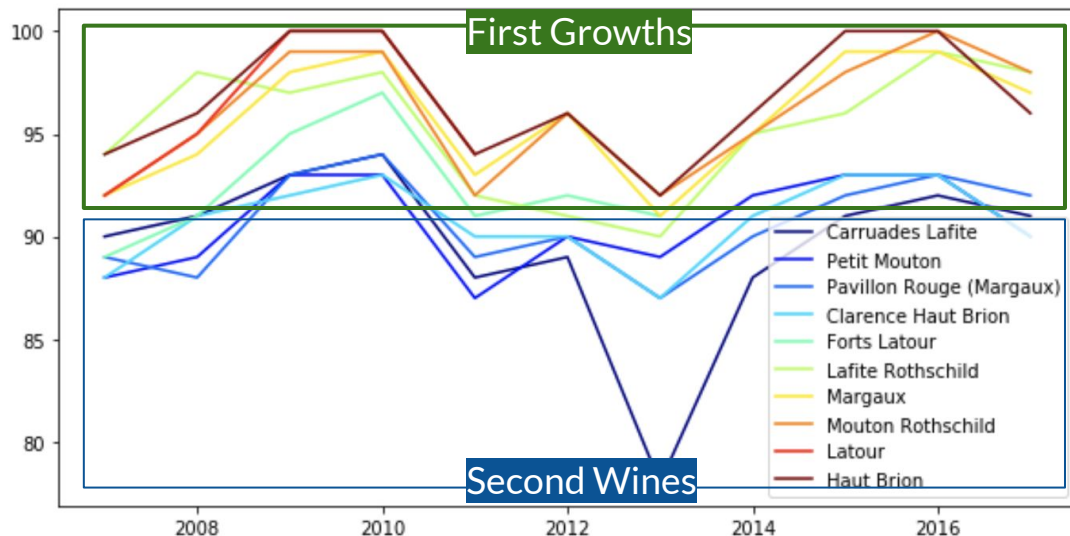

Data Overview



First Growths vs Second Wines



First Growths	
Haut Brion	96.7
Latour	96.2
Mouton Rothschild	96.0
Margaux	95.7
Lafite Rothschild	95.3

Forts Latour	92.3
Clarence Haut Brion	90.7
Pavillon Rouge (Margaux)	90.6
Petit Mouton	90.6
Carruades Lafite	89.5

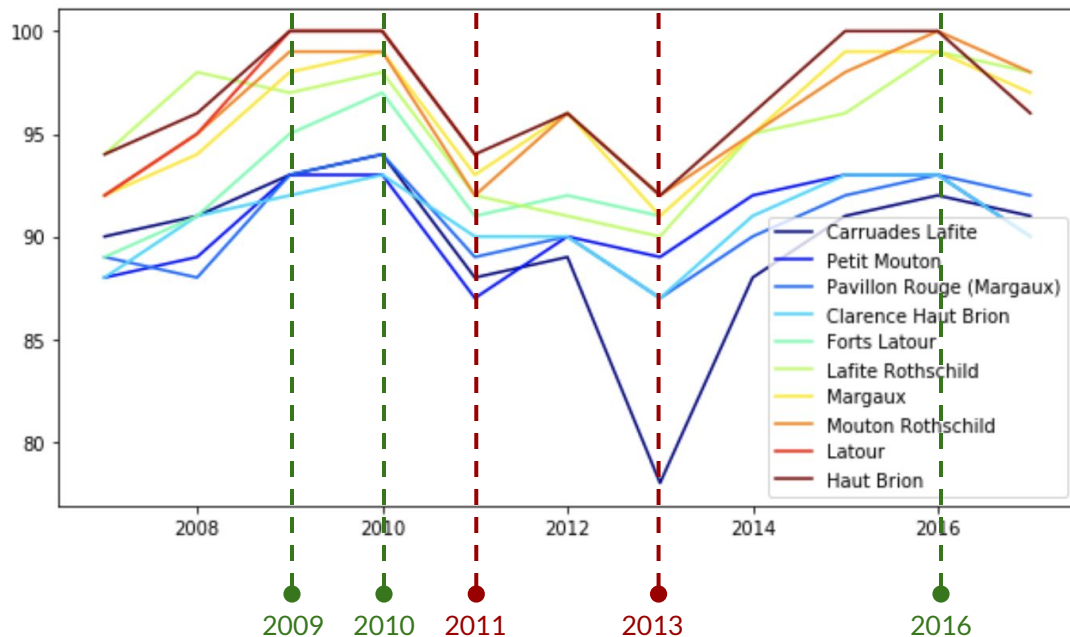
Second Wines

Generally, First Growth has higher scores.

