

COMMERCIAL REAL ESTATE INVESTMENT - LUSPF

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EXECUTIVE SUMMARY

By examining LUSPF's original weight of assets in their portfolio with 40% in large cap stocks, 20% in small cap stocks, 35% in 10-year bonds, 5% in cash T-bills and none in real estate, we construct an efficient frontier that include portfolios from with highest return to with lowest risk (fig.6 fig.8). And LUSPF's current portfolio which has 10.07 risk and 10.09 return is below the efficient frontier meaning this portfolio is poorly weighted and is possible to find a better portfolio that gains higher return with lower risk. Since LUSPF is asking AAA to build up a new portfolio that include 10% investment in commercial real estate, we also construct another efficient frontier that has 10% of total investment in sum of public and private real estate (fig.5 fig.7).

Without doubt, LUSPF's current portfolio is also below this efficient frontier and can be improved. [1]

To improve LUSPF's portfolio, using the current data we have, we have found 2 portfolios with different weight comparing to LUSPF's original portfolio and both with higher expected total return and lower expected risk:

- **Portfolio Suggestion 1:**
  2% Private Real Estate
  8% Public Real Estate
  31% Large Cap Stocks
  20% Small Cap Stocks
  34% 10-Year Bonds
  5% Cash T-Bills
  Risk: 9.60
  Return: 10.10

- **Portfolio Suggestion 2:**
  9% Private Real Estate
  1% Public Real Estate
  57% Large Cap Stocks
  1% Small Cap Stocks
  27% 10-Year Bonds
  5% Cash T-Bills
  Risk: 9.92
  Return:10.22

[1] The constraints for our efficient frontier is 5% of cash investment as LUSPF originally used and generally accepted in portfolio management in the industry.

INTRODUCTION

As a consultant of the Asset Allocation Advisors (AAA), this report aims to provide LUSPF with advice on the case whether to invest 10% ($100M) of LUSPF in commercial real estate by April 3rd, 2020. In order to give thorough advice on the approach, this report will combine both literature review on commercial real estate investment and quantitative review using relative economic data given by AAA.

Beyond the literature and quantitative review, this report will also assess the pro and cons of modern portfolio theory and apply the theory to decide what the best investment portfolio LUSPF should use in order to improve their investment conditions given their new investment strategy of including property investment.

QUANTITATIVE ANALYSIS

In order to better understand the quantitative performance of LUSPF's portfolio, AAA has given the related market index such as national property index and S&P 500 index. This report will first examine the market change of different index from the year of 1979 to 2018. We will look at the trend of each index and how they correlate with each other and influence the industry.

In Appendix ii, Fig.9 shows the general trend of all 8 indices AAA has provided us with from 1979 to 2018. From the figure, it is obviously shown that Equity REIT index indicated under the category of public real estate has grown the most since 1979 and is the highest among all indices in 2018. In comparison, although real GDP, inflation CPI and cash T-bills has also been steadily increasing for the 39 years, the extent to which it increased is no contrast to the others. Among other indices that has shown clear visual change, the 10-year government bonds and national property index stated as private real estate has been in a stable increasing phase for years. These two indices have shown little volatility throughout the years even in 2000 and 2008 financial crisis when public real estate, small cap stocks and large cap stocks all had heavy downfall.

From the correlation diagram in Appendix ii, Fig2, we can see that both public real estate and large cap stocks have a high correlation greater than 0.5 with small cap stocks. A rather high correlation between public real estate and the stock market can

be seen as a bad hedge, and therefore it is inappropriate to control risk if you include great amount of both public real estate asset and stocks in your portfolio. Cash T-bills also has a high correlation of around 0.81 with inflation CPI, which indicates that cash T-bills cannot be used as an inflation hedge.

COMMERCIAL REAL ESTATE

Overview

Commercial real estate properties are non-residential properties including office buildings, factory sites, retail, health-care facilities. Smaller-sized commercial real estate properties generally are owned by single investor, and companies like publicly traded REIT may simultaneously own and manage several commercial properties. In commercial real estate investment, investors tend to use either debt or equity investments as financing option. (Garay, 2016)

Advantage of commercial property investment

During the 1970s, investment in commercial real estate became an option for institutional investors who initially only invest in equities and bonds. Among many advantages of commercial property investment that we already know, two of them were the major drive force: commercial real estate investment serves as good risk diversifier against equites and bonds, and they are great inflation hedger.

