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Real Estate versus Financial Asset Returns and Inflation: Can a *P** Trading Strategy Improve REIT Investment Performance?

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Abstract. **The ability of a financial or real asset to provide a rate of return above the rate of inflation is crucial to investors. The financial literature on the inflation-hedging effectiveness of various investments suggests that real estate acts as a hedge against inflation on a period-by-period basis, while financial assets do not. Given this, an investor who could accurately forecast changes in inflation, and therefore alter his/her investment portfolio between real estate and financial assets, should be able to significantly improve portfolio returns.**

Recently, a new method of measuring potential inflation has been developed by the Federal Reserve Board. Dubbed *P, it relates long-run spending in the economy to long-run output and gives an implied value for future inflation. In this study, the accuracy of *P** in forecasting prices is compared to conventional forecasts of inflation. The *P** variable is then used to generate a decision rule for investors in terms of holding financial assets (which performs well in periods of low or falling inflation) and real estate (which has been identified as an asset that behaves as an effective hedge against inflation). The results for this strategy are then contrasted with the performance of selected assets under a simple buy-and-hold strategy.**

Introduction

One of an investor's major objectives is to protect wealth against inflation. It has been observed that, during periods of high inflation, certain financial assets do not protect the investor against changes in the price level and actually perform as a perverse hedge; i.e., decrease in value on a period-by-period basis. This behavior has been documented by Nelson (1976), Jaffe and Mandelker (1976) and Stulz (1986), among others. On the other hand, tangible assets such as real estate have generally served as an effective hedge against inflation (see Rubens, Bond and Webb, 1989). Consequently, investors who can correctly anticipate significant changes in inflation and are able to alter the composition of their investment portfolios between real and financial assets should be able to achieve better investment performance than a buy-and-hold strategy.

Recently, a new method of predicting inflation has been developed by the Board of Governors of the Federal Reserve System (see Hallman, Porter and Small, 1988). Dubbed P^* (P-star), it is the predicted price level generated from the identity $M^*V = P^*Q$, using

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the M2 money supply (M), the long-run M2 velocity of money (V), and the level of real potential output (Q). The P^* variable is essentially a prediction of the general level of inflation based on expected spending, relative to potential production. As such, it can easily be transformed into an inflation forecast.

This study will examine whether P^* can be used, in conjunction with other indicators, to develop a real estate investment strategy that outperforms a simple buy-and-hold approach to investing in real estate properties. Using P^* as a guide to future trends in inflation, the performance of passive investors in REITs will be contrasted with an active strategy of switching between real estate (during periods of accelerating or high inflation) and financial assets (during periods of falling or low inflation).

Review of the Literature

A complete inflation hedge, as defined by Rubens et al. (1989) is when the return on an asset varies in a one-to-one ratio with the variation in the rate of inflation. For many years, economists believed that common stocks were effective hedges against inflation. This was based on the belief that rising prices would generate rising earnings and dividends and cause an upward movement in share prices. This conclusion was initially challenged in a series of empirical papers by Bodie (1976), Jaffe and Mandelker (1976), and Nelson (1976). All three papers culminated in the finding that nominal and real rates of holding period returns on corporate equities were negatively and significantly related to the inflation rate. More recent studies have also examined the effectiveness of common stock as an inflation hedge. These studies, including those by Moosa (1980), Hasbrouck (1983), Gultekin (1983), and Stulz (1986), agree with the conclusions reached by the previous researchers that inflation was bad for financial assets. Gultekin and Hasbrouck in particular, found that the unexpected, as opposed to the expected, component of inflation explained the negative hedging characteristics of common stocks and bonds. Finally, Feldstein (1980) offered a theoretical explanation for the negative behavior of stocks relative to increases in inflation. Using primarily institutionalized problems such as replacement cost depreciation and taxation of nominal (as opposed to real) returns, he asserted that the negative relationship between equity returns and inflation was logical.

With regard to the inflation-hedging effectiveness of real estate, a limited number of studies indicate that properties have generally served as an effective hedge against rising prices. Fama and Schwert (1977), using Treasury bill rates as a measure of expected inflation, concluded that private residential real estate is a complete hedge against both expected and unexpected inflation. Brueggeman, Chen and Thibodeau (1984) found commercial real estate to be an effective hedge against expected inflation, as did Hartzell, Hekman and Miles (1987). Rubens et al. (1989) found that inclusion of real estate in portfolios lowers risk per unit of return and provides greater inflation protection and that farmland and residential real estate were complete positive hedges with regard to unexpected inflation. Wurtzebach, Mueller and Machi (1991) conclude that, while commercial real estate acts as an effective inflation hedge, it does so primarily when market supply and demand are in balance. Significant vacancy rates are found by them to be at least as important as inflation in determining real estate returns.

