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Combined Document Research：on Influencing Factors of REITS Returns

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Abstract. This study delves into the important elements that impact the returns of infrastructure (REITs) in the United States (US) Real Estate Investment Trusts. This research makes use of Financial Times Stock Exchange (FTSE) Nareit Industrial Index monthly data from 2012 to 2019. To evaluate the impact of several macro, meso, and microeconomic factors, a Vox Autoregressive model (VAR) is used. Inflation as measured through the Consumer Price Index (CPI) for short, and the expansion of the money supplies are two of the macroeconomic variables that are being deliberated. Household price index (HPI) and return of the public electricity sector are two examples of mesoeconomic variables. The return rate of 10-year Treasury bonds and getting back of the stock market 500-stock index (S&P500) are examples of microeconomic variables. Through an analysis of these characteristics, this article seeks to provide a thorough grasp of what drives infrastructures REITs performance and make a valuable contribution to investing strategy in this field.

1 Introduction

Investing in real estate in the form of committing to REITs is also one. These are the financial instruments representing straightforward real estate projects with great likelihood of profitable expansion and yielding of rental incomes. Most of the real estate investment trusts are quoted in the respective stock markets worldwide. This article discusses the issue of investment trusts of real estates. It has a new target of investing through property developments to the small and medium investors through real estate investment trusts [1].

The United States developed real estate investment trusts or REITs to open property market to middle income and small-scale investors. The United States congress developed the REITs as a means of making real estate investment a streamlined and affordable process [2].

The real estate investment trusts tend to lure small and medium investors through income certificates. The investors can list their income and tablets of stock upon the security market. One of the most popular investment tools available in the then-industrialized world, including in the US, were REITs [3].

The study by Anglin, and the study by Muller and Pauley indicates that there exists no correlation between the interest rate variable and the equity real estate investment trusts value.

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The relationship between the size of the REITs and stock market performance and larger REITS is positive. Li and examined the bank stock market of the United States and the real estate trust fund concerning the study of interdependence in school of the capitalism asset pricing model [4].

In another study that was performed by Karolyi and Sanders in a multi-strategy CAPM model, it was established that the relative level of correlation of the bonds, stocks, as well as REITS to each other varied substantially. In the period when the study was conducted, Gamecock defined the correlation of the returns in the REITs and the bond/stock returns. In a comparison between returns of the REITs and credit spread of long term and short-term corporate bonds, Zane and John identified a negative relationship between interest rates and the REITs returns and a positive relationship between the spread and returns of long term and short-term Mr. bonds. According to a study done by Bley and Olson the REITs index cast a sluggish negative rating on co-movement with the S and P 500 index.

According to Aching and Lee, the diversification effect of the risk of REITs was discovered in its relation to the REITs investment strategy. According to Lee and Stevenson, the greater the holding period of the REITs, the greater the effect of diversification. According to a study done by Eduardo real estate investment trust recorded poor returns compared to the stock markets at the crisis time. Kim and BCE note that the non-risk of the REITs displayed a weakening trend [5].

Nothing of the kind was a premature initiation of research on the REITs at the national level, and the research is still patchy. The other consideration that Xu Li made is on the relationship between the systematic risk of real estate investment and the underlying asset of the REITs and the decision of the market returns. In managing the non-stationary nature of the time varying REITs of real estate, Shang Tiancheng, Gao Junqing, Guo Junxiong, and others provided an analysis of the relationship between the equity, hybrid and mortgage REITs and their returns/yields using the error correction models and cointegration theory. They arrived at the conclusion that, stock market returns, and equity REITs are cointegrated. Wang Jianjun and Su Chao had been of mind that: the model of the new form of the REITs assists in revising the model of the work of the real estate and enhancing the value of the worrying real estate's work. REITs go a several steps ahead in the domestic real estate industry as far as competitiveness goes. The so-called moral hazard model as developed by Tirole and holmström was widely exercised as a phenomenon that Wang Qi was practicing; under the model of the fund governance, the mobility and profitability of the investment had got to reach its peak within the crowd of the REITS funds owners. The main assumption that Zhang Hong and Sun Xu made is that returns on investment fund of real estate are dependent on the indices of the sectors which happen to be relevant, and significant on the price of the property rentals although the influence of short run effect on the prices of the REITs is minimal. To determine the impact of the state pressure on the comer of behavior in the investment in REITs, Wang Cheng and Ge Qiming developed a structure of a non-strategic game between the government and the investors [6].

