

Yashil

IQTISODIYOT va TARAQQIYOT

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08.00.01 Iqtisodiyot nazariyasi
08.00.02 Makroiqtisodiyot
08.00.03 Sanoat iqtisodiyoti
08.00.04 Qishloq xo'jaligi iqtisodiyoti
08.00.05 Xizmat ko'rsatish tarmoqlari iqtisodiyoti
08.00.06 Ekonometrika va statistika
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08.00.16 Raqamli iqtisodiyot va xalqaro raqamli integratsiya
08.00.17 Turizm va mehmonxona faoliyati



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As the real estate market is growing further and current market environment including the low interest rates and abundance of capital or dry powder urges market participants to search for financial opportunities. If we compare the financial incentives of people, initially people would prefer just keeping their wealth in cash or convert it into gold as it was believed that this type of money is more stable. More capitalistic countries, such as the United States of America always distinguished itself from other countries in terms of interest in general population in stocks, shares and obligations (which are also referred as fixed income instruments). Within the last years the financial markets changed in response to policy makers actions. First major change was that the interest rates started decreasing after the global financial crisis. As we know the simple finance principle is the purchase assets that generate return and every asset has a certain profitability characteristic. This characteristic is usually seen in a ratio called return on investment. In other words how much will I get if I give you 1 euro. As the interest rates decreased this decreased the return on fixed income products. As The rush of investors for higher return directed the cash flows towards the more risky asset class, which are stocks of the public companies. Second major change was over regulation of these public companies. This resulted in the decrease of the number of public companies and most of the companies started going private. This was done mainly with the market participants such as so called private equity funds. These funds are the firms, which buy out the company which is in need of capital, most of the time partially financing this purchase with the debt. The goal is to keep this company till it's value increases astronomically and sell it with higher return on investment. The problem for investors was that these type of investments are rather risky and the more stable asset class in the market was seen as the real estate market.

MATERIALS AND METHODS

The availability and demand for homes, usually have an impact on real estate values, as well as based on the cost method how much would the replacement of this real estate costs. But there's more to valuation than that, especially when it comes to how interest rates, capital flows, and financing rates are controlled by the government. This concept is derived from the income approach or the discounted cash flow method used to value the real estate in a given situation, which is the most frequent valuation method used by investors. The income approach, which is used by commercial real estate appraisers and underwriters for real-estate backed investments, is very similar to the discounted cash flow analysis used for equity and bond investments. The most important factors are the determination of the cash flow, which is net operating income for a commercial real estate and the discount rate or the capitalization rate when determining the terminal value of the object. As we know the real estate provides the inflation hedging feature, which would increase the cash flow from rents or the net operating incomes of the real estate. The basic idea behind the net operating income is the determination of the net cash inflows for the real estate. In other words it is a difference between the real estate revenue and operating expenses of the real estate operator and the real estate itself. It is important to highlight that in the calculation of the net operating income there should be a consideration of the credit loss as well as when calculating the stable value, one would rely on the stable cash flow, which would have to consider the future changes in the cash flow, including the possible foreseeable changes in the future including some development work as well as the possible changes in the cash inflows in the near future. As the stable net operating income is determined the discount rate or the cap rate calculation is the next topic. Here one needs to understand the interpretation of the cap rate. Cap rate is not only the indicator of the risk factors, but most of the time the appraisers price in the perception of the market, where the possible changes in the market are also considered. For example, when the Brexit decision of the UK was announced the prices were rather stable, although there was no significant change in the cash flows in the beginning, there was a reflection of the change in the market condition for the retail sector of the commercial real estates. This resulted in a decrease of the prices in this sector and anticipated the difficulties in the market resulting from the Brexit. Although the inflation is priced in for the cash flows, the inflation is another component of the discount rate, which would affect the final price of the real estate to stabilize the price. Therefore, it is essential to understand the dependency between these factors to determine the valuation of the real estate and estimate the possible fluctuations in the market price.

There was a great amount of research in this topic, because this industry is enormous. According to Real Estate Global Market Report (The Business Research Company, 2021) global real estate market was \$2. 7 trillion worth, and it is expected to increase to \$2. 8 trillion with a compound annual growth rate of 3. 2%. This development further motivates the finance industry to pay more attention to this topic. One of the important researches was the discussion of Maxwell and Saint-Pierre of benchmarking real estate investment performance (1998). They discussed the major perceptions in the industry and analyzed the application of the real estate indices in practice with the example of pension funds' real estate investments.

