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Comparing consumption-based asset pricing models: The case of an Asian city

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ABSTRACT

Eight consumption-based asset pricing models are developed, estimated and compared their capacities in accounting for the asset markets in Hong Kong. Results based on conventional metrics or recently developed econometric techniques deliver similar results: introducing housing into the consumption-based models does not always improve the models' performance; how it is introduced matters. Recursive utility model and its housing-augmented variant, which emphasize the importance of early resolution of uncertainty and long term risk, outperform alternative models in forecasting stock returns. Collateral constraint model outperforms in predicting housing return, suggesting the importance of imperfect capital market in the housing market.

1. Introduction

This paper attempts to contribute to the literature by identifying the key determinants of the asset prices. More specifically, this paper constructs a series of consumption-based asset price models, and compares their empirical performance in explaining the housing and stock markets. As each model emphasizes a different set of driving force for the asset price movements, a comparison of model performance approximates a scientific assessment of different theories; each highlights a different set of asset price determinants. An evaluation of alternative asset price theories goes beyond intellectual curiosity. The trend of increasing integration of asset markets, the co-movements of the aggregate economy and asset markets during the recent global financial crisis may point to a different role of the central banks, as well as government intervention in the midst of potential asset market failure.[1] To address such a need, a *unifying framework* of the asset markets and the macro-economy is clearly demanded.

In fact, the economics literature has long sought to establish such a framework. For instance, Consumption-based Capital Asset Pricing Model (referred to canonical CCAPM hereafter), originally raised by Lucas (1978) and others, has been developed to relate the aggregate consumption to the stock market. Following the canonical CCAPM, researchers modified and extended the canonical

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[1] It is beyond the scope of this paper to discuss this literature. Among others, see Claessens et al. (2014) and the reference therein.

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model mainly in order to improve its empirical performance, including: (1) Recursive Preference (Epstein and Zin, 1989, 1991; Weil, 1989); (2) Habit Formation (Abel, 1990; Campbell and Cochrane, 1999; Constantinides, 1990). A common theme among these models is time-non-separability, i.e. they allow the marginal utility of consumption in the current period depends on previous period consumption or some valuation on the possible future holding.[2] We will provide more discussion on this in later sections.

Recently, researchers have also extended the canonical CCAPM to include housing in the utility function (as a durable consumption good) and in the budget constraint (as an asset). Piazzesi et al. (2007) label that as "Housing CCAPM" (HCCAPM). The main idea of this model is that the representative agent not only concerns the consumption volatility, but also the composition risk: the fluctuation in the relative share of housing service in their consumption basket. They also show that the non-housing consumption share can be useful in predicting the stock return, suggesting that there is a cross-market informational spillover. Other authors introduce housing collateral constraint (among others, Lustig and Nieuwerburgh (2005), Iacoviello (2004)), or labor income and home production (Santos and Veronesi, 2006; Davis and Martin, 2009, etc.) into the model, which seem to improve the asset price prediction.

Following all these contributions, this paper attempts to complement the literature by providing a comparison of model performance with data of an Asian city, namely, Hong Kong.[3] As most of the previous literature focus on the U.S. data, there are reasons to re-examine these models in a different context.[4] First, the United States is a large country and hence the national housing price index is inevitably a weighted average of the house prices among very different regions (for instance, see Green et al. (2005)). In contrast, Hong Kong is only a small city in terms of geographical area (only about 8% of the New York City), and hence the degree of "aggregation bias" in the Hong Kong housing price index may be lower than that in the U.S. national counterpart (for instance, see Hanushek et al. (2004)). At the same time such a small area has about seven million inhabitants currently. The high population density of Hong Kong also leads to the existence of an active housing market, which may facilitate the interpretation. Second, this paper can provide a robustness check, for instance, whether the results in the previous contributions depend on certain institutional setting specific to the United States. For instance, the U.S. practices local public finance in the sense that the local public goods (including the service of public education, local civil servants, etc.) are financed by the property tax in the local district, the counterpart in Hong Kong is financed by the total government revenue of the Hong Kong government, which tends to make "local sorting" less severe in Hong Kong.[5] Third, from the perspective of economic and financial market development, Hong Kong is a typical example for the case of "intermediate" development level, in the sense that it is not as developed as the U.S. and at the same time at least as developed as most countries in Asia. Hence, there may be some lessons for other countries currently or going to have the same degree of development. Fourth, certain aspects of the institutional setting in Hong Kong may help to simplify the analysis. For instance, Hong Kong uses effectively linear tax with no capital gain while US has progressive tax with capital gain, which could potentially affect the trading behavior. During our sampling period, the nominal exchange rate between the U.S. dollar and Hong Kong dollar is fixed, with no capital control or other origin-based discriminating policies imposed in Hong Kong.[6] Moreover, due to various historical reasons, the boundary of Hong Kong has been fixed even before the Second World War.[7] All these reasons stated above make Hong Kong a natural candidate for a comparison study.

It also seems to be a natural practice to compare the performance across different models. Obviously, all models are abstract of the reality and hence no model can capture every aspect of the reality. Nevertheless, for academic as well as policy reasons, we are still interested in knowing the "important driving forces" of the asset markets, which may not be directly observable. A comparison of model performance would shed light on those driving forces. For instance, if the "collateral model" outperforms the alternatives, it may follow that the capital market imperfection is indeed a very crucial factor of the asset market. On the other hand, if the "labor income model" outperforms the others, it may suggest that the labor market exerts significant influence to the asset market.

To facilitate the comparison, therefore, we actually present both several existing models of asset pricing, plus the extensions which include housing. Thus we allow for the fact that while some models may not be able to account for the stock market as well as other competing models, the "housing-augmented version" may enhance the performance. Alternatively, those "housing-augmented versions" may provide superior performance in accounting for the housing market performance. More specifically, the models that we consider for comparison can be divided into four groups: (1) the consumption-based asset pricing models including canonical CCAPM, habit formation model and recursive utility model; (2) the housing-augmented version of consumption-based models: Housing-CCAPM, Housing-Habit formation model and Housing-Recursive utility model; (3) the model contains labor income and home production; (4) the collateral constraint model considering borrowing capacity of indebted households.

[2] Among others, see also Leung and Chen (2006, 2010) on the implications of time-non-separability on the asset price movements.

[3] After the circulation of the first version of the paper, we are informed about the existence of Gordon and Samson (2002), which compare the canonical CCAPM, a CES-extension and the recursive utility model with Canadian data. They did not include housing in their analysis and they did not include neither the home production nor the collateral constraint model in their comparison.

[4] An important exception is Hwang and Lum (2010). More discussion on that paper will be followed.

[5] For an analysis on how the finance of local public goods can affect the sorting of economic agents and hence affect the housing market, see Hanushek and Yilmaz (2007), among others.

[6] In contrast, some countries will give a tax-advantage to citizens versus foreigners, while some will give a tax-disadvantage.

[7] In contrast, many cities in the U.S. have been expanding in terms of geographical areas in the last few decades.