A case study of a research of foreign REITs by Chinese researchers could be an article by Ding Jianchen, Xu Jie, and Li Xiangnan who in turn have given an organized account of the nature of US market real estate investment Trusts that could also be of great help when seeking to organize a market structure of the Chinese REIT. In his analysis of the US and Hong Kong real estate investment fund market, Guo Jun has come up with numerous propositions. This and an examination of the real estate structure in China saw her provide several viable suggestions as how to outcome the real estate investment trusts in China and several repositions of the Chinese REITs to the Chinese REITs (C-REITs) based on the local market conditions [7].

Finally, the U.S capital market is mature and the literature surrounding factors affecting the returns of REITs is scarce. According to the theoretical analysis, a VAR model in the monthly returns of FTSE Nareit Infrastructure REITs Index is used as the dependent variable, where in both the sample is January 2012 to December 2019. To explore the reasons behind the returns on the REITs, empirical analysis shall be executed.

2 Related works

2.1 Formatting the title, authors and affiliations

REITs is a form of the trust fund, in which the resources of nominated investors are pooled through issuance of the income certificates yet under the management as a form of arbitrage the objective of investing in real estate and laboring under the management of the trust among the investors against the amount of declared contribution to the trust. Identification US government is categorical that REITs of certain attributes are not supposed to pay Income tax and capital gains tax and hence it is among the most salient monetary instruments in the US The US has some 300 REITs [8].

2.2 United States REITs set up

The US REITs have been primarily corporate. The corporate REITs are funds that are already set up, as per the regulation of the Company Law, to mobilize funds in the shape of fund unit and invest it in real estate. This is the implication of why the US REITs keep increasing at an elevated pace since the laws and regulations that govern them are so strict [9].

2.3 Advantages of United States REITs

REITs in the US has strengths that have contributed to its success, namely, it is a secularized product, and it is supported by the US government on several matters such as taxation [10].

You do not need to invest much: REITs shares are as little as 10-25. Limit implies Finding- REITs allow you to purchase however many shares as you find useful or as many as purchasable.

High Market Returns, Diversified Portfolio Investment: REITS investments may be in diversified form of assets as real estate's values of assets [4].

High Liquidity: REITs are securities product that are usually offered in the form of stocks or beneficial certificates. As a result of such immovable properties, there are the REITS shares whose trading is a little more convenient to carry out being just stock markets.

Tax Benefits, Dividends to Wealthy Shareholders: REITs are taxable as separate taxation economic.

High Liquidity: In a similar manner, real estate may as well be described as an illiquid asset possessing a low liquidity trait with long business cycles and sequence of procedures one must undertake to buy and sell deals.

3 Theoretical analysis of factors influencing REITS returns

The factors of returns of REITs have a good chance of study theoretically and practically. The trading and operation and variables in which the factors analysis of their returns shall be concluded are distinguished by the variety and complexity of the variables to be employed used in the cognitive analysis of the factors which commerce and operation may exercise by them.

3.1 Impoverished economics majors

3.1.1 Economic growth level

Should the underlying real estate investment trust assets face a thriving macroeconomic environment, they possess other opportunities to invest further as well as obtain more operational revenue on market.

3.1.2 Inflation levels

The real estate investment trusts owners are automatically as well insulated against inflation.

3.1.3 Monetary policies

Monetary policy is extremely sensitive in such prices as REITs. The monetary authorities can devise monetary policy, and it will result in a scramble of a large amount of hot money in the securities market thus resulting in an eventual increase of the price of the REIT. The monetary authorities decrease the amount of money released into the market into the securities during tight monetary policy and this will decrease the prices of the REITs. The monetary authorities or the policymakers are using the short-term interest rates as the major instrument of the market control. Multi-purpose: later the text in the monetary policy introduced, as given under the VAR model, the money supply is also applied though, interest rate will be given with micro factors. In this, lies what seems to torment the two.

3.1.4 Market interest rate level

The degree of such a broad assessment of REITs to a significant degree there is. Not only of course could not the investors require so high pay and payments of dividends and a lower value of lack of interest calculable, but it is much less expensive to finance the investment trust businesses, based on investment-grade real property, which is beginning at debt financing or business based on recovery, and that distinction between alluring of recovery and permanent financing of alluring of recovery is becoming more pronounced. The fact that the economy is expanding is of course a bit of a setback in raising the valuation of the REITs, as well. When the growth hours are large by which the investor would anticipate the rise in the occupancy rate of the companies of REITs raising the rate of rent, it is fitting to observe that the growth of the rate of rent increase is finer than Funds From Operations (FFO) per share of companies which would also rise and-rate of risk premiums and risk premiums respectively- reduction.

