Real Estate Investment and Vulnerability to Financial Crisis in Thailand: A Financial Computable General Equilibrium Approach

Sutee ANANTSUKSOMSRI

Waseda Institute for Advanced Study, Waseda University, Japan

Introduction

The real estate sector and the financial sector are indeed highly interconnected. As one can see, the 1997 financial crisis in Thailand originally stemmed from overinvestment in the real estate sector. To examine the role of real estate in the economy, an economy-wide analytical framework that can capture interrelations among various economic sectors, including production sectors, households, government, and financial sectors, like a Financial Computable General Equilibrium (FCGE) model is needed. Yet, little has been done to methodically link the real estate sector to the financial sector. In this study, a FCGE model of Thailand, which explicitly connects the real estate sector to the financial sector, is used to analyze the importance of the real estate sector in Thai economy. To the best of my knowledge, this study is one of the first few attempts to analyze the economy-wide impacts of the real estate sector using a FCGE framework for an emerging market like Thailand.

Real Estate and Macroeconomic Growth

The real estate industry has contributed to the growth of Thailand in a rapidly growing economy during the boom decade. During the high-growth period, the industry accounted for almost one-third of the country's GDP. In addition, the construction sector, which is a real-estate-related industry, constituted about 20 percent of the growth in GDP. Altogether, real estate and its related industry were large contributor to the growth of Thai economy during the boom period.

The Degree of Vulnerability to Financial Crisis

After 1997, many studies have investigated the economic phenomena before and during the crisis. Azis (2002) suggests the variables signaling the degree of vulnerability to a crisis, which include: 1) real exchange rate (RER) appreciation, 2) lending boom, and 3) low level of foreign exchange reserve.

A look back at the historical data of Thailand suggests that these three indicators of vulnerability to financial crisis can signal overheating economic growth to some extent. Therefore, this study uses these three indicators to measure the degree of vulnerability to another crisis.

Property and Asset Markets

Pholphirul and Rukumnuaykit (2009) estimate the duration of the real estate cycle in Thailand to be approximately 69 months. The major leading indicators for the real estate cycle are construction price index, money supply (M2), property stock index and post-credit finance. They also find evidence that the real estate cycle in expansion periods is always found to lead the business/economic cycle of Thailand. The real estate business cycle in general can be explained by DiPasquale and Wheaton (1992). They suggest a simple analytical framework of a four-quadrant diagram explaining connections between the space market (property market) and real estate asset market. In this study, the framework of DiPasquale and Wheaton (1992) is incorporated as an extension of the standard FCGE model. Figure 1 depicts the relationship between the two markets.

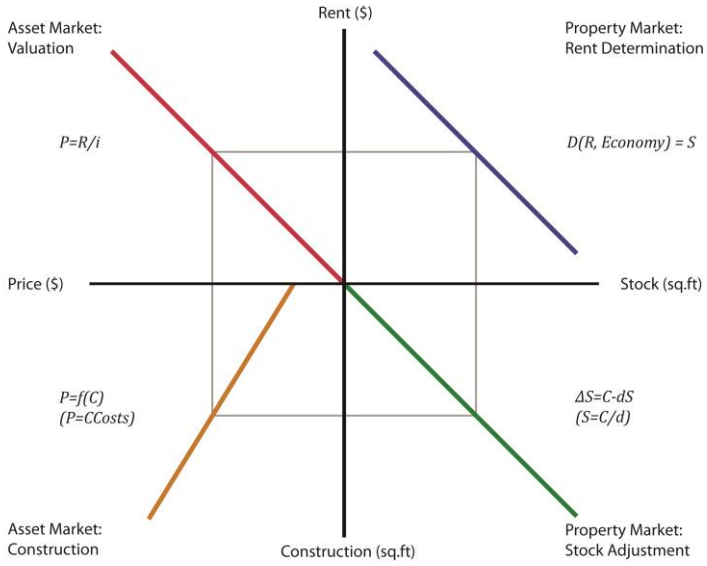

Figure 1: The relationship between property and asset markets

In the framework of DiPasquale and Wheaton (1992), rents in the short run are determined by the demand for space which is equal to the stock of space in equilibrium, shown in the property market quadrant (the northeast quadrant). The rent determination can be represented in the following equation:

$$D(R, Economy) = S,$$

where D is a demand for space, R is a rent, Economy is economic factors, and S is the stock of space. DiPasquale and Wheaton (1994) also suggest that the supply of housing can be represented in the following equation:

$$D(X, P, U, R) = S,$$

where demographic characteristics and real permanent income (X), housing price (P), cost of financing (U), and the alternative cost of renting (R).

