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ABSTRACT

This paper examines and compares wine price indices available on the wine market with those proposed in academia. We especially analyze the impact illiquidity has on the different indices and validate our findings using a simulation which allows us to define the biases induced by illiquidity on the statistical properties of the indices. We also propose adjustments to help market participants improve the reliability of wine indices and ultimately their decision-making. Our evidence indicates that both the volatility and the beta of fine wine is understated when estimated with existing wine index data. The true volatility and beta of the First Growths from Bordeaux appear to be close to 20%, respectively 0.45–0.60, suggesting that the diversification potential of fine wine is more limited than commonly believed.

1. Introduction

The status of fine wine has considerably evolved over the last two decades. It has grown from a consumption good to a tangible asset in its own right for a significant proportion of market participants. Investors and high net worth individuals (HNWI) have started to allocate part of their wealth into fine wine while wine funds have emerged catering for the increased demand in this asset (Masset and Weiskopf, 2015). The fine wine market has also evolved with the arrival of auction houses, wine brokers and wine investment service providers operating on all continents. This increased financialization of the fine wine market has spurred the creation of dedicated financial tools. The development of valuation tools and wine price indices, in particular, reflects the crucial need of market participants to access timely and accurate price information for decision-making and performance benchmarking purposes.

The very nature of fine wine combined with the specificities of the wine market, however, renders the valuation and estimation of price indices a complex exercise. Fine wines do not pay any cash-flows and thus their prices become a pure function of supply and demand, which is difficult to assess. Fine wines are traded on a decentralized and globalized market that is characterized by the coexistence of multiple trading channels. This induces information asymmetries amongst market participants and a fragmentation of its liquidity which impede the aggregation of a unique market price. Moreover, and unlike most

other collectibles, the quantity of each wine available for trading is limited but not fixed to a single unit. Multiple bottles of a specific wine exist which can all be traded individually. As such, the market for fine wines appears as the least illiquid amongst all collectibles. It therefore constitutes a unique framework to analyze issues related to the estimation of price indices for moderately liquid assets.

At the same time, academia has mirrored this financialization trend with a growing number of articles published on wine investments (see Burton and Jacobsen (2001), Fogarty (2006), Masset and Weiskopf (2010) and Dimson et al. (2015)). These articles either use the hedonic regression or the repeat-sales regression approach to estimate wine indices. These two methodologies aim at generating reliable indices even if the underlying dataset contains only a limited number of observations. A recent paper by Fogarty and Sadler (2014) reviews different index construction techniques. Their comparison not only includes the most used approaches in academia (repeat-sales and hedonic regressions) and in practice (commercial index), but also three lesser known methods (pooled, hybrid and average adjacent period return models). They show that both the pooled and hybrid models provide the best results, with findings being relatively comparable among the two and both using as much information as possible. The global focus of Fogarty and Sadler (2014) and this article is, however, rather different. Fogarty and Sadler (2014) compare index construction techniques and try to understand their impact in the context of financial portfolio analyses. We, on the other hand, want to study the

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quality of practitioner's models and to examine the problems the lack of liquidity has on the different methods. Both papers can thus be considered as complementary with a more theoretical approach for Fogarty and Sadler (2014) and a more practical approach for this article.

In practice, a variety of wine indices are also available with those provided by Liv-ex being today considered as the industry benchmark. Several other information providers also propose proprietary indices. For instance, Idealwine publishes its own family of indices and enjoys a leading position in France. Wine Spectator, Wine Market Journal, Wine Owners and Wine Decider also calculate indices and communicate them to the public. All these indices are calculated using the composite index approach.

Given the attention market participants grant these indices, it appears important to assess their reliability and to compare them to their academic counterparts which à priori appear more robust. The first objective of this paper is therefore to review indices existing in practice, to examine their construction method and to analyze their statistical properties. From a theoretical viewpoint, these indices display some shortcomings. They lack transparency, especially with regards to the weights assigned to the various index components. They rely on various types of price data, which are not necessarily appropriate to estimate reliable indices. Furthermore, the methodology used to compute the indices is rarely founded on solid theoretical arguments. Contrary to their academic counterparts, ad-hoc methods similar to those for liquid assets such as stocks or bonds are used. Unfortunately, wine is not a liquid asset. By comparison to an index constructed using the repeat-sales regression approach the existing indices appear to deliver a biased view of the reality. While their returns can be considered as reasonably realistic, the systematic and total risk of fine wine appears underestimated.