3.2 Madison and Makita Semen

3.2.1 Rental price index

Where the firm possesses the power on the rental housing assets then the firm could create REITs on the assets in the banking assets and provide the shares to the stockholders who was true to the firm. Residential rent price index can therefore be said to be one of the variables in the measures by which the effect of meso industry conditions can be created under returns of REITs. The next variable is not simply some basic index of rent but rather HPI.

3.2.2 Office retail property index of rent

Office retail property rent price index is a relative value that establishes the overall trend and changes in magnitude of price of renting an office space and retail property. The tail-bang cash flow of the various equity and hybrid real estate investment trusts is the operating income of the office retail property. This paper therefore chooses such an index of analysis as office and retail property rent price.

3.3 Micro factors

The vast majority of the investment trust funds on the securities exchange are publicly invested in the form of stock or beneficial certificates, and consequently, as with the volatility of the market, any volatility in the value of the specific real estate, or in financing investment is highly correlated on the investment trust funds, any volatility on the securities exchange can quite readily affect the volume of the real estate investment trust funds in the short run. In the current paper, the following indicators are selected in the following way.

3.3.1 Overall market index

The overall direction of the market and the overall effect of any direction within this market on the returns as well as on the point where investment trusts in the real estate can revive have been determined using the index of market general in this paper. All Equity REITs Index will be selected as an index that is going to be used in this paper. How to establish it. The general outline here is one of the REITs infrastructures but is general. The latter variable is the infrastructure index.

3.3.2 Financial stock index

The financial stock index reflects both the trend, and the fluctuations on the stock prices in the financial industry.

3.3.3 Real estate stock index

The index of stock of real estate reveals the change and amount of change of price of stocks of real estate companies after the change of real estate stocks in alignment with the movement of stock price and hence ensuring the image of natural easy understanding graph of the extent to which the real estate industry is evolving. Moreover, their assumption of the existence of 3 variables, and 2 triggers simplified the empirical model.

4 Empirical analysis of factors influencing REITS returns

4.1 Analysis methods introduction

4.1.1 VAR model

The VAR model applies estimates of all current variables in the model based on numerous lagged in variables of each variable. These are the estimated variables, which are known as the joint endogenous variables that are not restricted by anything in any way, till the estimation of the stereotypes. In the VAR, models are made based on the statistical nature of the data. Each endogenous variable of a system according to the lag values of all endogenous variables in the system is priced in the VAR model, and so, the univariate auto-regression model is generalized to a multivariate time series variable autoregression model by the VAR model. VAR model is one of the easiest models that an individual can use in his/her analysis and forecasting of various variables to do with the economy. And even in some, the case of nonparametric then multivariate may be reversed may be reversed and thus a gradual but gradual tendency is toward more and more economists considering the VAR model more carefully. The general form of the VAR model can be expressed with a lag rank of higher or less K and more variables of N as follows.

$$Y_t = \mu + \pi_1 Y_{t-1} + \pi_2 Y_{t-2} + \cdots + \pi_k Y_{t-k} + \mu_t \tag{1}$$

In Equation (1), Y is the $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots, \ -\infty < x < \infty$, time series column vector $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots, \ -\infty < x < \infty$. It is not all in these elements, but may have in its element's correlation in it, that is, the random error terms which correlate with the various equations. Interactive relationship between more than two variables is often analyzed by looking at VAR model, impulse response capabilities and breakup of analysis of variance can be used to represent interactive relationship between many economically relevant variables.

The VAR model is rather popular to test the correlation between various variables. The response of a combination of economic variables to its interaction can also be explained using the Impulse Response Functions analysis, and Variance Decomposition analysis.

4.2 Determination and adoption of influencing variables

4.2.1 Macro factors

The synthesis of various similar positions, inflation, level of market interest rates and money supply are referred to as macro factors embraced. Concerning as far as any indicator point view is concerned:

The economy in US is indicated in terms of industrial Production Index (INDPRO). The inflation relies on the monthly data of the US.

It relies on the monthly US Money Supply information. Then it is micro factors which market is being operated on the interest rate on which the 10-year bond yield of the interest rate is being measured subsequently.