* Latour left en primeur in 2012



Vintage Scores



Year Score

[(2010, 96.7),
(2016, 96.1),
(2009, 96.0),
(2015, 95.2),
(2017, 94.0),
(2008, 92.8),
(2014, 92.8),
(2012, 92.2),
(2011, 91.0),
(2007, 90.8),
(2013, 88.6)]

**2013's Prices
Compared with 2012**

Haut Brion:
-15%

Lafite 2013:
-14%

Mouton Rothschild:
-16%

--- Bull
--- Bear



Vintage Scores

First Growths

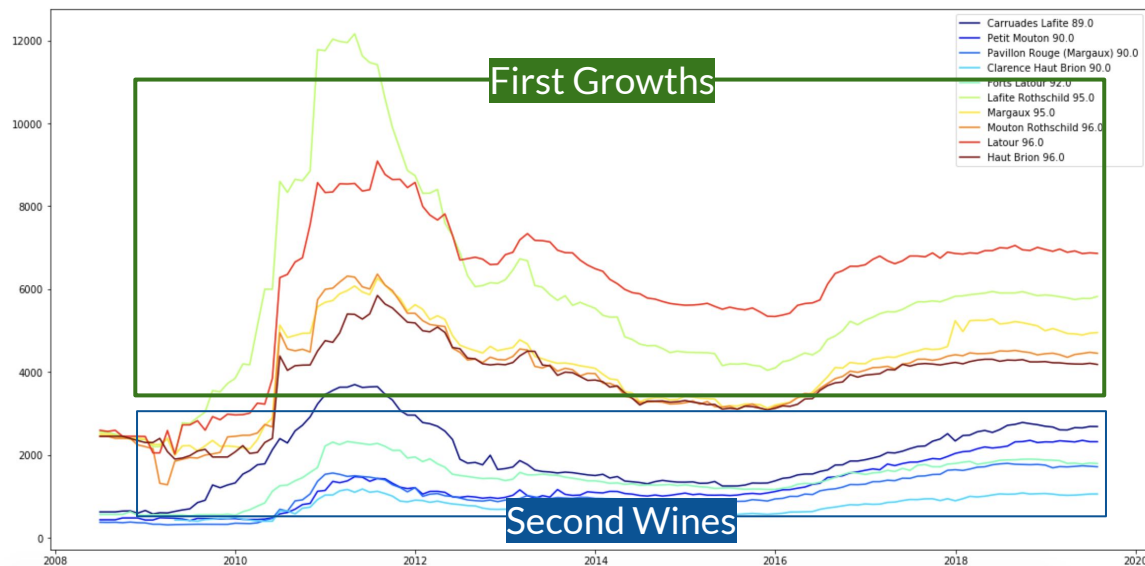
```
[ (2016, 99.5),  
  (2010, 99.2),  
  (2009, 98.8),  
  (2015, 98.2),  
  (2017, 97.2),  
  (2008, 95.6),  
  (2014, 95.2),  
  (2012, 94.8),  
  (2011, 93.0),  
  (2007, 92.8),  
  (2013, 91.2) ]
```

Second Wines

```
[ (2010, 94.2),  
  (2009, 93.2),  
  (2016, 92.8),  
  (2015, 92.2),  
  (2017, 90.8),  
  (2012, 90.2),  
  (2014, 90.2),  
  (2008, 90.0),  
  (2011, 89.0),  
  (2007, 88.8),  
  (2013, 86.4) ]
```



Trend Overview



First Growths:

- Prices are higher than Second Wines and more volatile
- All have higher std.
- As for Second Wines, Carruades Lafite has highest std 800.34.
 - Follow **Lafite Rothschild** std 2312.69

Scores can't indicate prices of the wines. Haut Brion has lowest average prices but it has best scores. Same for its second wine.