The second objective aims at understanding how the methodological limitations of existing wine indices combined with the lack of liquidity on the wine market affect their reliability. Illiquid assets are generally subject to various problems (Amihud et al., 2012) such as infrequent trading and delayed price adjustments. We therefore run a Monte-Carlo simulation to examine the impact of these problems on the statistical properties of the indices. We simulate a market on which assets trade infrequently and consider various degrees of liquidity, ranging from a slight lack of liquidity to a situation of severe illiquidity. The results from the simulations show that not properly accounting for illiquidity may induce low volatility estimates, a biased autocorrelation, and an underestimation of the correlation with other asset classes. These observations are in line with literature on illiquid assets (Khandani and Lo, 2011). Incidentally, the self-constructed index using the repeat-sales regression approach is less affected by these issues than the indices proposed in practice.

The third objective aims at proposing some adjustments that index providers and wine investors can apply to make indices more reliable and robust to illiquidity. Based on the aforementioned two objectives we implement adjustments which take the illiquidity and the delayed price reaction on the wine market into account. While these may not resolve all issues investors and index providers face they nevertheless significantly reduce biases in the risk and (auto)-correlation estimates while being rather straightforward to implement.

Our work has important implications for both academics and practitioners. The inherent limitations of existing wine indices impair the ability of investors to obtain a correct view of the wine market. In a nutshell, the most investable wines from Bordeaux appear to be almost as volatile as stocks and their beta close to 0.45–0.60 thereby suggesting that the diversification potential is more limited than commonly believed. This paper also contributes to the existing literature on fine wine and illiquid investments in general. First, it focuses on wine indices commonly used in practice. These indices have gained in importance due to their use as benchmarks and valuation tools on the fine wine market. As opposed to other assets (arts, real

estate) the reference indices on the wine market are, however, not based on theoretical arguments, but on pragmatism. The increase in popularity and importance of these indices, thus makes an in-depth analysis inevitable. Second, it makes use of an original dataset with hand-collected data to analyze existing wine indices and the manner they are constructed. The data used tracks wines that are commonly considered as fine wines contrary to Fogarty and Sadler (2014) who use Australian wines of which only Penfold's Grange can be viewed as investment grade on an international scale. So far the literature has mostly focused on the use of auction prices to run inferences about the performance of wine investments and has neglected the existence of these indices. This appears unfortunate given their popularity in practice. Third, we use a novel approach, based on a Monte-Carlo simulation, to examine and quantify the impact of illiquidity on the statistical properties of an index for a moderately liquid asset. Finally, our results establish that existing indices suffer from important weaknesses. We therefore propose direct adjustments to these indices, in order to improve their portfolio allocation and performance assessment role.

The remainder of the paper is organized as follows. Section 2 reviews index construction techniques for illiquid assets. Section 3 introduces the existing wine indices and examines their specificities. Section 4 presents the methodology used to analyze the features of the various indices used in practice. Section 5 is devoted to the analysis of the results and their implications for academics and practitioners, while Section 6 concludes.

2. Estimation of indices for illiquid assets

The key issue when estimating an index for an illiquid asset class is to come up with an index, which is capable of capturing changes in market conditions and which can be updated on a regular basis. These problems are particularly relevant for tangible assets, such as real-estate and collectibles, affected by multiple sources of illiquidity (e.g., inappropriate market structure, frictions and information asymmetries, limited number of traders and/or assets available for trade). When using transaction data, an index can either be inferred by modeling sales prices and controlling for the various variables that affect them, or by modeling the returns between consecutive sales of the exact same asset. These methods are respectively known as the “Hedonic Regression” (HR) and the “Repeat-Sales Regression” (RSR) approaches.

Unlike classic assets such as stocks and bonds, fine wine presents specific characteristics that reinforce illiquidity and price aggregation issues and rendering the estimation of a robust index a delicate task. First, fine wine can be exchanged in multiple ways and places (Masset and Weisskopf, 2013) which disperses overall liquidity on several, segmented submarkets and thus complicates the aggregation of information towards a single valid market price (Cardebat et al., 2016). Furthermore, the lack of cash flows and the intrinsic heterogeneity of each single bottle of wine lead to subjectivity and thus have a strong influence on prices and trades. This is reinforced by the occurrence of severe market frictions that further impairs liquidity and price formation. These frictions include but are not limited to transaction and search costs, storage and insurance fees and information asymmetries.¹ Finally, the rather restraint quantities of fine wine produced constitute a natural limit to trading and thus liquidity.

It is thus necessary to gather a large amount of price data in order to reliably estimate an index. Moreover, the statistical properties of the estimated index are likely to be affected by the types of price data (i.e., merchant prices, auction hammer prices, or prices recorded on a

¹ For example, producers safeguard data on the inventories they hold in their cellars for each wine and vintage. Also the risk of purchasing a counterfeit bottle increases with a lack of information as evidenced by the Kurniawan scandal.

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