4.2.2 Meso factors

Meso factors have much in common with the industry factors including glamorous properties. Some of the normative indicators of a traditional real estate REITs are used by it, including the growth rate on rental income, change in vacancy rates and rental property prices. Compared to traditional real estate REITs, infrastructure REITs value stock need not be based on familiar measuring doctors involving office/retail needed realty income tied predooms or even vacancy dimensions. As marketable at once underlying and central to activities of a modern civilized economy, yet displaying something of a public welfare strain, i.e. at once subject to direct management direction by the government agencies represented by the S&P 500 Utilities Sector Index has been selected as a 200 corresponding index. Moreover, as real estate as well as infrastructure real estate bonds in the real estate industry segment is vulnerable to the prosperity level of the real estate's industry, the influence of the prosperity level of the real estate's industry on the infrastructure REITs returns are necessary, thus introducing the HPI as another adjusting factor. The final empirical model assumes the explanation of the rate of growth of rental income and vacancy ratio without explaining them.

4.2.3 Micro factors

Its stock market turnover that is indicated in stock index. Some of these variables that reflect bond markets are some such as US 10 years Treasury bond yield.

4.3 Construction of the VAR model

The monthly return rate of the FTSE Nareit Infrastructure REITs Index is selected as the explained variable Yt. The sample period is from January 2012 to December 2019.

Table 1: VAR model factor selection able.

Category	Variable Name	Section Title	Reflect Matter	Selected Metric
Macro	INDPRO	Economic growth condition	Economic growth condition	US industrial added value
Intermediate	M2	Monetary policy	Monetary policy	Money supply
Micro	UTIL	Inflation situation	Inflation situation	Inflation rate
lmelvnnator	Overall level of stock market prices	Prosperity of public utilities industry	S&P500 util income index	S&P500 index
-	-	-	S&P500 util income index	Ten-year treasury yield

The Table 1 shows different economic variables, grouped into categories like "macro," "intermediate," and "micro." For each variable, it lists what it represents (such as economic growth, inflation, or monetary policy), what it reflects (like industrial value or money supply), and the specific metric used for analysis (like the S&P 500 index or inflation rate). It helps explain how these variables are linked to different economic factors.

4.4 Impulse response and variance decomposition analysis results

The model results are disclosed, summarizing the positive or negative correlation of the selected Table 1 independent variables on infrastructure REITS return changes, as well as the strength of the variables' explanatory power, thereby explaining its return characteristics.

4.4.1 Descriptive statistics of the data

According to Table 2, from the perspective of macro indicators, from January 2012 to December 2019, US REITS returns fluctuated significantly; from January 2012 to the end of 2019, the US macroeconomic performance was good, and the industrial production index basically maintained a stable growth trend. The fluctuation of the inflation rate was synchronized with REITS returns. The house price index fluctuated with less frequency but intuitively synchronized with returns. The utilities index and the S&P 500 index generally showed an increasing trend during the inspection period. The 10-year Treasury bond yield showed regular oscillations.

Table 2: Data statistics Jan 2012 ~ Dec 2019.

Category	Indicator name	Mean	Maximum	Minimum	Std dev
-	ROT	1.51	12.84	-10.91	4.40
Macro index	INDPRO	104.201	110.55	91.27	3.66
-	M2	12853.04	18603.2	9750.7	2072.48
-	CPI	0.13	0.80	-0.70	0.30
Meso index	HPI	0.51	2.56	-1.02	2.56
-	UTIL	242.93	339.37	176.28	42.71
-	S&P500	2231.86	3435.22	1285.64	554.24
Micro index	BOND	2.11	3.11	0.60	0.57

The money supply itself cannot explain the problem of changes in money supply. Therefore, this indicator is transformed into the increment of M2, denoted as $\Delta M2$. Simultaneously, to examine the impact of the growth rate of the S&P 500 index and the fluctuations of the utilities sector index on REITs, these two indicators are adjusted to growth rates.

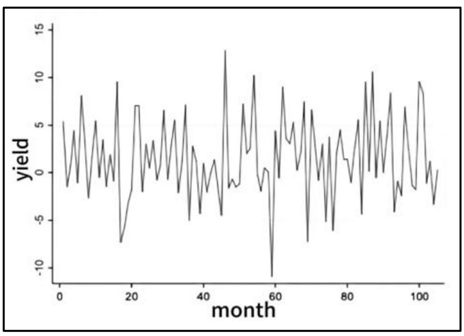

Fig. 1. REITs returns curve.

In Figure 1, A line chart showing the monthly returns of the FTSE Nareit Infrastructure REITs Index from Jan 2012 to Dec 2019. It shows significant volatility over time.