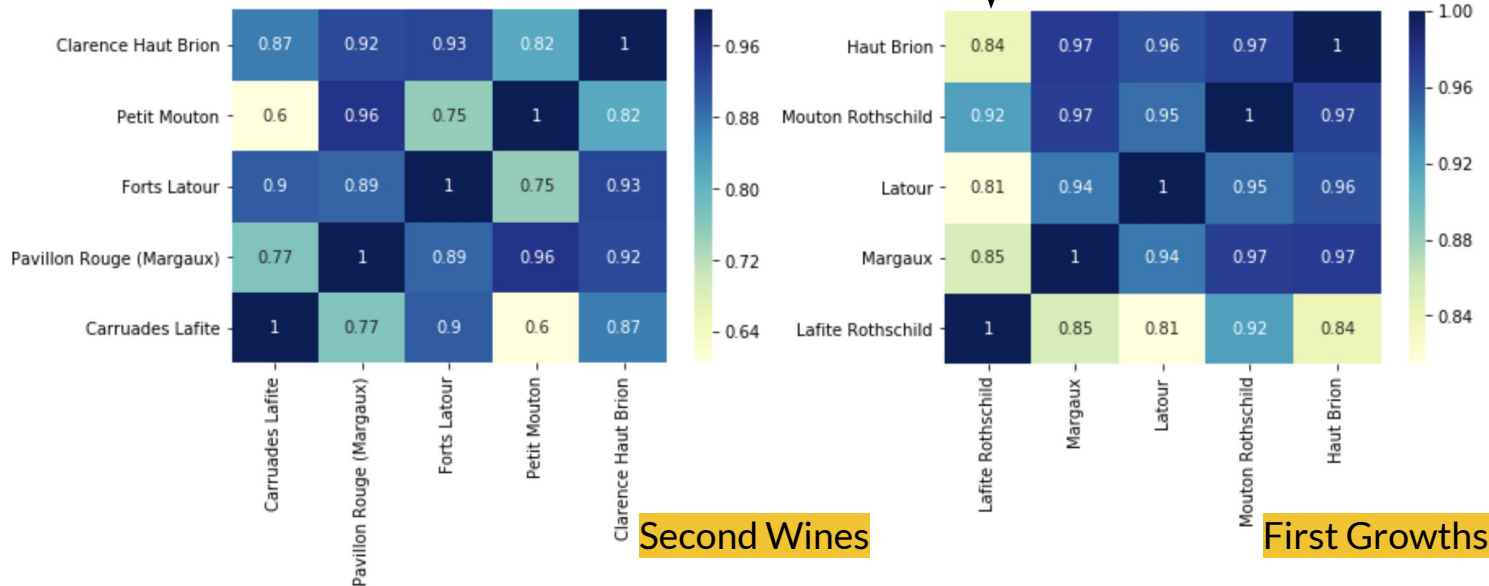
Second Wines Investments

reasons of investing second wines:

- I. Lower cost
 - II. Smaller profit margin
 - III. First Growth brand without the Grand Vin price.
 - IV. Easy entry point
-



Correlation Analysis



First Wines have higher correlation with each others, except for Lafite Rothschild
We will combine wines in each groups and perform the analysis. .



Correlation with its second wine

We expect the first growths have correlation with its second wines. If we want to invest in wines with same fluctuation as its first growths. We can select the second wines with higher correlation.

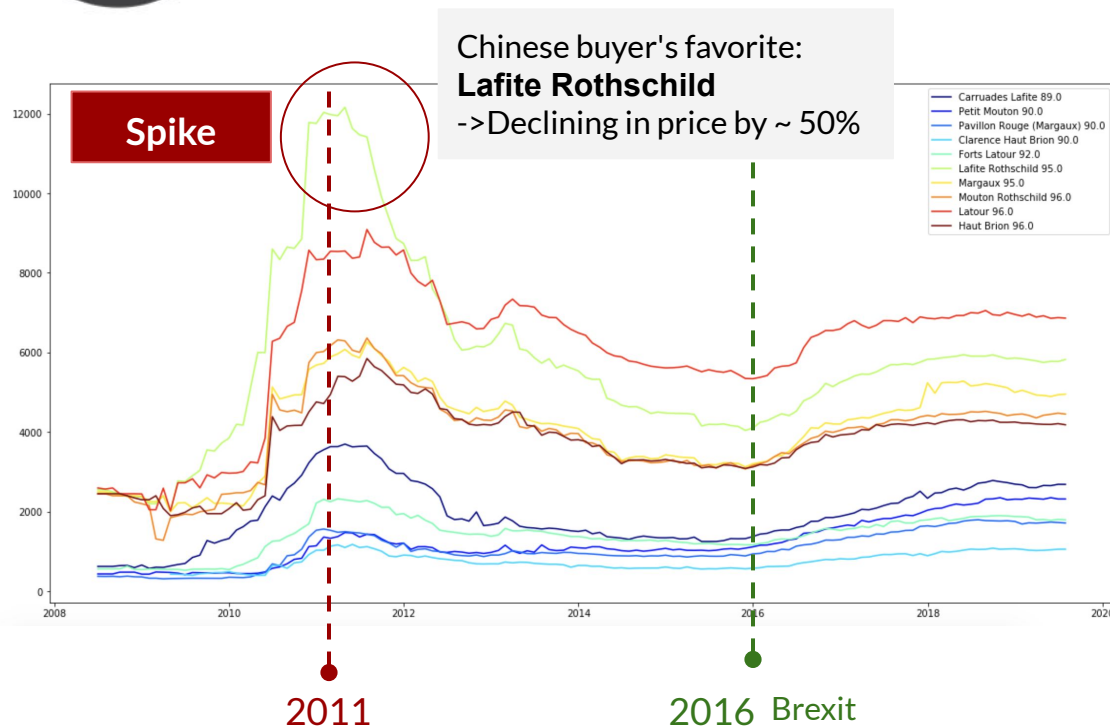
```
Lafite Rothschild Carruades Lafite  
(0.8996888901072726, 2.3337735045038907e-49)  
Margaux Pavillon Rouge (Margaux)  
(0.8190632890835016, 1.1820997866569127e-33)  
Latour Forts Latour  
(0.9530346472904997, 2.4298114182438203e-70)  
Mouton Rothschild Petit Mouton  
(0.5503666055583754, 5.627905420060863e-12)  
Haut Brion Clarence Haut Brion  
(0.8359403280518523, 1.3953475052684795e-33)
```

Note:
(Corr , P-value)

Bubble Detection



2011. Bubble Bursts



Before 2011:

Chinese buyers and others across southeast Asia helped lift prices to record highs starting in late 2008. "Chinese interest in fine wine, a popular gift among officials, steadily increases."

