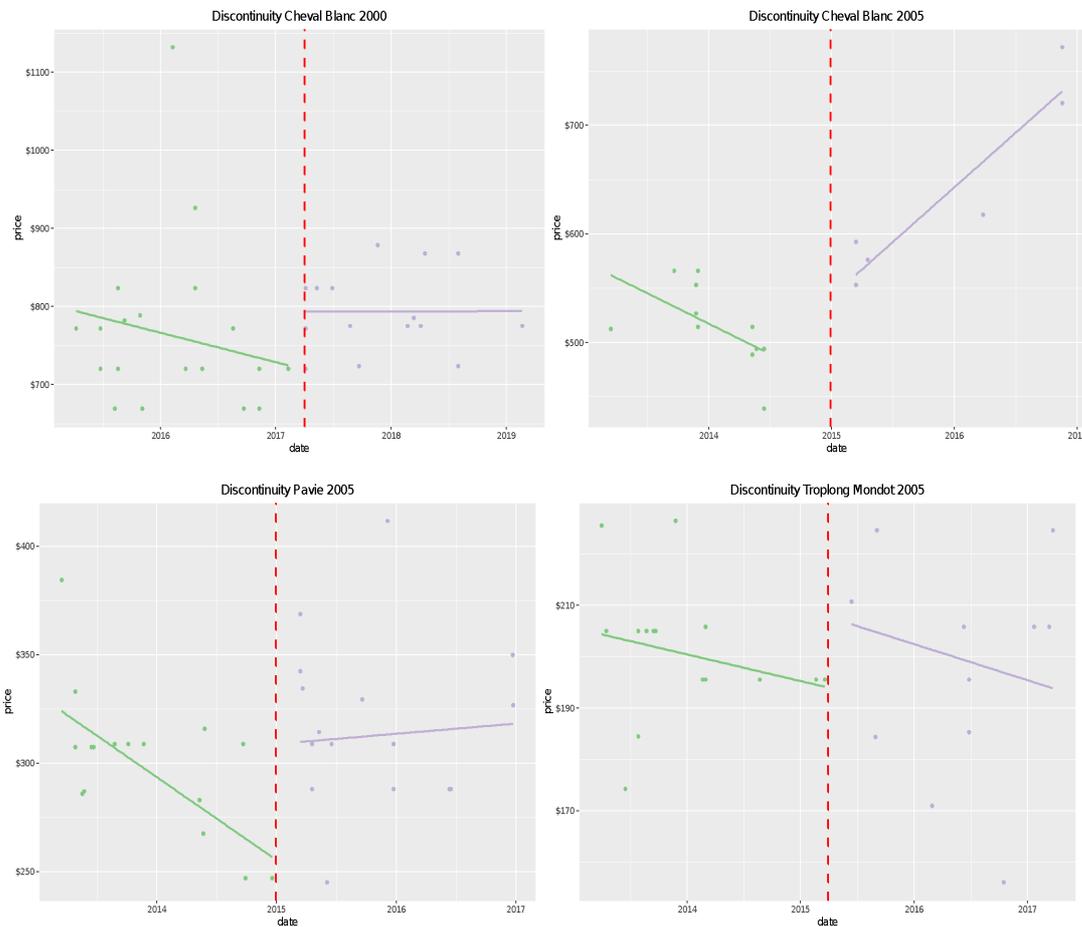
$$\beta_0 \equiv y_{0i}, \text{ while } \beta_1 \equiv y_{1i} - y_{0i}$$

4.3 Interpretation

4.3.1 Graphical representation of the RDiT framework

According to Lee and Lemieux (2010), graphs for the RD(iT) should be used to give a clear impression to the reader, while over-interpretation by the researcher, or even manipulating to produce a discontinuity effect, is not desirable. Applying a simple linear regression in R gives the following plots for the remaining wines. The regression lines are calculated separately before and after the rating to highlight potential discontinuity around the threshold. The first thing that can be seen clearly is the difference in time from the respective auction point before the rating of the individual wine, as well different time periods from the rating to the first auction data point afterwards, which may limit the model. Further it can be seen that the data points available vary tremendously from 12 to 43 observations within the two-year time frame before and after the rating by the critic. This is due to the irregular auctioning of the wines at Acker as well as Christie's. The four plots below show the exemplary representation of the data, with its findings and possible limitations.