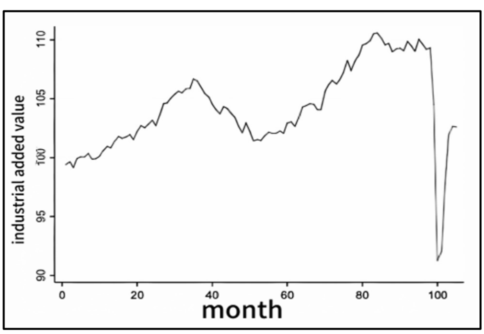

Fig. 2. Industrial production index curve.

In Figure 2, A line chart showing the monthly values of the US Industrial Production Index from Jan 2012 to Dec 2019. It shows a general upward trend with some fluctuations.

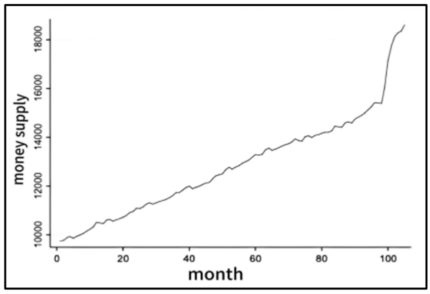

Fig. 3. Money supply curve.

In Figure 3, a line chart showing the monthly levels of US Money Supply M2 from Jan 2012 to Dec 2019. It shows a strong and steady upward trend.

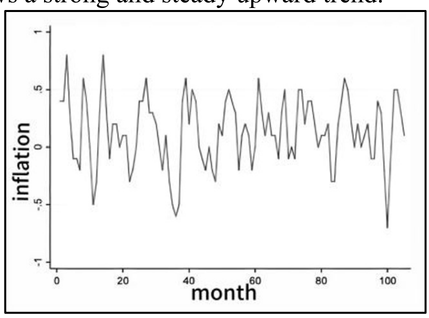

Fig. 4. Inflation rate curve.

In Figure 4, A line chart showing the monthly US CPI inflation rate from Jan 2012 to Dec 2019. It fluctuates around the mean of 0.13.

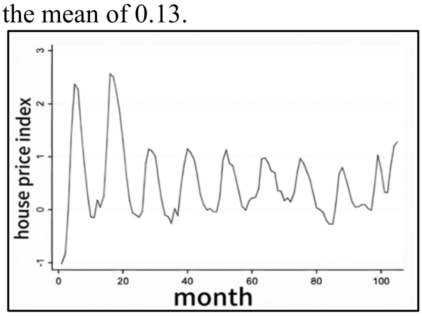

Fig. 5. House price index curve.

In Figure 5, A line chart showing the monthly US House Price Index change from Jan 2012 to Dec 2019. It fluctuates, sometimes negatively, but generally positively.

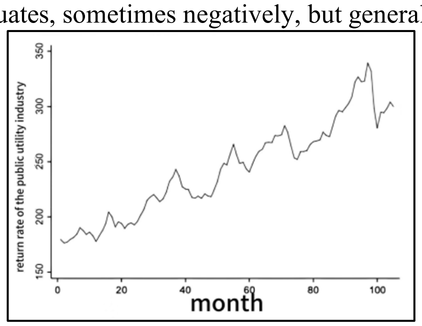

Fig. 6. Utilities sector index curve.

In Figure 6, A line chart showing the monthly levels of the S&P 500 Utilities Sector Index from Jan 2012 to Dec 2019. It shows a general upward trend with fluctuations.

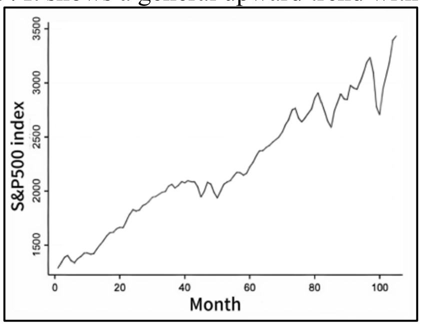

Fig. 7. S&P 500 index curve.

In Figure 7, A line chart showing the monthly levels of the S&P 500 Index from Jan 2012 to Dec 2019. It shows a strong upward trend with occasional dips.

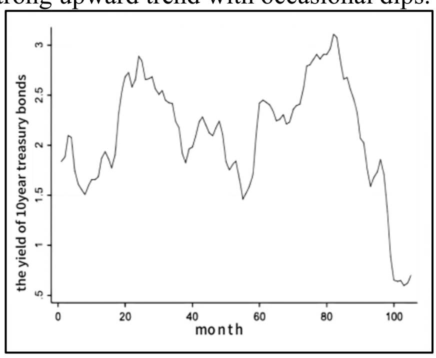

Fig. 8. 10-Year BOND Yield Curve.