During 2012:

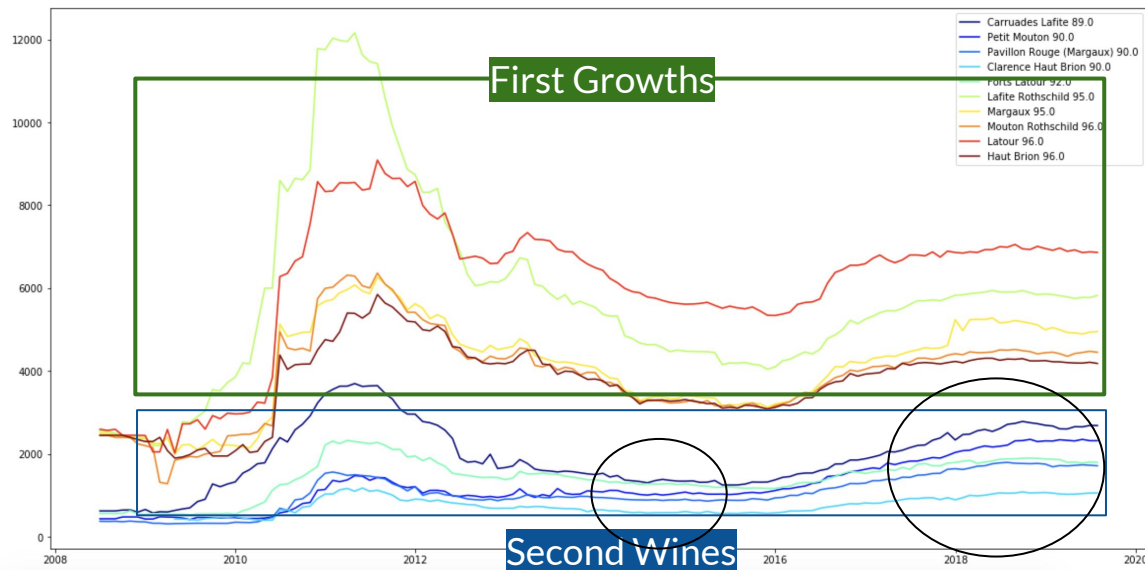
China announced a crack-down on gift-giving of luxury goods among government officials. Prices fell for a third consecutive year. According to Liv-ex indicators, the market fell 15% in 2011, followed by a 9% decline in 2012.

2011-2013:

Not outstanding years after 2009, 2010.



After 2011

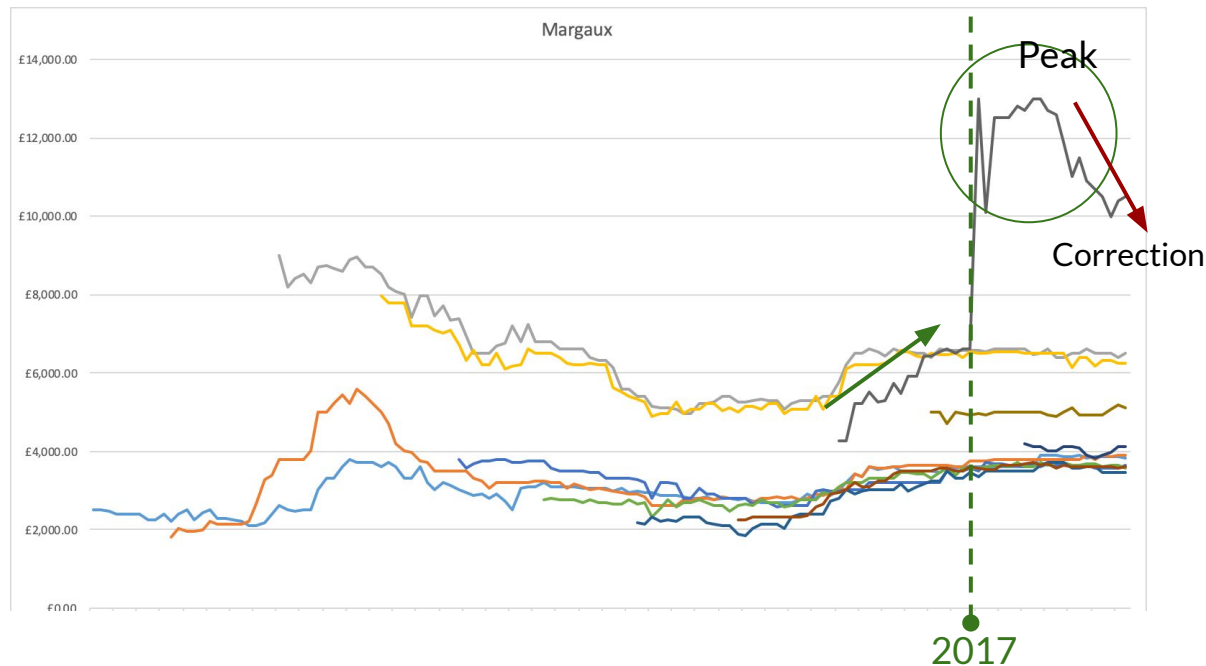


During the bear years(2012-2015), wines from the first growths had parallel trend, while second growths had smaller difference between prices.

After 2016, second growths started to diverge in price evolution.



