An approach in Market Residential Using Co-Integration Traditional Model

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Abstract: Using classical regression and Co-integration approach, this study investigates the short-term and long-term inflation hedging effectiveness of residential property in Third World Countries over the period 1980-2011. The Co-integration test used is the Autoregressive distributed lagged (ARDL) bounds testing approach of Pesaran et al. (2001) that based on the estimation of an unrestricted error correction model (UECM). This paper addresses one of the major problems of how to use a relatively small sample to estimate the long term relationships between variables using traditional Co-integration approaches that faced by many researchers in economic modeling. The results of actual inflation model show that the Third World Countries small and medium size residential property provides an effective hedge against actual inflation. The bounds testing results provide strong evidence to support the hypothesis that residential properties are effective long-term hedge against inflation. This study concludes that small and medium size residential property in Third World Countries have been a better short term and long term inflation hedge than large and luxury residential property, stock and time deposit.

Key words: Inflation hedging, Residential property, Co-integration, Third World Countries.

INTRODUCTION

The impact of inflation on real estate return has long been a primary financial concern of investors since the early 1970s. While inflation may have slowed in the 1990s, the global financial crisis in the 2008 and recent anxiety of global inflation provide an opportunity to re-examine the relationship between inflation and residential real estate return. The effectiveness of real estate and financial assets as an inflation hedge has been studied since 1970s. In a pioneer study, Fama and Schwert (1977) examined inflation hedging ability of residential properties, government bonds and common stock in the US between 1953 and 1971 using classical regression models. The authors concluded that only residential real estate was a complete hedge against expected and unexpected inflation. In fact, those regression results are not sufficient as a basis for concluding that the assets have been hedged against inflation even though Fama and Schwert (1977) had tried to apply a ‘differenced variable’ approach instead of the ‘level variable’ to tackle the spurious regression problem indicated by Granger and Newbold (1974). While the method of ‘differencing’ satisfies the stationary condition, the economic inferences derived from such estimated parameters have limited significance in the short-run. The criticism of spurious regression is still serious if the regression model’s underlying variables exhibit a long-run equilibrium relationship as the relevant long-run information may be lost after the differencing procedures have been completed. To tackle this problem, Ganesan and Chiang (1998) employed Engle-Granger (1987) Co-integration approach to investigate inflation hedging ability of real estate assets and found conflicting results between regression and Co-integration approach. They concluded that residential properties is a good hedge against inflation in the short-term but fail to provide a long-term inflation hedge in Third World Countries over the period 1984-1994.

Due to the statistical uncertainties of previous results, this research aims to re-examine the short and long-term inflation-hedging characteristics of residential properties with various small, medium, large and luxury apartments as compared with two major alternative financial assets (common stock and fixed deposit) in Third World Countries over the period of 1980-2011. The Third World Countries residential property markets is selected as Third World Countries has been one of the most dynamic markets in the World. For instance, the residential property price in general increase eleven-fold over the bull market period from 1984 to 1997 but decrease more than 65% over the bear market from 1998 to 2003 and rebound 200% over another bull market from 2004 to 2011.

2. Research Methods And Data:

2.1 The Data:

The annual data series on inflation rate, common stock price, and time deposit rate were extracted from the Third World Countries monthly digest of statistics, while the data series of various residential real estate returns were collected from the Third World Countries property review. The estimation period covers a period of 32 years from 1980 to 2011. As Fama and Schwert (1977) concluded that the consumer price index (CPI) is an acceptable proxy for the price levels an investor faces, the consumer price index A (CPIA) will be employed as
a reliably accepted measure of actual inflation because it consists of the smallest weight of private housing cost among all series of Third World Countries CPI. The four categories of private residential units are classified according to sizes; from the smallest class (U40) to largest class (O100), representing floor areas of 39.9 square meters (m²) and below (U40), 40.0 to 69.9 m² (U69), 70.0 to 99.9 m² (U99), 100 m² and over (O100), respectively. Given the disaggregated data set, it is possible for us to perform submarket tests across the different size categories.

2.2 Actual Inflation Model:

As shown in equation one, the first model is designed to test whether the various residential real estate and financial asset are effective hedges against actual inflation. This is equivalent to assume that the expected inflation is forecasted by Naive model as suggested by Gultekin (1983), and it provides perfect forecasts of inflation.

\[ \Delta RE_{it} = \alpha_0 + b_i \Delta INF_{it} + \epsilon_{it} \]  

where \( \Delta RE_{it} \) = return on residential real estate and financial assets and \( \Delta INF_{it} \) = actual rate of inflation. While the intercept \( \alpha_0 \) can be interpreted as representing the real rate of return, the beta coefficient on \( b_i \Delta INF_{it} \) shows the impact of the asset returns on changes in the actual change in inflation.