In Figure 8, A line chart showing the monthly yield of the US 10-Year Treasury Bono del Estado (BOND) from Jan 2012 to Dec 2019. It shows oscillations, rising until late 2018 and then falling.

Table 3. Adjusted data statistics Jan 2012 ~ Dec 2019.

Category	Indicator name	Mean	Maximum	Minimum	Std dev
Macro index	ROT	1.51	12.84	-10.91	4.41
	INDPRO	104,48	110.55	99.16	3.20
	M2	59.42	193.30	-96.60	65.50
Meso index	CPI	0.13	0.80	-0.60	0.30
-	HPI	0.49	2.56	-1.02	0.67
-	UTIL	0.0068	0.0791	-0.0985	0.04
Micro index	S&P500	0.01	0.08	-0.09	0.03
-	BOND	2.11	3.11	0.60	0.57

With the assistance of Table 3, one can also demonstrate the results in the form of statistical data on different categories and indicators of the January-2012 to December-2019 period.

This picture includes a table that gives a brief overview of the adjusted statistics of various economic indicators during the period between January 2012 and December 2019. This table is once further subdivided into other different categories, such as: macro index, meso index or micro index which bring with them the use of different indicators. The indicators are laid in a tabular form with their mean, maximum, minimum and their standard deviation.

Macro Index: This indicator consists of aspects of the growth in industrial production or money supply growth.

Meso Index: Index that has certain walkdowns like Consumer Price Index and house price index.

Micro Index: Interest: Considers stock market information.

4.4.2 Stability test of VAR model

The stability test of the VAR model indicates that all the roots of the characteristic equation accept smaller values than the value of one of the moduli of a unit circle and the derived VAR model is hence stable.

4.4.3 Granger causality test

The results of the Granger causality test indicate that all 8 specific samples of Return on T-bil (ROT) are all Granger causals, at the test level of 5 percent. The causal relationship between Industrial Production Index (INDPRO) and ROT is not present.

4.4.4 Analysis of the reaction to impulse

Dynamical effects of a one standard deviation shock to every variable on both current values and future values are investigated by using impulse response capabilities.

Price effect of ROT to CPI: ROT deals with CPI negatively whereby the shock is peak in the second period before diminishing and resulting in equilibrium.

ROT Effect of HPI to ROT: Positive signal of HPI to ROT, at the second period the effect is greatest and decreasing gradually to an equilibrium condition.

Response of ROT to ΔUTIL: ROT has been found to respond positively to the shock ΔUTIL that reaches a peak in the second period and thereafter the effect decreases steadily with the decay of the shock.

Report on reaction of ROT to Delta S&P 500: The positive effect of the 500 effect is the increased value of ROT at the peak in the second period, but the effects produced by the shock are positive and in the long run the effects are weak and exhausted over time.
The ROT resulting to BOND contribution with positive effects to the ROT that would cause maximum effects in the second period and so would start reducing then further latter periods would time waste.

5 Conclusion

The article presents a research study of the US infrastructure REITs determinants of returns. Theoretically, the VAR model is estimated based on monthly values over January 2012-December 2019. The responses draw through the following response to impurity and analysis of variance functions yield the following responses:

The Macro Factors have a significant impact on the negative returns of REITs. Its beneficial contribution is in the supply of money, and its adverse contribution is the inflation. In this model set up and now it did not identify the economic growth as a Granger cause.

Meso Facts also exist when it comes to the returns of REITs. The utilities sector has a positive response of the house price index and increment of the index rate.

The most potent are Micro Factors. The total effect of the stock market in general on REITS returns is positive and the largest contributor to variance. The theory is not opposed to the negative influence that the bond yield causes.

The set of factors that determine the returns of a REITs seems to be a combination of the mix of the macro and meso and micro factors among which the forces force of the performance of the stock market is the most superficial, either in the short presumably factors or in the medium temporary factors.

Some of its limitations include that it needs a sample period, which was not recent in time of the major crisis or the COVID-19 pandemic which will show just the opposite results. Future studies can: broaden the sample with serial sample periods; cross-studies of other types of REITs (e.g. equity vs. mortgage vs. infrastructure); additional detail of underlying asset performance (e.g. rental earnings, occupancy rates of specific sector when available); and new hampered studies in nascent Chinese market in REITs where appropriate data can be met.

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