The evidence is strong that unexpected increases in inflation have had strong negative effects on stock prices, while real estate has generally served as an effective positive hedge against inflation. Given this, it is logical for investors to attempt to accurately forecast

inflation in order to minimize the probability of holding financial assets when there are increases in unexpected inflation and to increase their holdings of real estate investments in balanced markets (that is, investors try to maximize their wealth).

*P** as An Inflation Forecasting Tool

Inflation occurs over long periods of time when aggregate demand grows faster than aggregate supply. Aggregate demand (total spending) in the economy must, by definition, be equal to the quantity of money in circulation (M) times the turnover rate of money or velocity (V). Aggregate supply must be equal to the prices of goods and services (P) times the quantity of goods and services produced (Q). The two must be equal ex-post (imbalances are reflected as increased or decreased spending on inventories). Therefore, the result is the traditional equation of exchange:

$$M*V=P*Q\,. \tag{1}$$

When a broader measure of money, $M2$, is used in (1), it has been observed that over many years the value of V is remarkably stable. This implies that aggregate demand in the long run is proportional to $M2$. Recognizing this, the Federal Reserve Board has generated an inflation forecasting variable called P^*. It is equal to the long-run level of aggregate demand ($M2*V1$), where $V1$ is the mean $M2$ velocity for an extended sample period, divided by the Federal Reserve Board's estimate of the potential output (Qp) for the U.S. economy. Thus, P^* is seen as:

$$P^* = \frac{M2*V1}{Qp}. \tag{2}$$

P^* is the price level that should exist, given a certain stock of $M2$. When this is above the current price level, the inflation rate can be expected to accelerate. When $P^*<P$, there should be downward pressure on the inflation rate.

Research on P^* as a forecaster of inflation has, thus far, been very limited. Hallman, Porter and Small conducted an intensive study of the forecasting accuracy of P^* (1988). Using diagnostic tests, first difference vs. level tests, tests of components of price gaps, tests of a general nested model and an examination of the effects of deregulation of the financial system and oil shocks on the P^* relationship, they concluded that "... P^* can help the monetary authorities track the implications of short- and intermediate-term policies for the long-term objective of a stable price level." They also reached the conclusion that P^* outperformed several inflation forecasting methodologies, including T-bill, ARIMA and models developed by various forecasters. The results indicate that P^* is a useful tool for forecasting movements in inflation.

Using *P** in Real Estate Investment Decisions

In this section a buy–sell rule, based on the relationship between P^* and the actual value of the implicit price deflator, is employed. The investment results using this rule will then be compared to a strategy of simply buying and holding the various assets over the selected sample periods.

Exhibit 1
Values of *P* (GNP Deflator) and *P from 1972.1 to 1991.4**

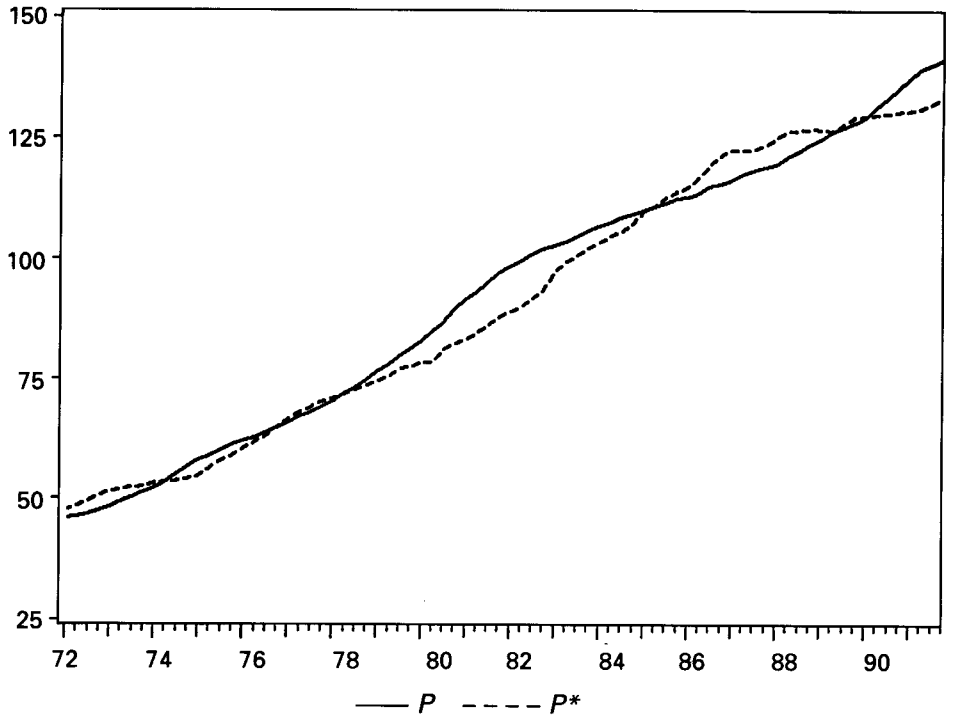

Exhibit 1 shows the values over the 1972.1–1991.4 period for the GNP deflator (P) and the values for P^*. When the value of P is above that of P^*, it is assumed that there are downward expectations about inflation and, therefore, a buy signal is generated for financial assets and a sell signal is generated for real estate. When the value of P is below that of P^*, it is assumed that there are upward expectations about inflation and a sell signal is generated for financial assets and a buy signal is generated for real estate.