Margaux 2015



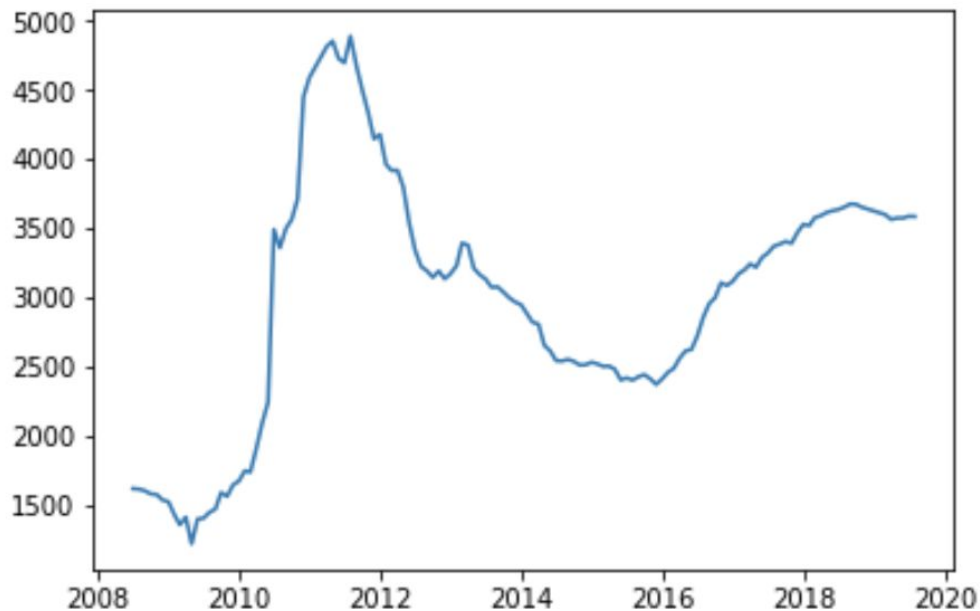
"The bottle is dedicated to the late Paul Pontallier. As well as being Pontallier's last vintage, 2015 also marks the estate's 200th anniversary."

The price for this wine skyrocketed in 2017. It went down for correction after 2018. Because of the doubling price, we consider it as a small bubble. However, it is acceptable for having higher price given its meaning and marketing strategies.

