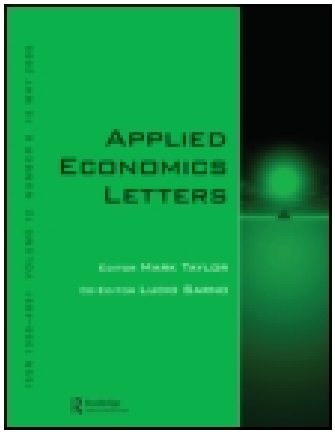

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The relationships between rent multiplier and user cost - a case study of Taipei

Sun-Tien Wu [a] & Chieh-Hsuan Wang [b]
[a] Department of International Business , China University of Technology , Taipei, Taiwan
[b] Department of Economics , National Chengchi University , Taipei, Taiwan
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The relationships between rent multiplier and user cost – a case study of Taipei

Sun-Tien Wu[a] and Chieh-Hsuan Wang[b,*]

[a]*Department of International Business, China University of Technology, Taipei, Taiwan*
[b]*Department of Economics, National Chengchi University, Taipei, Taiwan*

The value of Rent Multiplier (RM) for the city of Taipei has been in extraordinary magnitudes and remains to be a myth to most housing economists. Why does the RM in Taipei exhibit such a peculiarity? Is it because the populace there are so peculiar in their housing behaviours that can be held to account for such an extraordinary phenomenon or because there are logically consistent economic factors behind the scene that might have led the people to make their housing choices rather differently from the way usually envisaged by the conventional wisdom in economics? In this article, we try to uncover the myth by examining whether the economic factors such as user cost, vacancy rate and people's disposable income can be held to account for the above-mentioned consequence through a vector error correction model. More specifically, we examine whether there are long-term relationships between those explanatory variables and the RMs in question. The results show that our argument that the extraordinary RM phenomenon can be explained with user cost is empirically verified.

I. Introduction

The value of Rent Multiplier (RM) in Taiwan has been well above the level implied by economic theory for more than three decades. The phenomenon is even acute in the city of Taipei.

Although the phenomenon has been noticed and studied by Lin (1992), Lee (1997) and Peng and Chang (2000), among others, and came up primarily with an assertion that the extraordinary high RM phenomenon is mainly due to the rapid rising house price they observed in Taiwan during the periods they studied, the true cause of the phenomenon remains to be identified.

Obviously, the rising price argument is valid only in the booming period and the analytical framework they adopted seems to presume implicitly that the house market and the rental market are not connected so that the effect of changing conditions in the former does not get channelled into the latter. As such, the level of RM would inevitably become higher in boom periods. In our opinion, this is not an appropriate analytical framework to work with because we believe that house and rental markets in reality are connected and interactive to each other all the time such that rent and house prices must move in the same direction at least in the long run. Thus, the extraordinary magnitude of RM one observed in boom periods cannot sustain itself forever. Clearly, something other than the high price argument must be searched for a better explanation on this matter.

In this article, we argue that the user cost of homeownership can be held to account for the extraordinary

*Corresponding author. E-mail: 95258508@nccu.edu.tw

housing behaviour of Taiwanese people as manifested in their extraordinary housing preference in favour of owning rather than renting.[1] We believe that this extraordinary high RM is rather a logical result of rational choice given that the user cost of homeownership is extraordinarily low in Taiwan,[2] and we contend that the user cost of homeownership is a more appropriate approach in explaining about and shedding light on the inner substance of the extraordinary RM phenomenon. As such, the approach is a more general and appropriate one in the sense that it can be used to explain the mystery at any time for any country no matter whether the housing market of interest is in boom.

To demonstrate this contention, we shall put forward an analytical framework with the user cost of homeownership playing the key role in people's determination on their buying/renting decisions with an aim that the above-mentioned multiplier mystery can be unveiled. This analytical framework will be presented in the following section. Following that, we shall proceed to test those arguments with a vector error correction model to demonstrate that our arguments do have empirical ground. The results of the empirical works are then assessed and analysed to see whether the empirical models fit well with the data acquired. These assessment and analysis are presented in Section III.

Then, a summary of our study and some conclusions that are reached by this study are presented in Section IV.