Figure 6: Auction data for Château Cheval Blanc 2000, Château Cheval Blanc 2005, Château Pavie 2005 and Château Troplong Mondot 2005 with smoothed regression lines according to the regression discontinuity in time design, price per bottle, in USD¹⁴

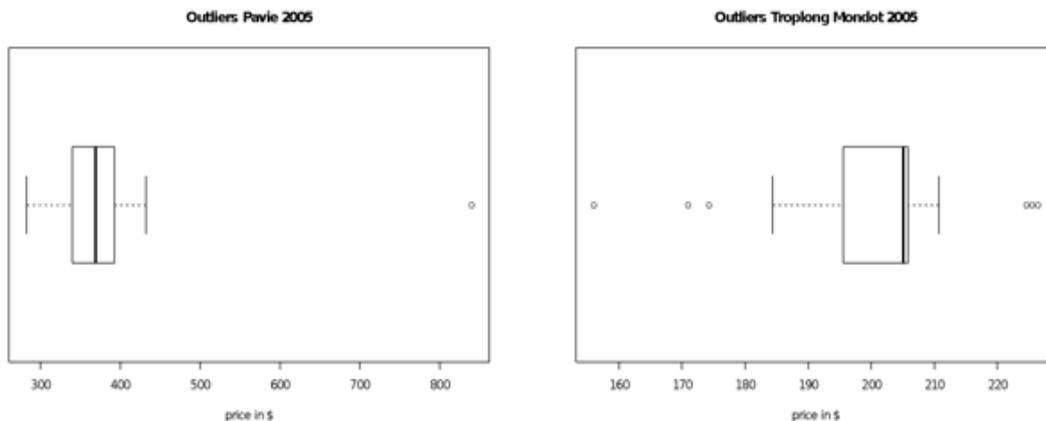


Statistical outliers can be detected, looking at the boxplots of the individual wines, which are left in the sample. This is only done for the wines with a very low adjusted R-squared, due to a potentially bad model fit. A single outlier has been found for Château Angelus 2005 and Château Cheval Blanc 2000 as well as Château Pavie 2005. A possible and scientifically researched explanation for outliers is so-called *auction-fever*. Ku et al. (2005) state in their paper that possible factors such as “time pressure, rivalry, social facilitation, and hype can all combine to intensify arousal and contribute to impaired decision-making, i.e., overbidding” (p. 101). This correction in the data improves the model for Château Angelus 2005 and Château Cheval Blanc 2005, but reduces the significance level of the rating effect for Château Pavie

¹⁴ <https://www.ackerwines.com/wine-analytics/?wine=2000%20Chateau%20Cheval%20Blanc> (12.06.2021).
<https://www.ackerwines.com/wine-analytics/?wine=2005%20Chateau%20Cheval%20Blanc> (12.06.2021).
<https://www.ackerwines.com/wine-analytics/?wine=2005%20Chateau%20Pavie> (12.06.2021).
<https://www.ackerwines.com/wine-analytics/?wine=2005%20Chateau%20Troplong%20Mondot> (12.06.2021).

2005. For Château La Mission Haut Brion 2005 as well as Château Troplong Mondot 2005 multiple outliers have been detected by the test. Both variants can be easily detected in the boxplots below.