2.3 Selection of Pesaran ARDL Co-integration Approach:

Although the classical Engle-Granger approach and Johansen Co-integration approach had been applied by Gransen and Chiang (1998) and Stevenson (2000) to test for the existence of long-term relationships between inflation and real estate return in Third World Countries and United Kingdom, there are several disadvantages to those approaches. Firstly, the Engle-Granger (1987) and Johansen (1988) approaches, for example, required that all the underlying variables be integrated in the same order. The pre-modeling testing for the order of integration is technically the first essential step required to determine long-run Co-integration relationships. However, it is found that in our premodelling analysis that the traditional Engle-Granger approach and Johansen Co-integration approach will be unable to apply in this study because the unit root results, shown in section 3.2, indicate that all the underlying variables are either I(0) or I(1) variable and not integrated with same order. Secondly, Johansen (1988) Co-integration approach based on maximum likelihood method is an asymptotical efficient estimator. It implies that when the Johansen procedures are applied to small sample, such as annual real estate return data in this study, the parameter estimates will be subject to small sample bias. As the availability of the annual residential real estate return data is limited to 32, it is on the main concern about this small sample problem. Hence, there should be a strong need to look for alternative Co-integration approaches that is applicable for small sample size for further investigations into the inflation and asset returns relationships. The problems associated with unit root tests and limited sample size of annual data in this study support the use of the Pesaran et al. (2001) bounds testing approach (Pesaran approach hereafter), which is applicable irrespective of whether the underlying variables are I(0) or I(1) and applicable for small sample size.

2.4 Pesaran ARDL Bounds Testing (Cointegration) Model:

In contrast to the traditional Engle-Granger approach and Johansen Co-integration approach which have been widely applied in the empirical literature, the Pesaran et al. (2001) approach has not been applied in any inflation and asset return study for Third World Countries.

\[ DY_i = \alpha_0 + \alpha_i \text{time} + \sum_{k=1}^{K} b_k DY_{t-k} + \sum_{l=0}^{L} d_{l}DY_{t-l} + + g_1 Y_{t-1} + g_2 X_{t-1} + \mu_i \]  

An unrestricted error correction model (UECM) is constructed to test for the existence of a long-run relationship in equation 2, where Y is the dependent variable (asset return), the X is independent variable (inflation) and all variables in logarithm, K is the number of lags, and D represents the differences. The intercept and time trend may be added or deleted to UECM based on the empirical results in equation 2. Following Stevenson (2000), only actual inflation is examined for the Co-integration analysis. This is justified on the basis that the purpose of the Co-integration analysis is to test for evidence of a long-run relationship, and therefore it is legitimate to assume that actual and expected rates of inflation are equal. The maximum number of lags is 3 due to the limited sample size of 32 in this study. We then use bounds testing approach to examine for the presence of a long-run relationship between inflation and asset return using two separate statistics. Firstly, we use the F-statistics to determine the significance of the lagged levels of the included variables in the underlying autoregressive distributed lag model in Equation 2. The Pesaran approach gives two sets of critical values, one set assuming that all the underlying variables are I(0), and the second set assuming that all underlying variables are either I(0), or I(1). For each application, this provides a band covering all the possible classifications of the
variables into $I(0)$ and $I(1)$. According to Pesaran, if the computed F-statistics falls within the critical bound of the value band, a conclusive inference is inconclusive, and depends on whether the underlying variables are $I(1)$ or $I(0)$. The second test is a t-test on the lagged level dependent variable. The statistics have a non-standard distribution and depend on whether the variables are individually $I(0)$ or $I(1)$. The values of the F and t statistics will indicate the existence of the long-term relationships between the underlying variables in the inflation and asset return models.

3. Conclusion:

Using ARDL Co-integration approach, this paper firstly investigated the nature of the inflation hedging effectiveness of residential property, common stock and time deposits. The ARDL Co-integration results suggest that all size of residential real estate and common stock provide a long-term effective hedge for inflation over the long run. The Co-integration results is contradict to the findings of Ganesan and Chiang (1998), Chu and Sing (2004) and Zhou and Clementa (2010) but comply with Anari and Kolari (2002) and Li and Ge (2008). Overall, this study concludes that the small and medium size properties appear to provide a better short-term and long-term hedge against inflation than large, luxury apartments and financial assets in Third World Countries. Further research should be considered for the Co-integration and causality analysis of the nature of the inflation hedging effectiveness business real estate, such as offices, shops, factory and hotel and the directions of causality between inflation and residential and business real estate returns.

REFERENCES


