CHAPTER 7

CONCLUSION

7.1 Summary

In this study, we use an overlapping generation model with heterogeneous agents to explain the portfolio composition and their relationship to macroeconomic shocks of households in Thailand, with housing assets recognized separately from other kinds of wealth. Households in the model work for a fixed number of period before retiring and dying with certainty when reaching the specified age. There are productivity shocks both at the aggregate economy level, which affects overall output, and at the individual level, which affects productivity type of each household. Given a deterministic age efficiency profile, households maximize expected (remaining) lifetime utility by choosing optimal leisure, non-housing consumption, housing capital, and business capital in each period. The prices of factors of production, which are capital and labor, are determined by their marginal productivity in each period. The complication in solving the utility-maximizing problem in this economy arises because each household does not know other households' decisions at the time it has to make the decision. However, other households' decisions actually affect the factor prices, which are critical to the decision on investment and leisure. In simulating this economy, we have to come up with guess functions that happen to match the results from the aggregate decision when all households rely on these functions in making the decision.

The model can satisfactorily predict the ratio of total investment, business investment, housing investment, non-housing consumption, total capital, business capital, and housing capital that are very close to the Thai data. It also predicts the standard deviation ratio[1] and correlation with output of total investment, housing investment, business investment, non-housing consumption, and employment that are in line with empirical data. The age profile of average housing-to-wealth ratio,

[1] Standard deviation of variables of interest to standard deviation of output

average holding of housing capital, and average holding of business capital from the model is similar in shape to the one derived from the 2006 Household Socio-Economic Survey, but is different in magnitude.

Several variations of the base case model are analyzed to better understand the implication of the model. In the first exercise, we explore the model without borrowing. When borrowing is not allowed, households find it optimal to hold larger business capital and smaller housing capital. The net effect is an increase in total capital and a decrease in consumption of non-housing goods as a proportion of output. This reflects the needs for higher precautionary savings. The correlation of housing investment with output rises significantly. This is because housing capital can no longer serve its role as collateral and so households tend to make decisions on housing capital more on the basis of immediate needs for housing service. Another interesting finding is that, without borrowing, households cannot own houses as large as the base case model at young ages but can finally own larger houses when they mature. Next, we try increasing the magnitude of aggregate productivity shock. The ratio of key variables to output barely change considering a much larger shock assumed in this variation of base case model. On the other hand, the standard deviation ratio of housing investment and business investment increase significantly and the correlation of both variables with output drop. Households take the expectation of the future into consideration when making decisions and the wider range of possibilities of the future causes the decision today to seem to be less related to the observed current-period shock. In another variation, we simulate the model without housing capital. The standard deviation ratio of consumption as well as its correlation with output rises sharply, reflecting less ability of households to smooth consumption against output shock. We also explore the model with large productivity shock and without housing with the focus on the effect of changing the magnitude of shock in the model without housing compare with the base case model. Households are found to respond to larger productivity shock in similar way in the model with and without housing capital. And finally, we investigate the effect of removing transaction costs from the base case model. Housing investment and housing capital are found to increase as a proportion of output. Standard deviation ratio rises for both housing investment and business investment, whereas correlation with output falls.

Regarding the relationship to aggregate productivity shock, the model shows that households tend to borrow against a higher proportion of housing capital in bad years especially for households in young age groups, as shown by larger housing-to-wealth ratio. For housing capital and business capital, households tend to hold lower level of housing capital and business capital in bad years than they do in good years. The magnitude of the difference between good years and bad years is magnified in the large shock version of the model.

To see how sensitive the simulation results are to each key parameter, the sensitivity analysis is performed for the discount factor, the expenditure share of non-housing goods, income share of capital, depreciation rate of business capital, depreciation rate of housing capital and down payment. Overall, the discount factor has the strongest impact on the model results, affecting the ratio to output, standard deviation ratio, and correlation with output of all key variables, except for the correlation of total investment to output. The down payment has the weakest overall effect. The expenditure share of non-housing goods has a very strong impact on housing investment and housing capital as a proportion of output. The income share of capital has quite an influence on the housing investment, business investment, housing capital, and business capital as a proportion of output. The depreciation rate of business capital has the largest impact on standard deviation ratio of business investment and the depreciation rate of housing capital has the largest impact on standard deviation ratio of housing investment. No parameter investigated has an impact on correlation of total investment with output.

In the last section, we examine the impulse responses of key variables to a sudden one-time change in aggregate productivity shock. In the first period of shock, output as a percentage of steady state value takes a larger jump than the shock that we assume. This is because households respond to the technology shock by increasing the hours worked (i.e. consume less leisure) to take advantage of 'temporarily' high wage rate. The consumption of non-housing goods rises in the first period of the shock as households receive higher wage incomes and returns on invested business capital. Business capital rises sharply for several periods following the shock before gradually declining back to the steady state level. Housing capital continues to rise after business capital starts to fall but eventually starts to decline back to the steady

state level. Although employment rises above the steady state value in the period of the initial shock, it starts to decline in the second period and ends up undershooting its steady state value. This is because the sharp increase in interest income from business capital causes households to value leisure more. The interest rate jumps in the first period in response to the sudden increase in productivity. As business capital keeps rising, the interest rate declines and undershoots its steady state value before gradually rising back to the steady stead value. The wage rate also jumps in the first period of the shock before gradually declining to the steady state value.