“As an asset class, CRE behaves very differently from stocks or bonds.” (Sam 2020). Unlike stock or bonds, CRE has a relatively low correlation with the stock market, meaning that they will not be affected influentially from the volatility in global stock market especially during global financial crisis, for example in 2008. As stated by Sam (2020), even within CRE markets, there exist different investors demand upon CREs and therefore the risks within CRE can be mitigated as well.

CRE also works as great inflation hedger because both the rental income cash flow and real estate’s capital value tend to appreciate with the inflation within the economy. In 1970s, Fama and Schwert (1977) first found the hedging ability of private real estate against the economy inflation. With further research, Rubens (1989) provided with statistical evidence on the hedge effectiveness of CRE against inflation. Rubens’s research proved that the inclusion of CRE in the mixed asset portfolio provided a hedge against inflation.

Other than these two fundamentals of CRE that make CRE preferable to numerous investors, CRE can also provide investors with long-term stable cash flow. Unlike

many investments that only benefit from purchase and sale, CRE, such as office, apartment buildings, industrial buildings offer steady rental income from tenants. Apart from that, CRE are usually properties with high value and therefore cannot be generally purchased in full but with leverage. Therefore, investors are expecting to have even higher gains with leverage. (Paul 2020).

Disadvantage of Commercial Property Investment

With all those advantages being said, commercial real estate investment also comes with downsides that terrify many investors from making the investment decision. The major downsides that investors in both 1980s and current time worry about CRE investment are its high management cost but relatively lower return comparing to stocks as well as its illiquidity. First of all, the cost of CRE investment is rather high comparing to residential real estate. The commercial property is rather expensive and therefore require enormous amount of money to purchase. And since CREs' tenants are retails, offices, factories, they have a higher management cost. Unlike residential properties, tenants for CRE are usually longer-term tenants and it will be difficult and expensive to find new tenants when the previous lease term ends. (Goel 2019)

As stated by Crosby and McAllister in 2004, the main problems of CRE focus on illiquidity, low trading and high transaction cost which are also the most influential factor on asset pricings. And liquidity is heavily influenced by the transaction process in CRE trade. Crosby and McAllister state that the factors include: the rate of turnover and time taken to transact, the cost associated in the process of transaction (both explicit and implicit cost in form of information, time), uncertainty in the achieved return or price cash flow at the time of transaction.

MODERN PORTFOLIO THEORY

Overview

Modern Portfolio Theory (MPT) is developed by Markowitz (1952, 1959) which make portfolio problem become the choice of mean and variance of the portfolio of assets. The theory further develops into the fundamental theory of mean variance portfolio theory. Two conditions will be either maximizing expected return holding constant variance and minimizing variance holding constant expected return. In order to visualizing the conditions depending on individual risk return preferences, the concept of Efficient frontier is used and will be shown in Appendix.

Strength of Modern Portfolio Theory

Elton, Gruber, Brown, Goetzmann (2013) in their book Modern Portfolio Theory and Investment Analysis has stated and proved that by constructing portfolio of assets, investor can gain higher expected return while having lower total risks. Even under opposite market conditions, different assets can have their highest and lowest returns. Therefore, investor can always find a combination of assets that provide investors with the same return under all market conditions. Generally, the portfolio of assets diverse the risks of individual assets and yield a stable return from portfolio with lower risks, or even no risk in extreme conditions.

Other than maximizing return and minimizing risk, a well-concerned portfolio of assets targeting on having tax efficiency can also minimize the impact of taxation and increase the net return. As stated by Douglas Thorne in 2019: “Depending on such variables as the type of account, security type and tax bracket of the investor, taxation can eat into returns and make otherwise attractive investments mediocre at best”. A portfolio can therefore spread and dilute the tax impact from each asset and reduce the tax impact onto the portfolio.

Limitations of Modern Portfolio Theory

As an advanced investment management theory, MPT do have limitations. First of all, in order to reduce the overall risk of the portfolio, sometimes investors have to include risky investment such as futures which is a tricky investment technique that is hard for normal investors to understand. And there cannot be actual assets that have performance independent of other assets and the market. Therefore, the optimal portfolio construction sometimes only exists in theory. (McClure 2020)

One of the fundamentals of portfolio theory is the inclusion of risk-free asset in portfolio which are typically government bonds. However, government bonds in reality are not really risk-free and can still be affected, especially by severe market conditions. Apart from that, the actual information of return and risk of a specific asset is actually unachievable for normal investors as the market is constantly changing. Also, it is difficult to get enough data of the asset to actually quantify the risk of a certain asset since the asset or stocks are closely related to market index and one can never get all the instant information of an asset from the index. (Bleiberg 2018)