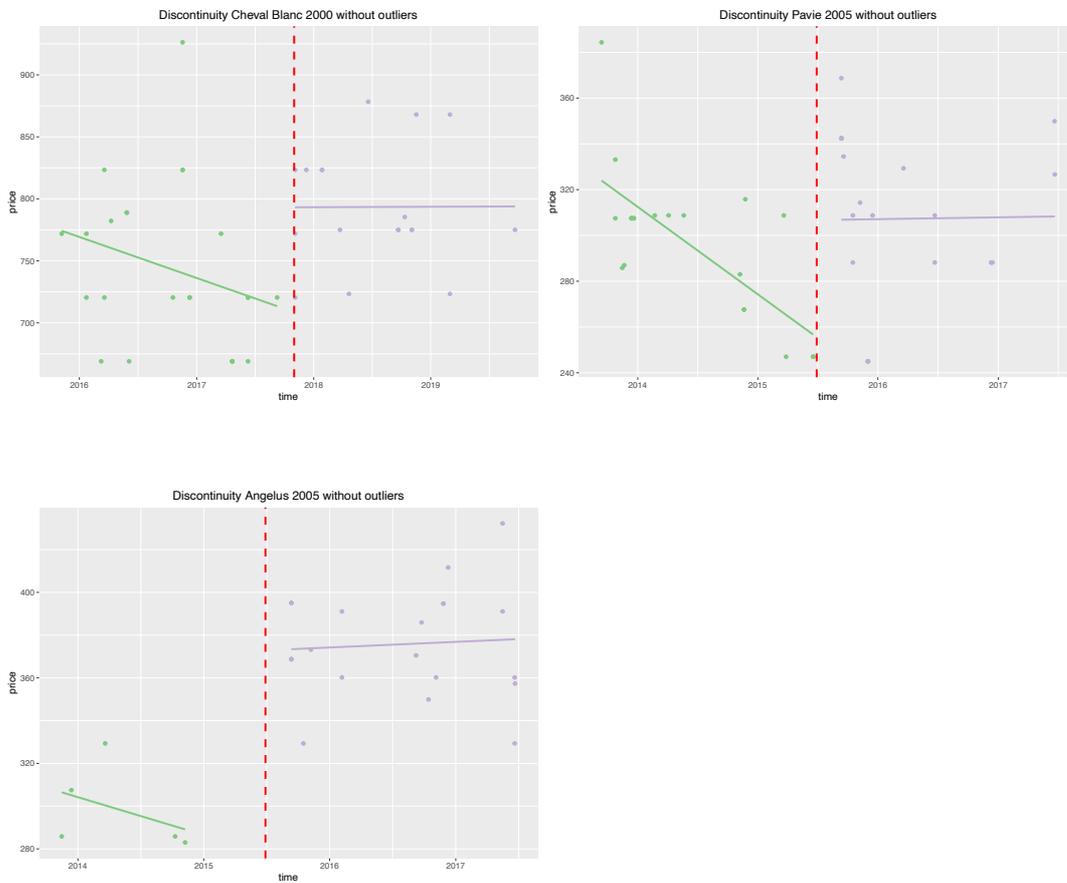
Figure 7: Detection of outliers using boxplots for Château Pavie 2005 and Château Troplong Mondot 2005¹⁵



Excluding multiple data points improves the adjusted R-squared, but simultaneously gives biased results due to even more missing data points. Carefully considering this trade-off, the exclusion of multiple data points is omitted, deductions regarding the low adjusted R-squared are accepted, but the data quality remains high. After this correction for outliers in the given cases, the data points are plotted again. Apart from Château Troplong Mondot 2005 the samples show at least a slight positive trend after the maximum rating of the critic. The intercept, which can be clearly seen with the two regression lines, is positive for all wines except Château Larcis Ducasse 2005, which shows a regression line after the rating below the regression line without the rating.

¹⁵ <https://www.ackerwines.com/wine-analytics/?wine=2005%20Chateau%20Pavie> (12.06.2021).
<https://www.ackerwines.com/wine-analytics/?wine=2005%20Chateau%20Troplong%20Mondot> (12.06.2021).

Figure 8: Auction data for Château Cheval Blanc 2000, Château Pavie 2005 and Château Angelus 2005 with smoothed regression lines according to the regression discontinuity in time design, without outliers, price per bottle, in USD¹⁶



4.3.2 Statistical interpretation of the RDiT framework

After the correction for outliers the regressions are conducted again. The regressions support the findings in the scatterplots before.

¹⁶ <https://www.ackerwines.com/wine-analytics/?wine=2000%20Chateau%20Cheval%20Blanc> (12.06.2021).
<https://www.ackerwines.com/wine-analytics/?wine=2005%20Chateau%20Pavie> (12.06.2021).
<https://www.ackerwines.com/wine-analytics/?wine=Chateau%20Angelus> (12.06.2021).

Table 8: Regression output, using the RDiT model¹⁷

Wine	Coefficient Estimate (β_2)	Pr(> t)	Significance level	Critic
Château Angelus 2005	95.07	0.0134	*	Robert Parker
Château Cheval Blanc 2000	82.78	0.023	*	Vinous
Château Cheval Blanc 2005	79.95	0.00561	**	Robert Parker
Château Larcis Ducasse 2005	-63.75	0.0658	.	Robert Parker
Château La Mission Haut Brion 2005	17.96	0.576		Robert Parker
Château Pavie 2005	47.37	0.01158	*	Robert Parker
Château Troplong Mondot 2005	13.77	0.229		Robert Parker
Château Margaux 2000	326.5	0.046	*	Jancis Robinson

The significance levels are taken from the respective R regression summaries and are the following:

*** ≤ 0.001 ** ≤ 0.01 * ≤ 0.05 . ≤ 0.1

The majority of the sampled wines have a statistically significant increase in price, which is attributable to the rating of the wine critic as other influential variables have been excluded. Rather interesting is the exception, Château Larcis Ducasse 2005, which has a negative price impact due to the rating, which contradicts the findings in the graph. As the intention is to find a statistically significant impact in contrast to quantify the impact, only the significance level is discussed.