7.2 Policy implication

The Thai government has long put forth homeownership and affordable housing finance as one of its policy priorities. It recognizes that housing development is one of the key drivers to economic growth and places high importance of housing finance as an essential element to housing development. Especially after the financial crisis in 1997, the government has been trying to make borrowing more accessible and make housing more affordable by providing policy support to the Government Housing Bank as a key housing policy instrument to foster the housing industry.

The Government Housing Bank has played an important role in the development of housing sector in Thailand. It was the leader in extending loan repayment period from 20 years to 30 years and in increasing the loan-to-value ratio from 70%-80% to 90%-100%. And its rapid increase in number of branches throughout the country has made housing loan more accessible to lower-income group in all areas. This on-going trend in the Thai economy is equivalent to lowering γ in terms of model parameter. In the model, the accessibility of housing loan is simplified by one parameter, which is the loan-to-value ratio. In fact, the longer repayment period and the higher accessibility of loan to homebuyers should also work to the same effect as larger loan-to-value ratio. Therefore, the model predicts the tendency for higher housing investment and higher housing stock for the Thai economy in equilibrium. Also, the model predicts housing investment to be less procyclical.

Whenever the economy experiences a slowdown, government often gives top priority to assisting the property sector first because it is generally considered a key area of focus for jump starting the economy. The tax breaks for property buyers are one of the measures that can be used. In that case, the model predicts that the lower transaction costs will lead to higher housing investment and housing stock. The model also predicts higher volatility of housing investment relative to output and predicts housing investment to be less procyclical. Note however that the model predicts based on the assumption that the taxes are lifted forever, whereas in reality these tax breaks are just temporarily in effect.

Before ending this chapter, we summarize the limitation of this study and suggestion for future research.

7.3 Limitation and suggestion for future research

One assumption made in this model is that all households are homeowners. In reality, some households rent their primary residence and some households invest in housing for rent. So, there might be a problem of comparability of the model results with the observed data. One way to mitigate the problem is to exclude renters from the survey sample as we do in this study. This way, it would appear as if we are comparing the no-renters version of the real world to the model. However, it is very likely that almost all the homeowners in the sample were once renters earlier in life, at the age range that we include in the model. And so, they might not behave under the same constraints as the model assumes in earlier periods of their lives.

Anyway, as can be seen in Chapter 3, to include the endogenous choice over to rent or to own a house usually involves introducing some combination of following features:

Features to encourage owning:

- Utility premium of owning over renting: For example, Platania and Schlagenhauf (2000) assume that, for the same house, an individual derives more utility if he owns it than if he rents it, by a certain factor.

- Tax deductibility of mortgage payment: By introducing the tax deductibility of mortgage payment, the user cost of owning a house becomes distortedly cheaper relative to renting.
- Externality associated with renting: With the externality arising from the maintenance problem as assumed in Henderson and Ioannides (1983), agents in the model will tend to find the rent to be too high.

Features to discourage owning:

- Minimum house size to own: Imposing a minimum size of house to own makes it more difficult for some households to own a house.
- Moving shock and high transaction costs: The combination of exogenous moving shock and high transaction costs of selling houses will make it less attractive for some households to become a homeowner.
- Borrowing constraint: Households need to be able to pay the down payment fraction of the house. This feature makes homeownership an unaffordable choice for some households.

The results from such model depend largely on how strong the effect of each feature is set to be. Another way of modeling renter/owner decision is by specifying exogenous stochastic process for house prices and set the rent as some percentage of the prices. Households will then consider the effect of capital appreciation when making decision to buy or sell a house. The relationship/correlation between each variable in such model is vital to the conclusion. Besides, the mechanism we are investigating may actually be causing those relationships. In this study, we avoid making too many assumptions that may directly dictate the result of the model.

Another limitation is the use of three-state Markov chain approximation of productivity types of households. Even though this model can explain the distribution of wealth across generation and the aggregate economy quite well, it does not have a say about the distribution of wealth within the same generation. If the computational times can be significantly reduced and more than three states can be used to characterize the productivity types of households, the model will be able to provide a better insight on the wealth distribution, both within and across generations.

Government is another issue that we abstract from. Tax and pension income can be introduced without significantly changing the structure of the model. The additional condition that the government balances its budget in every period might be needed.

Finally, the assumption that there is equal population at each age in the economy is a large deviation from reality. Different probability of death could be introduced at each age to induce the demographic pattern that more closely matches the actual pattern. The demographic pattern, however, may not be something we should expect to stabilize at some point in time. Too many factors are affecting birth rates and death rates of people of each generation at each age. When death uncertainty is introduced in the model, the issue that follows naturally is the treatment of bequest. The bequest in the model could be either voluntary (in the sense that the giver derives some utility from bequeathing) or accidental (in the sense that the giver does not really care about leaving the bequest). This could be an interesting addition to the model.