Subsequently, in the asset market (the northwest quadrant), the rent determines a price for real estate asset according to a capitalization rate, which includes the long-term interest rate, expected growth in rents, risks associated with rental income stream, and the treatment of real estate in the tax code. The real estate valuation in the asset market can be represented in the following equation:

$$P = R/i,$$

where P is a price for real estate asset, R is rents, and i is a capitalization rate.

In the asset market (the southwest quadrant), the price of real estate assets is related to the replacement or construction costs. In the long run, the price of real estate in the asset market should be equal to construction costs in the equilibrium. The real estate construction in the asset market can be represented in the following equation:

$$P = f(c),$$

where P is a price of real estate asset, and f(c) is a function of replacement cost.

The connections from the asset market are then back to the property market through the relation of construction costs and a long-run stock of real estate space (the southeast quadrant). The stock depending on construction costs and the depreciation rate of stock will determine rents (NE quadrant). The stock adjustment of space in the property market can be represented in the following equation:

$$\Delta S = C - dS,$$

where S is a long-run stock of real estate space, d is a the depreciation rate of stock, and C is new construction.

Data and Methodology

This study employs the Computable General Equilibrium (CGE) model framework based on a Financial Social Accounting Matrix (FSAM) of Thailand, to analyze the role of real estate in the economy. The CGE model is then developed into the framework of a standard Financial Computable General Equilibrium (FCGE) model based on the model developed by Puttanapong (2009). The principle assumption underpinning FCGE models is the balance between total assets and liabilities held by each institution during a given period of time. FCGE models simulate theoretical behaviors of institutions in the financial market through a system of equations. The general equilibrium is achieved when all conditions and constraints hold.

The FCGE model framework is an extension of the CGE model incorporating the flow of funds account. Vongpradhip (1987) and Rosenzweig and Taylor (1990) were among the pioneers who developed a FCGE for Thailand. Consequently, influenced by the studies of Azis (2002) and Mansury

(2002) on the economy of Indonesia, Manopiniwes (2005) and Puttanapong (2008), this study presents the FCGE model for Thailand, using the 2007 FSAM as its base year data. The model replicates the activities in the real economy and financial transactions in Thai economy.

This study also incorporates the FCGE model with the theoretical framework relation of property and asset market by DiPasquale and Wheaton (1992). This model is developed to measure the economy-wide impact on real and financial sectors in the economy due to real estate investment. The results of the model suggest policy implication of socio-economic impact of real estate investments, and the degree of vulnerability to the crisis is evaluated by macroeconomic indicators from the model.

Simulation and results

The FCGE model is used to simulate the impact of real estate investment on the economy of Thailand. This model is based on the 2007 Thailand FSAM, which provides rich information of economic activities and structure such as income distribution, transfers among institutions, production and consumption patterns, saving and investment, and flow of funds. The fact that the model is economy-wide and price-endogenous makes the FCGE model suitable for analyzing the effect of real estate investment on not only macroeconomic fundamentals but also on social factors, especially on income distribution.

In this study, the risks and opportunities from high investment speculation in real estate is examined. There are four simulation scenarios are undertaken: (1) baseline, additional five percent increase annually in an investment in (2) real estate, (3) agriculture, and (4) manufacturing sectors. The baseline simulation scenario is assumed that there is the annual growth of 3.5% in real estate investment in Thailand. Three other scenarios are assumed that there is additional five percent increase in an investment from a rich household in alternate sectors, which represents speculative behavior. The time frame of the simulation is 10 years. Both the risks and opportunities from the high speculation are measured from the simulation results.

The risk, so called the vulnerability to a crisis, is analyzed. In this study, the simulation results can provide only two out of three indicators: real exchange rate (RER) appreciation and the level of foreign exchange reserve. On the other hand, the opportunity is indicated by macroeconomic fundamentals, such as GDP, Real GDP (RGDP), Price Index (PINDEX), exchange rate (EXR), as well as socio-economic indicators, such as incomes of the poor and non-poor, income distribution, and unemployment rate. The income distribution is measured by the ratio of the incomes of the poor to those of the non-poor household.