One recalls Wurtzebach, Mueller and Machi's (1991) conclusion that, while commercial real estate acts as an effective inflation hedge, it does so only in the presence of market supply and demand being in balance. No one can question that imbalances between supply and demand in real estate may significantly affect returns. However, the above analysis may fail to recognize that a general inflation results from excess demand in the aggregate. Therefore, in periods of rising inflation there should be higher demand for, and lower vacancy rates in, real estate. To test for this, the vacancy rate (as a percent) for all homeowners and rental units is regressed against the one- and two-year lagged rate inflation rates derived from the GNP deflator. In addition, tests for causality using pairwise Granger causality tests are performed. The results are presented in Exhibit 2.

The results suggest that almost 70% of changes in vacancy rates are due to changes in lagged inflation. This is because rising inflation is due to excess demand in most markets, including real estate. The Granger tests strongly indicate that lagged inflation adds significantly to explaining the vacancy rate, but that the opposite is not true. The conclusion is that the ability to accurately forecast movements in inflation should allow better

Exhibit 2
Regression Results of Vacancy Rates and Inflation from 1960.1 to 1991.4
(t-statistics in parentheses)

Constant	1-Year Lag	2-Year Lag	R^2	Std Error
8.46 (62.51)	−.160 (3.751)	−.237 (5.613)	.672	.693

Pairwise Granger Causality Test

Null Hypothesis (4-Quarter Lags)	*F*-statistic
Vacancy rate is not caused by lagged inflation	3.561
Lagged inflation is not caused by vacancy rate	1.123

prediction of changes in real estate returns. This is in stark contrast with the Wurtzebach et al. conclusion that no consistent causal relationship exists between vacancy rates and inflation. Therefore, the decision rule on real estate versus financial assets used in this study is based only upon the inflation direction predicted by P^*.

Financial return data is for total returns (capital gains plus reinvested dividends) and is from *Stocks, Bonds, Bills and Inflation* (1990). For the purposes of this study, large capitalization common stocks (S&P500), small capitalization stocks, long-term U.S. Government bonds and U.S. Treasury bills will be used as the investment instruments when the decision rule indicates investment in financial assets. The returns are available monthly, but are expressed as quarterly data. REIT returns are from the *REIT Sourcebook,* available from the National Association of Real Estate Investment Trusts (NAREIT). REIT returns analyzed in this study include all REITs, equity REITs, mortgage REITs, and hybrid REITs. Returns are quarterly price and income totals from 1972.1 through 1991.4.

Because of the presumed inflation-hedging characteristics of real estate, investors are assumed to hold only commercial properties in quarters where P^* indicates accelerating inflation. In quarters where the P^* model predicts declining inflation, investors are assumed to hold only financial assets. Since this involves rearrangement of the investor's portfolio, the strategy involves trading costs. Thus, the returns are calculated using a flat 1% purchase/sale commission. These holding period returns for the P^* strategy are then compared to a simple buy-and-hold strategy for the REITs and the four financial assets over the entire sample period. For the 1972.1 through 1991.4 period, the relationship between P and P^* results in the following investment strategy:

Period No.	
1	1972.1 to 1974.2—Real Estate
2	1974.3 to 1976.3—Financial Assets
3	1976.4 to 1978.1—Real Estate
4	1978.2 to 1985.2—Financial Assets
5	1985.3 to 1989.4—Real Estate
6	1990.1 to 1991.4—Financial Assets

The results of a buy-and-hold strategy are presented in Exhibit 3 for each type of asset. Under the naive buy-and-hold strategy, small stocks earn the highest rates, followed by

equity REITs and S&P500 (large) stocks. In terms of risk per unit of return (or coefficient of variation, CV), Treasury bills had the lowest CV, followed by equity REITs, large stocks and small stocks, respectively. REITs as a group (all) and mortgage and hybrid REITs all had very low relative returns and high CVs.

Exhibit 4 shows the returns and CVs for REITs and financial assets using a P^* strategy. For example, REITs are assumed to have been held from 1972.1 through 1974.2, when P^* was greater than P. Financial assets are held in the periods when P^* is less than P. Because of the lag in the release of data, the strategy is implemented one quarter after P^* moves above or below P.