II. The Analytical Framework and Empirical Methodology

The analytical framework of this study comprises two conceptual elements. (1) The user cost matters. (2) The markets are interactive such that price changes that resulted from one market's conditions would have effects on the price level of the other. As to the formulation of user cost, we follow the specification of Poterba (1991), which can be rearranged to arrive at an RM formula as

$$\mathrm{RM} = \frac{1}{((1-\theta)(i+\tau_{\mathrm{P}}) + \delta + \alpha + m - \pi^{\mathrm{e}})} \qquad (1)$$

where i, τ_{P}, δ, m and π^{e} stand for the interest rate, tax rate of the property tax, the rate of depreciation, the rate of maintenance and the rate of expected capital gain, respectively.

It is clear from the formula that the magnitude of RM depends reciprocally on the level of the user cost of homeownership. Thus, whenever we find that some of the terms in the denominator on the right-hand side term are taking extraordinary values in a certain country, we are readily able to explain, at least in theory, why that country has extraordinary RMs.

Here, one thing to note is in order. The relationship between the RM and the user cost as expressed in Equation 1 is an expression of the competitive equilibrium condition for housing markets in general. For any particular housing market, however, the condition may not always prevail. Thus, the magnitude of RM is inevitably subject to influences from demand- and supply-side factors over time. Therefore, when carrying out empirical studies, one needs to include demand- and supply-side factors, besides the user cost variable(s), as explanatory variables. In general mathematical form, this would amount to

$$\mathrm{RM} = f(\mathrm{UC}, V_{\mathrm{d}}, V_{\mathrm{s}}), f'(\mathrm{UC}) < 0, f'(V_{\mathrm{d}}) > 0, f'(V_{\mathrm{s}}) < 0 \qquad (2)$$

where UC represents the level of user cost whereas V_{d} and V_{s} represent, respectively, the other demand and supply variables that may have influences on the RM of interest.

III. The Empirical Work and Discussion of the Estimation Results

The function for the RM to be tested with empirical data is formulated as follows:

$$\mathrm{RM} = f(\mathrm{UC}, V, Y, T) \qquad (3)$$

where UC stands for the user cost of homeownership, V the seasonal vacancy rate for the area studied, Y the disposable income for the sample households and T the time trend of the RM time series. The specification of these variables is listed in Table 1.

[1] As a matter of fact, the rate of homeownership in Taiwan is so high that there are only few countries in the world that can be its competitor. On the contrary, the percentage of renters among all the households is only 13%, a figure that is hardly remarkable.
[2] The actual tax burden for those property owners, as shown by Peng *et al.* (2007), is roughly only one-tenth of the nominal rates stipulated by the authorities concerned, ranging from 0.09 to 0.13% for a couple of sampled districts in the city of Taipei. Viewing from the user cost perspective, this incredibly low tax incidences for the property owners must have profound impact on the house owners' cost of capital and would obviously affect their owning/renting decision in favour of owning instead of renting and hence push up the magnitude of RMs.

Table 1. The variables and their specifications

Variable	Specification
RM: rent multiplier	Defined as house price (P_H) divided by rent (R_H), where P_H and R_H, respectively, are measured in 10 000 NT\$/m^2
UC: user cost of homeownership	Defined as $((1-\theta)(i+\tau_P)+\delta+m-\pi^e)$, the same expression in RHS of Equation 2, where θ, i, τ_P, δ, m and π^e represent personal income tax rate, tax rate of the property tax, mortgage rate, depreciation rate, maintenance rate and expected capital gains rate, respectively, all measured in per cent
V: seasonal vacancy rate	Defined as the ratio of the amount of vacant units to the total housing stock for the area studied, also measured in per cent
Y: household disposable income	Measured in NT\$ per season

Note that the time trend of RM is generated by the estimation process itself. Note also that the vacancy rate is included to reflect the variations in housing supply *vis-à-vis* demand and household disposable income is included to account for the variations in demand whereas time trend has been added to account for other exogenous factors possibly affecting the RM.