Table 1: The results of 5% investment increase on real estate, agriculture, and manufacturing sectors at the end of year 10

Variables	Baseline	Real estate	Agriculture	Manufacturing
Vulnerability to crisis				
M2/FOREX	0.23810	0.23819	0.23827	0.23825
RER	34.5170	34.496	34.489	34.482
Macroeconomic indicators				
GDP	7,214,334	7,255,572	7,291,635	7,283,635
RGDP	7,133,400	7,134,646	7,132,971	7,138,499
PINDEX	1.012	1.017	1.022	1.021
EXR	34.913	35.086	35.262	35.191
Socioeconomic indicators				
Income of the poor	1,073,982	1,078,600	1,089,227	1,081,892
Income of the non-poor	2,953,232	2,970,756	2,981,759	2,981,416
Income distribution	0.3637	0.3631	0.3653	0.3629
Unemployment rate	0.0125	0.0117	0.0112	0.0109

The simulation of three scenarios of a 5 percent increase in investment in real estate, agriculture, and manufacturing sectors illustrates both the risks and opportunities from such investment scenarios. Table 1 summarizes the simulation results of various indicators at the end of year 10. As can be seen, in comparison to the baseline, there is a marginal difference in terms of vulnerability to crisis among three scenarios.

The results suggest that, although the investment in agriculture sector may lead to high growth in term of GDP, it also contributes to higher inflation, resulting in lower GDP growth in real term. In addition, the investment in manufacturing may yield to the highest RGDP growth and lowest unemployment rate, but it worsens income distribution between the poor and non-poor households. Although, 5 percent additional investment in the real estate sector, on the other, may not lead to high growth as much as in agriculture or manufacturing sectors, it seems to bring lower economic cost—in term of inflation—as well as lower social cost—in term of income distribution—to the Thai economy. Investment in the real estate sector contributes the least impact on increasing commodity price.

The simulation demonstrates that moderate investment in the real estate sector does not strongly cause the country to be vulnerable to financial crisis. Such investment may also benefit the Thai economy economically and socially. Therefore, monitoring mechanisms to control overheating or speculative investment in real estate are recommended. Such policies may include introducing a capital gains tax on real estate asset investment or an excise tax on real estate properties. These tax mechanisms are currently not imposed in Thailand, yet they could be elements of a policy that controls overheating or unsound real estate investment.

Conclusion

Growth in the economy of Thailand is highly related with the role of the real estate industry. While the framework of SAM and CGE show the interaction between real estate and other sectors in the real economy, the flow of funds accounts and FSAM extend the more realistic picture of connection between real estate and the financial market. With the FCGE model, the simulations of the role of real estate industry on economy and social welfare can be investigated. The simulation has shown that opportunities and risks from higher investment in real estate are not as high as higher investment in agriculture and manufacturing sectors.

In addition, various policy implications can be applied to mitigate the negative effects from the real estate investment in Thailand. The analysis suggests that moderate growth in the real estate sector is desirable. Thus, taxation policies, such as a capital gains tax on investment in real estate assets and an excise tax on real estate properties, should be implemented to control overheating real estate investment. Upon the availability of greater detail FSAM and data on asset and liability holdings of institutions beside households such as government and financial instructions, this FCGE model can be extended to incorporate asset holding behaviors of such institutions.

References

Azis, I. (2002). A New Approach to Modeling the Impacts of Financial Crisis on Income Distribution and Poverty. *ADBI Research Paper Series*, 35.

DiPasquale, D., and Wheaton, W. C. (1992). The Markets for Real Estate Asset and Space: A Conceptual Framework. *Journal of the American Real Estate & Urban Economics Association, 20*, 2, 181-197.

DiPasquale, D., and Wheaton, W. C. (1994). Housing Market Dynamics and the Future of Housing Prices. *Journal of Urban Economics*, *35*, 1, 1-27.

Manopiniwes, C. (2005) A. *Computable General Equilibrium (CGE) Model for Thailand with Financial and Environmental Linkages: The analysis of selected policies*. Cornell University.

Mansury, Y. S. (2002). *Nonlinear impacts of the Asian financial crisis on income distribution in Indonesia: A financial computable general equilibrium approach*. Cornell University.

Pholphirul, P., & Rukumnuaykit, P. (2009). Real Estate Cycle and Real Business Cycle: An Evidence from Thailand. *Pacific Rim Property Research Journal*, *15*, 2, 20, 145-165.

Puttanapong, N. (2008). *The Computable General Equilibrium (CGE) models with Monte-Carlo simulation for Thailand: an impact analysis of Baht appreciation.* Cornell University.

Rosenzweig, J.A., L. Taylor (1990). *Devaluation, Capital Flows, and Crowding-Out: A CGE Model with Portfolio Choice for Thailand*. In Taylor, L. (ed.), Socially Relevant Policy Analysis. Structuralist Computable General Equilibrium Models for the Developing World. Cambridge, Massachusetts.

Vongpradhip, D. (1987). *A CGE model with Real and Financial Sector Linkages*. Bangkok, Thailand: Thailand Development Research Institute Foundation.