Geltner et al. addressed the question of what the ideal research index is and what would be the optimal depth and breadth of market coverage and type of information for the database analyzed (2007). They focused



on the U. S. commercial real estate market and analyzed the deficiencies of as a tool a widely known Index: National Council of Real Estate Investment Fiduciaries. They also compared the private real estate indices with comparable public benchmarks and drew conclusions.

Brounen, Eichholtz & Ling also addressed the illiquidity of the real estate market and its performance (2007). They investigated if the value creation can be achieved by actively managing the property portfolio and concluded that it is hard even after disposing the illiquid private property markets.

Sampagnaro et al. concentrated on the reliability and heterogeneity of real estate indexes and their impact on the predictability of returns (2010). The major difference in this research was to analyze the discrepancies in the sources of data and the effect of lack of standardization on the reliability of the data. They concluded that there was a poor level of homogeneity between national and urban data time series and pinpointed the need to aim at improving data quality and comparability between different data sources.

As the introduction of more stock like real estate financial instrument: real estate investment trusts (REITs) gave more liquid instrument to trade, it raised a question if this is more comparable benchmark to consider. The analysis of the REITs showed that the real estate investments represent much more risk compared to indicators derived from SCS series (Cotter & Roll, 2010). Cotter & Roll studied US market over the past three decades and compared their return and risk characteristics with stock market indexes.

RESULTS

We decided to use widely available data for couple of reasons. Firstly the pricing of the commercial real estate is very precious information and can therefore be quite expensive to purchase for research purposes. Secondly, prices in the real estate market is very limited and most of the time not shared by the investors to keep their books in secrecy. Based on the reasons above we considered two market indexes for the real estate asset class. These include: NCREIF Property Index (NPI) and NAREIT. National Association Of Real Estate Investment Trusts (NAREIT) – is an index which is collected by the trade association that deals with the real estate investment trusts. As REITs are the publicly traded real estate companies, their prices are very frequent and liquid. However their prices are affected by the other systematic risks, which distorts the real economic effects on the market prices (Investopedia. com). The NCREIF Property Index (NPI) – as defined by the National Council of Real Estate Investment Fiduciaries (NCREIF) is a “quarterly, unleveraged composite total return for private commercial real estate properties held for investment purposes only”. These properties are invested by the institutional investors without the tax shield within the fiduciary obligation. (ncreif. org, n. d.) As the sample data we will take the NPI index as it represents the prices of the real purchased properties in the United States of America. It also corrects for the leveraged financing, which excludes the share of financing from the transaction. Without this correction the pricing of the real estate assets might seem very volatile and can include too much noise. With respect to total return feature, it can make sure that there are no cash flow escaping the structure through different mechanisms, such as dividend recapitalization or dividend payout by the underlying structure. Our data covers the period between 2005 and 2020. If we plot our data as the change in the property prices we can see the following aspects:

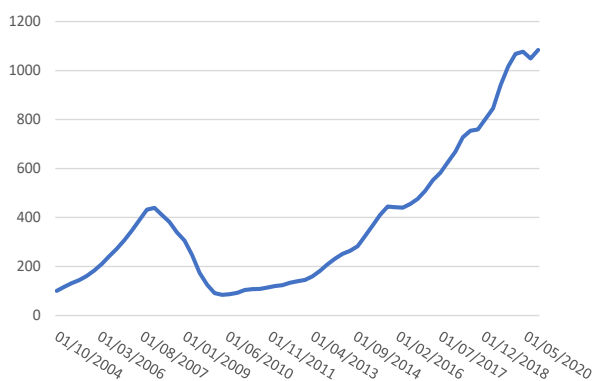


Illustration 1: Volume and Change in property Index

Source: made by the author.

From the graph above we can recognize that the prices were in an upward trend with the property prices increasing till the middle of 2008. With the beginning of the of the global financial economic crisis, the real estate market crashed and the maximum deviation in the price went all the way to 29. 8% decrease over one quarter.

Table 1: Basic summary statistics

Summary Statistics	%
Max	16.56%
75th Percentile	11.25%
Mean	4.35%
Median	5.93%
25th Percentile	2.84%
Min	-29.81%
Standard Deviation	10.11%

Source: made by the author.

From the summary statistics we can see that the overall direction of the prices are upward trending with the average deviation of 4.35%. As the economy recovered from the global financial economic crisis, there was a high support from the policy makers, especially by the central banks of the countries (see illustration 2). The lower interest rates means, the loans are less interesting for the risky investors, while banks are required to keep their balance sheets secure with less risky assets such as real estate. This in turn rushed great amount of capital into market. We can therefore see how the market prices increased significantly above the pre crisis levels.