Price Behaviour

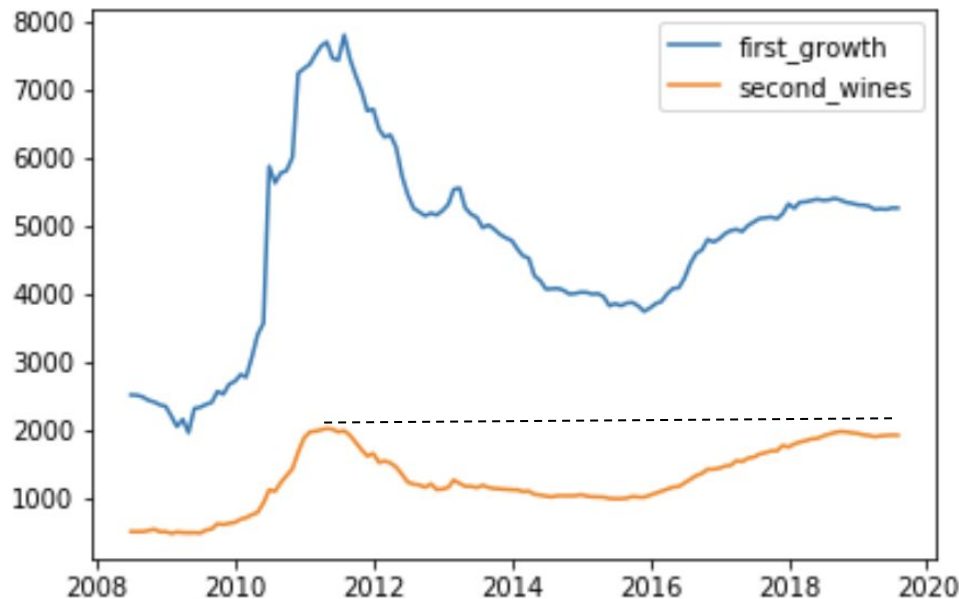


Market Trend Overview





First Growths vs Second Wines



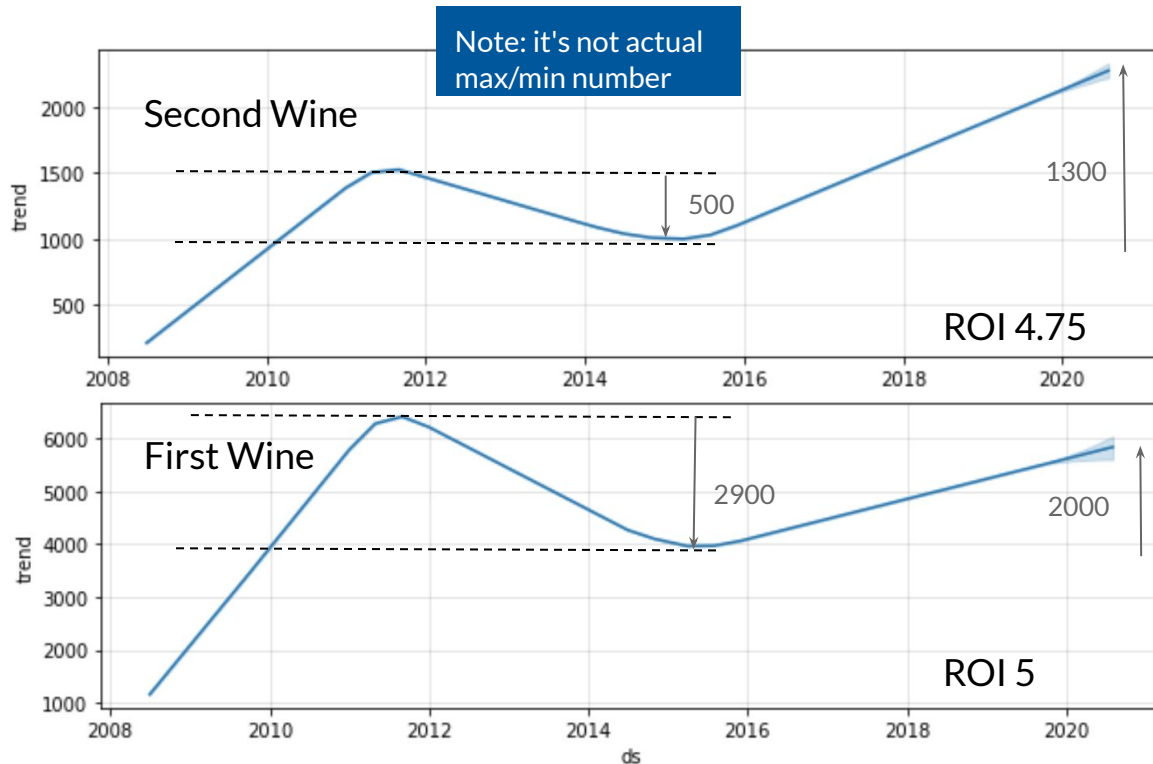
Overview:

Grouping first growths and second wines, we can see the general trend for each groups.

Prices of the second wines are catching up the prices from highest peak in 2011. We do not take it as a bubble signal because it does take steady steps climbing upward for past couple years.



Trend Analysis



Using built-in functions from fbprophet, I remove the possible seasonality and extract the trend from our data.

Second wines perform better now than 2011. It would be hard for first growth to get back to the prices like 2011. However, the growth rate is higher than second wines'.

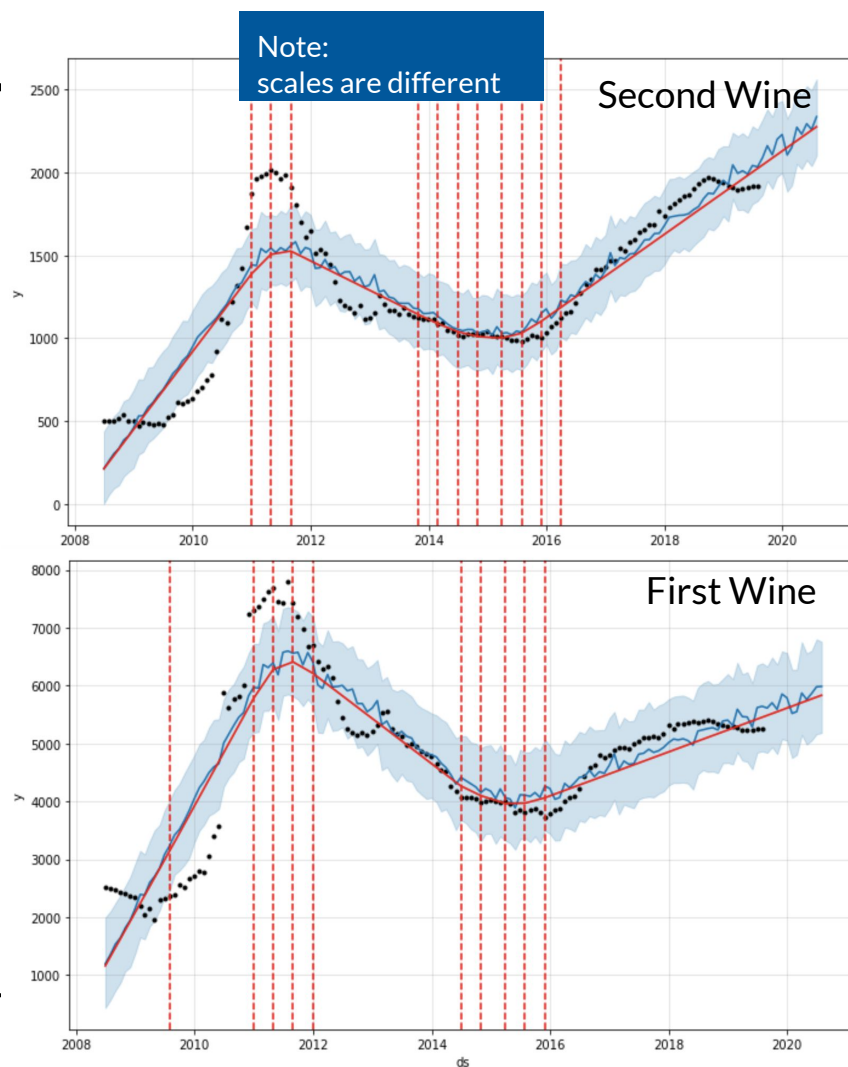


Changepoints

Using built-in functions- automatic changepoint detection from fbprophet, I annotate the changepoints (red lines) for two groups. We can see both of them have similar red lines, which are also align with events[1] mentioned before.