The MPT takes an assumption regarding the investors that all investors are risk-averse, which might be fallible for certain investors. Being risk-averse means investors all prefer less risk and get nervous when the risk of investment increase. With that being said, investors are assumed to prefer a portfolio with less risk even if it has lower return. And it is assumed that investors all believe the higher return as compensation for higher risk. The two assumptions form the major assumption of MPT, and assumptions are not always solid. In reality, investors can be split into risk-averse or risk-seeking. And even certain investor's preference of risk might change in different time or market condition. (Miller 2019)

CONCLUSION

Portfolio suggestion 1 put a more even weight on large cap stocks and 10-year bonds since their correlation is close to zero and negative at -0.02. They can work a hedge that balance the risk between stock market and government bonds. A higher proportion of public real estate is also included in the portfolio because it has a poor correlation with cash T-bills, and it can hedge the 5% cash T-bills in the portfolio.

Portfolio suggestion 2 put a heavier weight on large cap stocks which do have a higher risk because of the volatility in stock market. However, in return, it also gives a higher return comparing to the original portfolio LUSPF has, and by including a 27% 10-year bond, the portfolio still manages to control risk below LUSPF's original portfolio. Furthermore, a 9% private real estate is included as it works perfect as an inflation hedge and will preserve the value of the portfolio against inflation.

By including a total of 10% weight in real estate and alter the weights, LUSPF's new portfolios can extract a higher total portfolio return while having lower risk. Hence the new portfolio will be more efficiently allocated and improve LUSPF's investment result. And after all, we can conclude that the inclusion of real estate is essential for portfolio management and it should be under LUSPF's consideration to include a certain amount of real estate asset investment in their portfolio.

APPENDIX

Appendix I

Abbreviation:

- AAA – Asset Allocation Advisors
- BOT – Board of Trustees
- CRE – Commercial Real Estate
- LUSPF – Lee US Pension Fund
- MPT – Modern Portfolio Theory
- REIT – Real Estate Investment Fund

Appendix II

Fig.1

	Private Real Estate	Public Real Estate	Large Cap Stocks	Small Cap Stocks	10 year Bonds	Cash T-Bills	Inflation CPI	Real GDP
MEAN	8.38	12.53	12.01	11.26	8.09	4.15	2.98	2.71
SD	12.58	16.78	15.95	18.16	10.03	3.37	1.76	1.91

Fig.2

	PrivateReal estate	Public Real estate	Large Cap Stocks	Small Cap Stocks	10 Year Bonds	Cash T-Bills	Inflation CPI	Real GDP
PrivateReal estate	1							
Public Real estate	0.245707309	1						
Large Cap Stocks	0.185981934	0.476304536	1					
Small Cap Stocks	0.114724036	0.671534729	0.821079669	1				
10 Year Bonds	-0.035813572	0.012207341	-0.024603183	-0.096007671	1			
Cash T-Bills	0.030681686	0.015198474	0.084999742	-0.019308352	0.398963943	1		
Inflation CPI	-0.001741495	-0.070130619	-0.166898428	-0.106546693	0.360041677	0.814474976	1	
Real GDP	0.535179989	0.286299335	0.400921307	0.252442449	-0.257422371	0.150127471	-0.155064161	1

Fig.3

	PrivateReal estate	Public Real estate	Large Cap Stocks	Small Cap Stocks	10 Year Bonds	Cash T-Bills	Risk	Return
Weight	0%	5%	44%	5%	41%	5%	9.11967453	9.989882615

Fig.4

	PrivateReal estate	Public Real estate	Large Cap Stocks	Small Cap Stocks	10 Year Bonds	Cash T-Bills	Risk	Return
Weight	0%	0%	40%	20%	35%	5%	10.06998539	10.09403759

Fig.5 Ideal Portfolios

	PrivateReal estate	Public Real estate	Large Cap Stocks	Small Cap Stocks	10 Year Bonds	Cash T-Bills	Risk	Return
Max Return	0.00	0.10	0.90	0.00	0.00	0.00	15.23	12.06
9	0.00	0.10	0.85	0.01	0.00	0.05	14.51	11.70
8	0.05	0.05	0.80	0.01	0.04	0.05	13.50	11.33
7	0.09	0.01	0.76	0.01	0.08	0.05	12.59	10.96
6	0.09	0.01	0.67	0.01	0.18	0.05	11.20	10.59
5	0.09	0.01	0.57	0.01	0.27	0.05	9.92	10.22
4	0.09	0.01	0.48	0.01	0.36	0.05	8.83	9.85
3	0.09	0.01	0.39	0.01	0.46	0.05	8.01	9.49
2	0.09	0.01	0.29	0.01	0.55	0.05	7.51	9.12
Min Risk	0.10	0.00	0.11	0.13	0.61	0.05	7.28	8.75
								0.368334673