The data set we used in this study is composed of four quarterly time series of RM, UC, V and Y that we acquired from various publications by the various authorities concerned in Taiwan from 1991Q3 to 2006Q2, and their stationarity properties are examined by the conventional unit root test and the Augmented Dickey–Fuller test before they were used in empirical study with the Johansen method.

The unit root test shows that the series for RM, UC, V and Y are not exactly stationary time series and all the variables are stationary in first difference at the 1% level. The Johansen test indicates that the null of a zero cointegrating relationship can be rejected at the 5% level. The results indicate that there are two cointegration vectors that existed in our model set.[3]

After confirming the cointegrating relationship, we then proceeded to explore the long-term relationship between the RM and its determinants. The result of the estimation is as follows[4]:

$$\begin{aligned} \mathrm{RM} = & -6.2941\mathrm{UC} - 34.3428V \\ & + 0.0000275Y - 0.01252T \\ & + 9.576065(-4.7940)^{***}\ (-4.78143)^{***} \\ & \times (5.5495)^{***}(-4.5206)^{***} \\ & \bar{R}^2\text{–value: } 0.71\ F\text{–statistic: } 16.46 \end{aligned} \tag{4}$$

The result represents the long-term relationships among the variables of our interest from which one can understand the direction and degree of the relation among those variables.

There are several points that can be made from the estimation results. First, the model fits the data for the city of Taipei quite well, as can be judged from the R^2 and F-statistic values. Second, all the coefficients estimated have their expected signs. We believe that this can be taken as an indication of the adequacy of our modal specification.

Third, all the variables included in the estimation equation are statistically significant, indicating that each variable considered here does have its own identifiable influence on the value of RM. In particular, the influence of UC, as indicated by the t-value of its coefficient, is so significant that the p-value of its rejection is as small as negligible!

Finally, the sign of the coefficient of UC for Taipei is negative, indicating that the magnitude of RM does go in the opposite direction with the value of UC indeed. This relation is exactly what we have laid down in the theoretical framework in Section II. This result obviously verifies our hypothesis that the extraordinary high RM that we have observed in Taiwan is a result of its extreme low user cost of homeowning.

The result also shows that the estimated error correction coefficient obtained from the regression of the vector error correction model is –0.07, and the t-statistic is –3.59, indicating that the RM in this study is adjusted at a speed of 7% every quarter and approximately 42.9 months or roughly 3.5 years is required for adjusting from short-term disequilibrium to long-term equilibrium.[5]

[3] Maximum eigenvalue test shows one cointegration vector, significant at 5%.
[4] The values in parentheses are t-statistics: *** denote t-statistics significant at 1% levels, respectively.
[5] As the industrial adjustment is made quarterly at a speed of 7%, the time required for short-term adjustment to long-term equilibrium is $1/-0.07 = 14.29$ quarters, meaning that $14.29 \times 3 = 42.87$ is needed for complete adjustment.

IV. Summary and Conclusion

The article tries to uncover the mystery of the extraordinary high RM that has emerged in Taiwan for more than three decades with a user cost approach. The results of the empirical study show that our hypothesis that the magnitude of RM can be explained primarily by the level of homeowners' user cost is unambiguously verified. The conclusion is made on the ground that our empirical model not only fits the acquitted data quite well but also meets other statistical requirements that are needed for establishing our confidence on the estimation work.

References

Lee, Zu.-G. (1997) A study on rental level in Taiwan Areas, Unpublished MA Thesis, N. B2002002289. Department of Land Economics, National Chengchi University, Taiwan (in Chinese).

Lin, C. C. (1992) An investigation to the relationship between rent and house price of Taiwan, *Journal of Taiwan Bank*, **43**, 279–312 (in Chinese).

Peng, C. W. and Chang, C. O. (2000) Expectation, pre-announcement and housing cycles, *Journal of Management*, **17**, 343–68 (in Chinese).

Peng, C. W., Wu, S. T. and Wu, S. H. (2007) An analysis on the influence of effective property rate on house price – a case study of Ta-Ton and Nu-Hu districts in the city of Taipei, *Journal of Taiwan Land Research*, **10**, 49–66 (in Chinese).

Poterba, J. M. (1991) House price dynamics: the role of tax policy and demography, *Brookings Papers on Economic Activity*, **2**, 143–83.