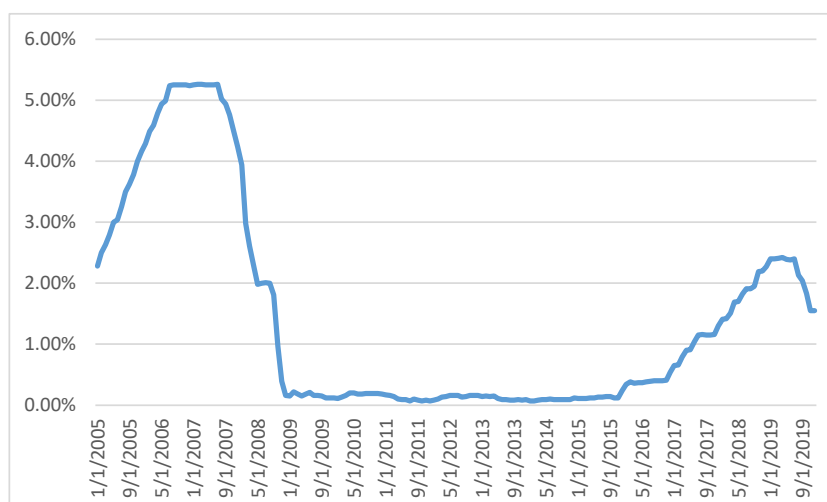


Illustration 2: Funds rate of the Federal Reserve bank

Source: Bloomberg

It's worth noting that the rates started cripple up in the recent years. Especially with the inflation expectations increasing for the US. This raises some questions such as if the market can withstand this change or if the price levels will revert to pre-crisis market environment. In this paper we decided to set out the process where we start with the initial raw data, in this case the NPI quarterly index. As the frequency is lower, we will interpolate this data with the Denton method based on the case developed by Baum & Hristakeva (2014). This method calculates the pro rata method of interpolation for a low-frequency time series by using a similar benchmark to connect the interpolated values and states the limitation so that the derived interpolation complies with the low-frequency totals. After interpolating this data we need to determine the final value on which to base our decision. For this paper, we decided to use widely used risk metric: Value at risk. This metric provides certain threshold at which the institutional investor can bear potential losses at certain probability. In this context, we would see at certain confidence interval or certain probability with the data on the commercial real estate transactions, how much can the market price deviate from the given level within certain period.

DISCUSSION

We applied the interpolation method and derived the interpolated values based on the REIT index, which is high frequency data. In order to get realistic values, we have taken month end close values of the REIT index.



Overall, the interpolated data was not significantly different. This is mainly because the volatility of the REIT index was not significantly high compared to the NPI index. We can see minor differences in the summary statistics. Mainly the extreme values have increased slightly. For example, the maximum value increased by around 0.6% and mean stayed rather stable. The minimum value also stayed constant at 29.81% as during the crisis.

Table 2: Comparison of summary statistics between the initial and interpolated data

Summary Statistics	Initial	Interpolated
Max	16.56%	17.14%
75th Percentile	11.25%	11.32%
Mean	4.35%	4.38%
Median	5.93%	5.66%
25th Percentile	2.84%	2.60%
Min	-29.81%	-29.81%
Standard Deviation	10.11%	10.03%

When deriving the VaR values for both datasets, we can see that the interpolated dataset is more volatile as it also incorporates the volatility of the interpolated data.

Table 3: Value at risk for interpolated and initial dataset.

VaR	Initial	Interpolated
1%	-28,56%	-29,62%
5%	-18,12%	-22,32%
10%	-7,40%	-7,74%

We can see that the VaR values at 1% significance level are higher and in case of the house prices this can result in a great volatility. Overall we can see that the interpolated dataset is more suitable for the analysis of the real estate markets as they are not low frequency and represent more realistic volatility in the market.

CONCLUSION

In this paper we considered the market values in the real estate and derived the value at risk parameters based on the real estate market data. In order to find the more appropriate index we decided to start with the most relevant type of market index which is the Property index in the united states based on the purchases of the real estate properties. We then corrected this low frequency data with the Dentons interpolation and considered there the REIT index in order to avoid stale volatility. The result was as expected where we saw the volatilities increased. After that we derived the value at risk parameters, where this results have also increased. As a conclusion, we suggest using interpolation and not relying solely on the low frequency data when analysing the real estate markets.

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Yashil

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