The results of the strategy are noteworthy. The strategy of alternating REIT investments and four different financial assets is useful in enhancing some investor returns. With the exception of T-bills, the P^* strategy earns a higher rate of return when combining equity REITs with S&P500 stocks, small stocks and government bonds. And every REIT, when combined with either S&P500 stocks or small stocks under the P^* strategy, has a lower coefficient of variation than by itself.

Exhibit 3
Annualized Returns and Coefficient of Variations on Various REIT Properties and Financial Assets under a Buy-and-Hold Strategy (with Commission) from 1972.1 to 1991.4

Asset	Return (%)	Coeff. of Var.
S&P500	11.87	1.47
Small stocks	14.79	1.75
Government bonds	8.40	1.44
Treasury bills	7.68	.34
REIT-All	8.73	2.62
REIT-Equity	12.70	1.41
REIT-Mortgage	4.22	5.40
REIT-Hybrid	7.52	3.70

Exhibit 4
Annualized Returns (R) and Coefficient of Variations (CV) on Various Commercial Properties under a P^* Strategy Using Various REIT Properties and Financial Assets (with Commission) from 1972.1 to 1991.4

	REIT Asset							
Financial Asset	All R%	CV	Equity R%	CV	Mortgage R%	CV	Hybrid R%	CV
B&H*	8.73	2.62	12.70	1.41	4.22	5.40	7.52	3.70
S&P500	9.70	2.12	13.16	1.22	7.74	2.93	7.38	3.02
Small	14.98	1.87	18.14	1.34	12.84	2.34	13.33	2.33
Bonds	5.46	3.39	8.63	1.70	3.33	6.16	3.82	5.29
T-bills	3.74	4.01	6.91	1.52	1.61	10.68	2.10	8.06

*Buy and Hold

When combined with U.S. Government bonds and Treasury bills, however, the P^* strategy does not appear useful for any type of REIT. With every REIT, the return, when combined with bonds and bills, is lower than the placebo of buying and holding the REIT in question. In addition, the P^* strategy with bills and bonds produces a higher CV for all of the REITs. This is not a surprising finding for Treasury bills, given their short-term maturity and reasonable inflation-hedging effectiveness. The results of the strategy with bonds, however, is quite puzzling. Presumably, bonds should be poor inflation hedges and great deflation hedges.

As an aside, it should be pointed out that the P^* strategy would have kept an investor out of the stock market and in REITs during the stock market crash period in 1987. It should also be obvious that an investor attempting to maximize returns with the lowest CV would have done best during this period with common stocks and equity REITs or small stocks and equity REITs. In both cases, the returns to holders of S&P500 and small stocks were higher and CVs lower when these financial assets were combined with equity REITs using the P^* strategy, contrasted to buying and holding the stocks. The conclusion is that some REIT holders would benefit from the P^* rule and equity holders benefit when combining with equity REITs. In addition, holders of small stocks earned a higher return when combined with all REITs, although the CV for this strategy is slightly higher than the buy-and-hold strategy for small equities.

Summary and Conclusions

In this study, the variable P^* (defined as the ratio of quarterly M2 times the mean value of M2 velocity divided by real potential output) was first examined as a predictor of the actual GNP price deflator. It was found to have been a useful tool in forecasting general movements in inflation in the future. Given the behavior of real estate as an effective inflation hedge, the P^* variable was then used to establish by-and-sell signals over the period 1972.1 through 1991.4 for REITs and selected financial assets. A period where P^* was above the actual level of the GNP deflator, P, was considered to be a forecast of increasing inflation, and thus a sell signal for financial assets and a buy signal for REITs. A level of P^* below P was considered consistent with falling inflation and produced a buy signal for financial assets and a sell signal for real estate. The buy–sell decisions were implemented on portfolios of REITs, including all REITs, equity REITs, mortgage REITs and hybrid REITs.

The financial assets used were the S&P500, small stocks and U.S. Treasury bonds and bills. This strategy for REITs was then contrasted with a strategy of buying and holding REITs and financial assets over the sample period. The returns for the P^* market timing strategy and the buy-and-hold strategy were calculated on a net of 1% commission basis. The results clearly indicated that holders of REITs improved their returns and lowered their coefficient of variations by switching between real estate and large and small stocks using the P^* strategy. When combined with bonds and bills, however, the P^* strategy was inferior to a buy-and-hold strategy for REITs. In addition, buy-and-hold strategies for large and small stocks by themselves were inferior to a P^* strategy that included equity REITs. The conclusion of the study is that the P^* strategy is an effective investment tool in reducing relative REIT risk and boosting returns when used with large and/or small cap common stocks, but not bonds and T-bills.

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