Second wines spent less time in the 2011 bubble and started to form the bottom before first wines.

[1] 2011 bubble & 2016 Brexit



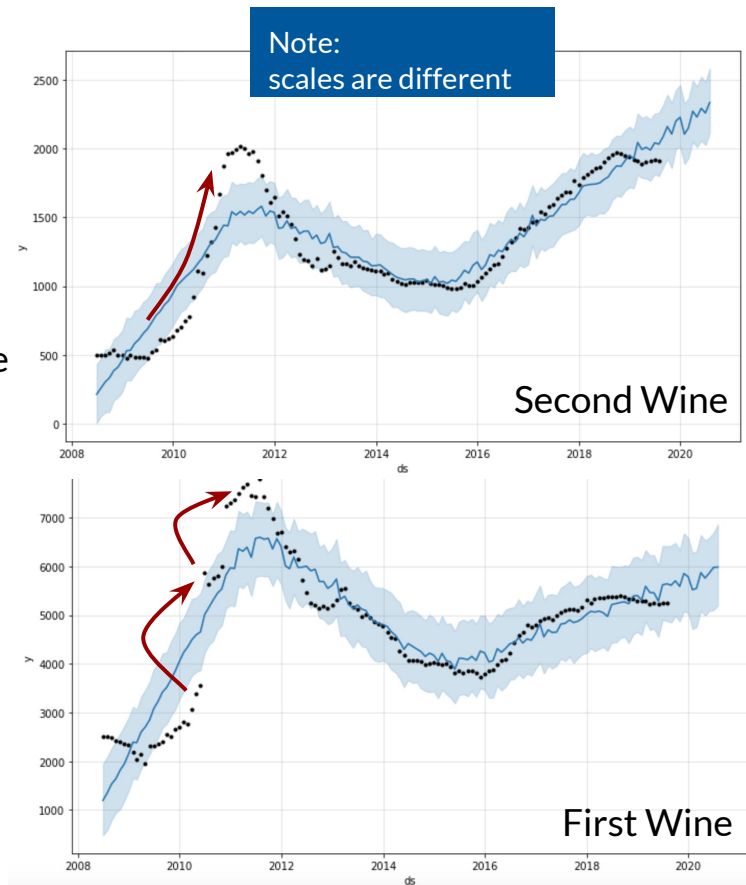


Performance

Building prediction models, I extrapolate the price evolution for next 12 months.

From the graphs, we can see first wines are very volatile. We take it as a risky signals.

For next 12 months, I expect the trend keeps moving upward. First wines are slowing down in 2018, but the predictive trend is still showing positive.





Past Performance Comparison

First Growths

ROI:

$$(5254.71 - 2509)/2509 = 1.09$$

STD: 1396.01

Second Wines

ROI:

$$(1914.42 - 500)/500 = 2.83$$

STD: 463.27



Future Performance Comparison

First Growths

ROI for upcoming 12m:

0.14 with expecting profits 732.4025

	ds	yhat	yhat_lower	yhat_upper
134	2019-08-31	5613.391042	4856.170845	6393.548230
135	2019-09-30	5703.793220	4997.189274	6471.277554
136	2019-10-31	5590.000281	4822.826649	6338.874911
137	2019-11-30	5854.243534	5069.087116	6627.115402
138	2019-12-31	5788.856397	5018.572052	6518.259033
139	2020-01-31	5520.430438	4752.899575	6265.791699
140	2020-02-29	5550.698913	4747.358556	6296.070109
141	2020-03-31	5872.039527	5077.826076	6627.720477
142	2020-04-30	5761.263592	4972.198498	6540.409189
143	2020-05-31	5864.902048	5105.746711	6614.489482
144	2020-06-30	5979.899884	5208.986373	6734.559160
145	2020-07-31	5987.115254	5137.270781	6735.504870

Second Wines

ROI for upcoming 12m:

0.22 with expecting profits 422.2752

	ds	yhat	yhat_lower	yhat_upper
134	2019-08-31	2088.492518	1852.913213	2302.007399
135	2019-09-30	2161.685274	1932.487293	2398.471101
136	2019-10-31	2106.198413	1878.873702	2331.033656
137	2019-11-30	2200.654423	1979.608924	2423.103503
138	2019-12-31	2229.114674	2008.830110	2454.105779
139	2020-01-31	2105.398668	1881.457582	2338.519539
140	2020-02-29	2151.743655	1924.274843	2377.553246
141	2020-03-31	2272.805636	2063.683615	2491.597670
142	2020-04-30	2230.737693	2001.105345	2436.605470
143	2020-05-31	2294.265726	2056.592843	2517.405458
144	2020-06-30	2259.466479	2016.041235	2492.796416
145	2020-07-31	2336.690802	2099.577952	2555.479749