4.3.3 Wilcoxon-Mann-Whitney test

As the sample now is unpaired compared to the tests conducted before, it is necessary to use the Wilcoxon-Mann-Whitney test in this case. It tests the difference for means in the sizes in the pre- and post-rating period (Mann and Whitney, 1947).

¹⁷ Own calculation.

Table 9: Wilcoxon signed-rank-test results¹⁸

Wilcoxon signed rank test results				
	sample size	pre	post	p-Value
Château Angelus 2005				
Château Cheval Blanc 2000	26	21	5	0.0004387
Château Cheval Blanc 2005	42	24	18	0.002007
Château Larcis Ducasse 2005	23	12	11	0.0004927
Château La Mission Haut Brion 2005	12	8	4	0.0912
Château Pavie 2005	31	17	14	0.02751
Château Troplong Mondot 2005	43	22	21	0.06658
Château Margaux 2000	43	25	18	0.3871
Château Angelus 2005	21	7	14	0.0009639

Applying the Wilcoxon-Mann-Whitney test to the data sets, shows extensive coincidences with the regression applied before with slight changes. Using the standard 95% confidence interval, H_0 , which states that prices are significantly less before and higher after the rating, doesn't hold for Château Troplong Mondot 2005, Château Pavie 2005 or Château Larcis Ducasse 2005. For these wines, the method chosen states that prices don't differ before and after the rating of the critic. Conducting the Wilcoxon test, five of the eight wines of our sample differ (highly, according to the p-values reported) significantly in auction prices pre- and post-rating. While the regression model determines a statistically negative impact regarding the rating of Château Troplong Mondot 2005, the Wilcoxon-Mann-Whitney test has not been able to show a statistically significant positive or negative impact.

4.4 Summary

In this thesis, the question has been raised whether the rating of major wine critics, such as *The Wine Advocate* represented by Robert Parker, the *Wine Spectator* or other key players such as

¹⁸ Own calculation.

Vinous, James Suckling or Jancis Robinson impact wine prices by rating certain wines, with the maximum possible number in the critic's respective rating scheme. Subsequently the subsample of the rated wines (maximum score) has been further reduced by applying certain assumptions and explaining them in an understandable way, as the wine-market is complex and not simplistic. The restriction and reduction process includes assumptions like excluding old wine due to scarcity price increases or the choice of the corresponding wines from a certain region due to data availability. All these assumptions had to be made in order to isolate the effect of the rating as an influence on the price. The Wilcoxon test has been carried out to show that prices for magnum bottles differ significantly from two standard bottles and need to be excluded from the sample of the respective wine in order to avoid bias. The same statistical test has been executed to show that there is no price difference per bottle if sold in a six-bottle OWC or a 12-bottle OWC, respectively. A regression discontinuity in time framework is applied as a regression model, which is significant at (at least) a 95% confidence interval level for five out of eight wines and discussed visually and formally. Alternatively, a Wilcoxon-Mann-Whitney test has been conducted, which shows significant price changes before and after the rating for six out of eight wines.

4.5 Findings

As mentioned beforehand, a big issue of the data sets used are their irregularity and the difference in distance from the last pre-rating data point to the date of rating to the first post-rating data point. Even bearing in mind that the modeled data sets differ from each other, statistically significant results have been found in the majority of the cases. A rigid reduction has been necessary to ensure equal circumstances for the wines to isolate a possible rating effect. After interpreting the outcome of the model for the different sampled wines, the following can be stated. Do wine ratings impact wine prices? Yes, using a regression discontinuity in time model, it can be verified that (maximum) ratings of various critics cause a significant increase in prices for the majority of the samples in this thesis.

Unfortunately, due to assumptions as well as to the multiple restrictions imposed in the reduction process, some critics overall were eliminated from the sample. The final wines were rated by *Robert Parker*, *Jancis Robinson* or *Vinous*.

4.6 Further research

To improve the model, there are many possibilities. Improvement may be achieved by gathering more data points, eventually from wholesalers or wine merchants, whose data is available on a regular (preferably daily or monthly) basis. Individuals with good relationships in the auction scene may be able to gather auction data from companies that don't list these online in detail. If some data points are missing, an interpolation approach may be conducted. A larger number of data points makes it possible to narrow down the time-frame before and after the rating to achieve more robust results.