Fig.6 Original Portfolios

	PrivateReal estate	Public Real estate	Large Cap Stocks	Small Cap Stocks	10 Year Bonds	Cash T-Bills	Risk	Return
Max Return	0.00	0.00	1.00	0.00	0.00	0.00	15.95	12.01
9	0.00	0.00	0.95	0.00	0.01	0.04	15.17	11.66
8	0.00	0.00	0.87	0.01	0.08	0.05	13.97	11.32
7	0.00	0.00	0.78	0.01	0.16	0.05	12.62	10.97
6	0.00	0.00	0.69	0.01	0.25	0.05	11.36	10.62
5	0.00	0.00	0.60	0.01	0.34	0.05	10.23	10.27
4	0.00	0.00	0.51	0.01	0.43	0.05	9.27	9.92
3	0.00	0.00	0.42	0.01	0.52	0.05	8.55	9.57
2	0.00	0.00	0.33	0.01	0.61	0.05	8.13	9.22
Min Risk	0.00	0.00	0.15	0.13	0.67	0.05	7.93	8.88
								0.348584832

Fig.7 Efficient Frontier of Ideal Portfolios

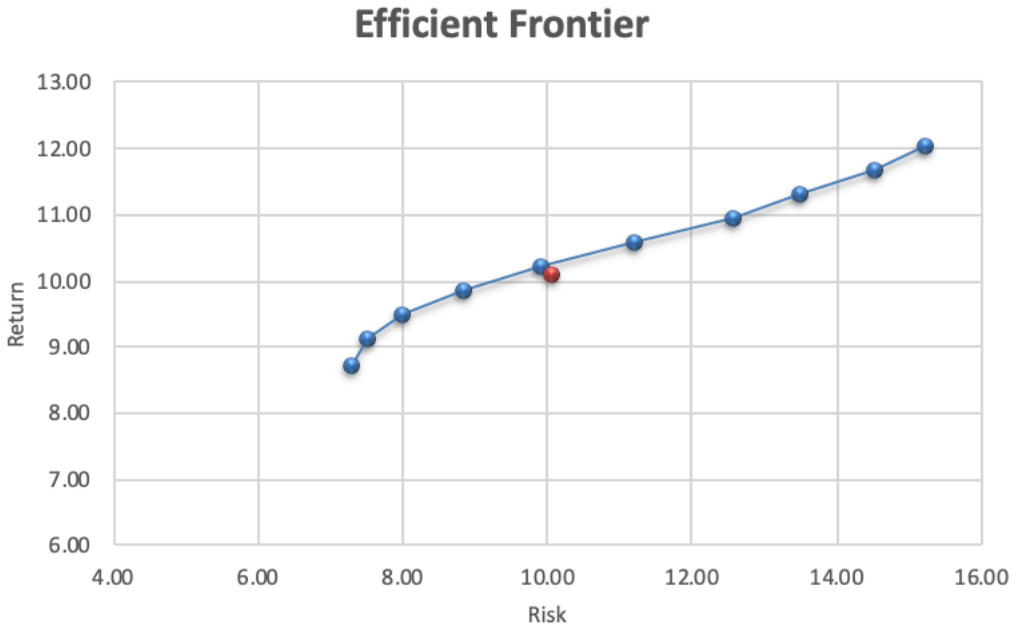


Fig.8 Efficient Frontier of LUSPF's original portfolio

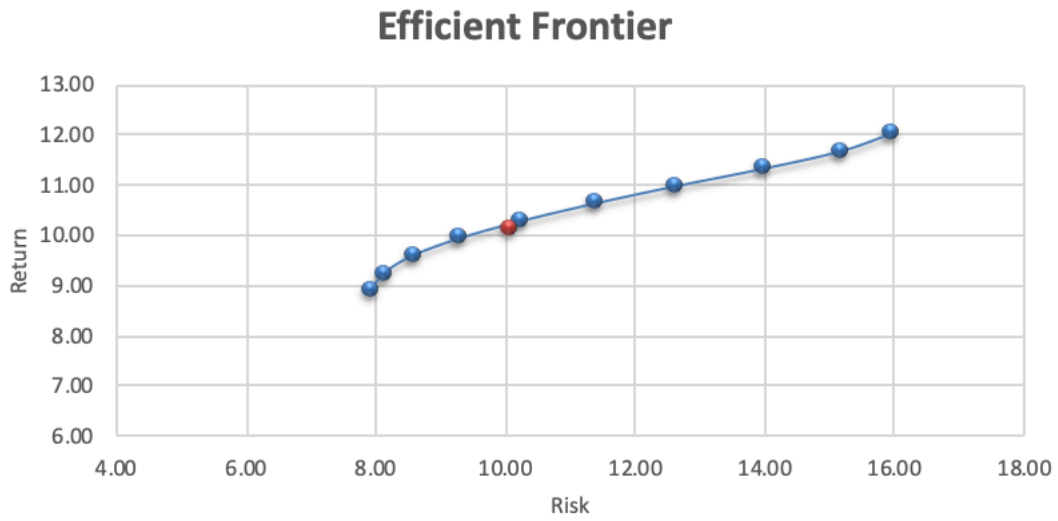
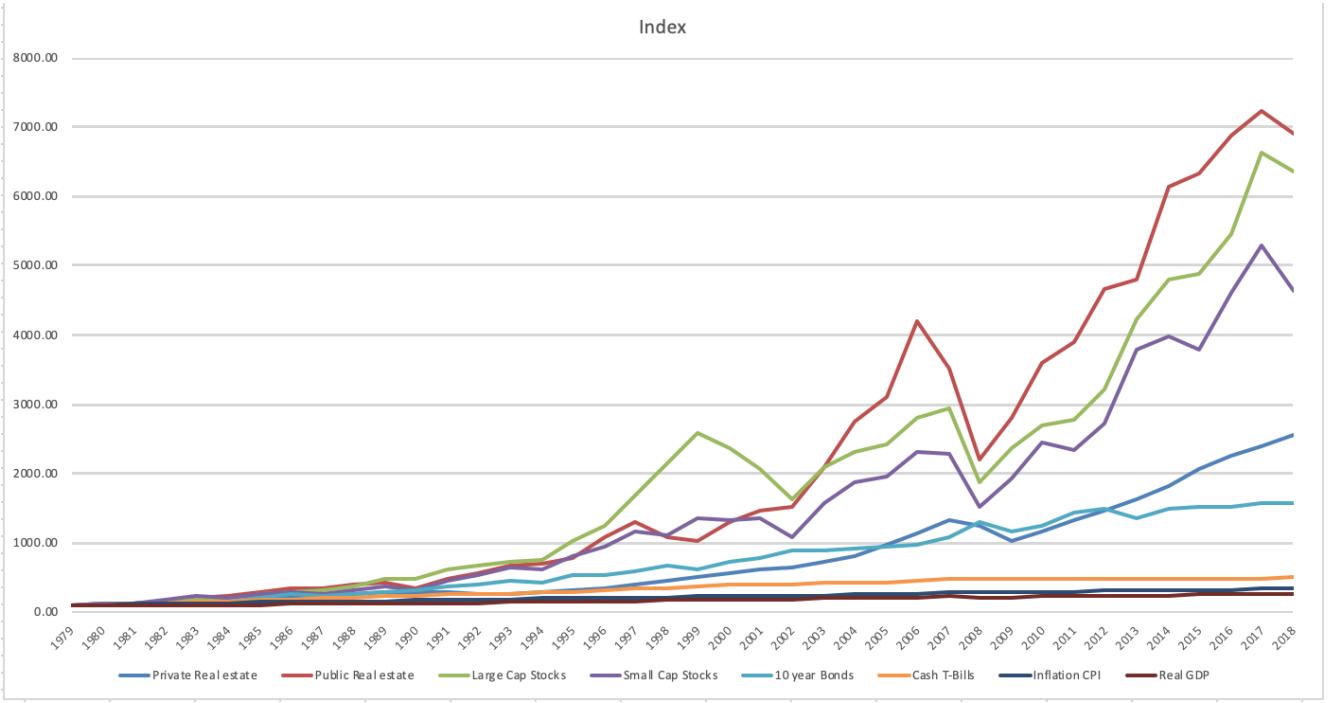

Efficient Frontier
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
Return
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
Risk

Fig.9 Index


Index
8000.00
7000.00
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
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1994
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2016
2017
2018
Private Real estate
Public Real estate
Large Cap Stocks
Small Cap Stocks
10 year Bonds
Cash T-Bills
Inflation CPI
Real GDP