80% CI

My Selection



Investor Type

Passive Investors:

- More risk-averse
- Low cash flow
- Medium to long term investment



Selection Methodology

1. Choose secondary wines over first growths

- a. Lower cost but similar quality
- b. Smaller volatility
- c. Higher ROI for upcoming 12 months
- d. Upward Trend
 - i. Carruades Lafite, Petit Mouton

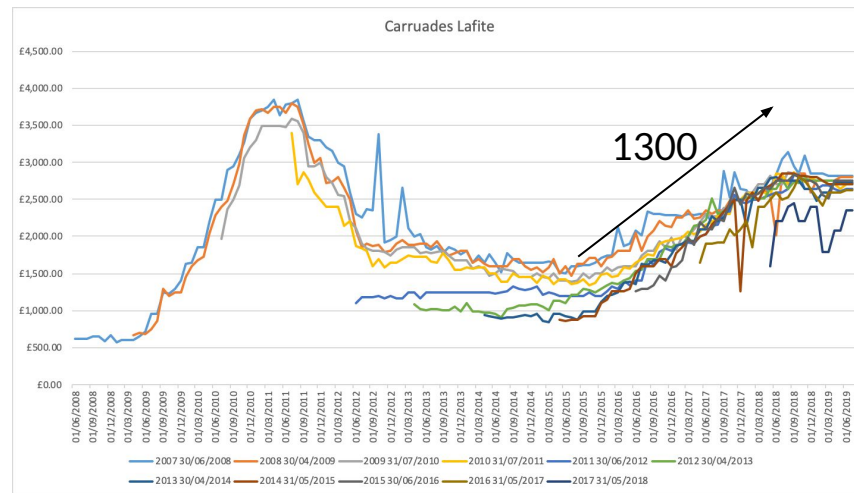
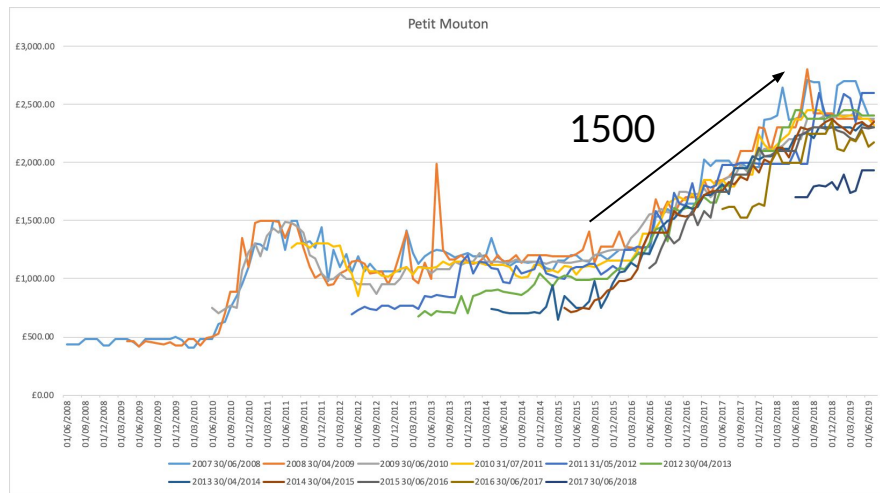
[(2010, 94.2),
(2009, 93.2),
(2016, 92.8),
(2015, 92.2),
(2017, 90.8),
(2012, 90.2),
(2014, 90.2),
(2008, 90.0),
(2011, 89.0),
(2007, 88.8),
(2013, 86.4)]

2. Checking trend plots and correlation charts

- a. Choosing vintages
 - i. low correlation with other vintages, higher scores
-> usually undervalued now
 - ii. Ans : 2009, 2010 (low correlation: 2017)



Before Final Choice





Pros and Cons

Carruades Lafite 2017: score 91

- **Lafite Rothschild** 's Second wine
- It will catch up the current average price (same happened to 2016 vintage)
- When we check the correlation between different vintages, they are high enough that we may assume regardless of the score, the prices will be similar.

Petit Mouton 2009: score 93

- Less volatile
 - Higher ROI than 2011
 - Steady trend upward
-



Final Choice - Petit Mouton 2009

1. Clear upward trend
 2. Overcome the 2011 Bubble
 3. Good Vintage
 4. Sarcacity
 5. Less Risk for a mid-long investment
-



The list of wines we have provided is for Bordeaux First Growth (5 wines) and their Second wine (5 wines) . These are arguably the very best wines produced in Bordeaux and possibly in the world and their Second Wines are also highly sought

- Can you identify the key drivers for the price of the First Growth and their Second Wines. Are they the same?
 - What is the trend and price evolution of these wines : do they follow the same patterns? Can you identify a clear trend for each group?
 - Compare First growth and their second Wines based on the analysis above : what are the main differences in their behaviour over time?
 - If you had to invest in ONE wine of ONE vintage in this list (100 wines), which one would you chose and why?
 - Can you explain very briefly why there was a bubble in 2011 and why Margaux 2015 has such an outlier price?
-