Furthermore, if the time intervals are regularly spaced, a time series approach may be conducted to forecast wine prices on a long-term basis after a rating.

This would broaden the choice of wines that come into question, due to price data availability, which has been lacking for a large number of maximally rated wines for various reasons, some of which have already been mentioned (e.g., due to their origin, or global interest in the product itself., e.g., noble-sweet wine).

As the research question in this thesis has been whether expert ratings have a significant impact on wine prices, a possible future research question may be to quantify the findings for individual critics. The dataset of wines also may be expanded to wines with 99 or 98 points, or even fewer, to calculate the quantitative effect for each group of points awarded and every critic.

All the possible future research questions can be examined separately, perhaps by using a combination of the proposals mentioned beforehand.

4.7 Conclusion

Our statistically significant findings using RD(iT) are in line with the subjective evaluation by industry experts. A well-known Master of Wine, Benjamin Lewin, argues that the whole industry agrees that (at least) Robert Parker has an influence on (Bordeaux) wines (Lewin, 2009, p. 145).

Parker's unofficial biography gives examples of the changes in prices especially after a 100-point rating: "The Mouton [1982] had come on the market at 170 francs in 1983 [...], but immediately after Parker gave the wine 100 points in February 1985, at that moment the prices went to 450, 500, and we rode it up to 750 francs[...]" (McCoy, 2006, p. 152). This was followed by a staggering price increase of a red wine, a cult Cabernet Sauvignon from Napa Valley, California, which had been awarded 100 points by Robert Parker. The 1997 vintages' price initially had been 125 USD, but it later fetched as much as twenty times that price in various auctions (McCoy, 2006, p. 274).

The findings in this thesis, that (maximum) ratings influence price are supported by various sources in the existing literature using different approaches. Masset et al (2016) and Kugler & Kugler (2010) also found a significant price increase (using retail prices in Switzerland) for some of the critics (including Robert Parker), which also have been cited in this paper. This is also supported by Taylor and Barber (2008), who state, according to their model, that wines that received high ratings increase in price. Regarding Bordeaux *en primeur* prices, which have been excluded in this paper, it is mentioned that, after a maximum rating by *The Wine Advocate*, the corresponding wine makers were able to achieve four times the price they received without the *en primeur* rating (McCoy, 2006, p. 252). This evidence is supported by Noparumpa et al. (2015) who state that future prices increased within a very short time frame.

Using the findings in this thesis and all the other papers quoted, the following investment ideas may be deduced: Buy young wines, which have been rated by well-known critics with scores in the high 90s and speculate on a possible re-rating of the wine and subsequently an upgrade to a perfect score, which, with a very high probability, will cause prices to increase. If the rating remains at the original high level without being upgraded, the wine still can act as a diversification and hedging tool in an investment portfolio (Kumar, 2005, pp. 2-9).

Though wine does not "produce" an annual income in the form of a regularly paid dividend, it still enjoys one advantage over other investment classes like bonds or stocks (Kumar, 2005, pp. 96-97). If prices decline or remain constant, it can still be consumed with great pleasure.

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Abstract

English

This thesis addresses the question of whether expert ratings have an influence on fine wine prices. For this reason, a selection of renowned critics in the wine industry has been made. Subsequently a selection of the rated wines was carried out and carefully reduced according to appropriate arguments to make data comparable. A regression discontinuity in time model was applied and interpreted visually as well as statistically. Further, a Wilcoxon test was conducted to check the results. The majority of the sampled wines shows that the rating has a significantly positive impact on the price, which is in line with previous literature.

Keywords: alternative investment, wine, fine wine, expert, auctions,

German

Diese Masterarbeit beschäftigt sich mit der Frage, ob KritikerInnenbewertungen einen Einfluss auf Fine-Wine-Preise haben. Nach der Auswahl der KritikerInnen wurden jene Weine mit der Höchstpunktzahl der jeweiligen KritikerInnen zu Rate gezogen und das Sample anhand entsprechender Argumente und Kriterien reduziert und verkleinert, um Fremdeinflüsse ausschließen zu können. Ein regression discontinuity in time model wurde

angewandt und sowohl statistisch als auch graphisch interpretiert und erläutert. Es zeigt sich für die Mehrheit der Weine nach dem Rating ein signifikant positiver Einfluss auf den Preis. Dies stimmt mit der bestehenden Literatur überein.