Journal of Indonesian Economy and Business
Volume 37, Number 1, 2022, 15 – 38

PROPERTY PRICE, CAPITAL INFLOWS, AND FINANCIAL SYSTEM STABILITY IN ASEAN-5 ECONOMIES: A SIMULTANEOUS ANALYSIS

Sonia Anggun Andini*, Telisa Aulia Falianty

Department of Economics, Faculty of Economics and Business, Universitas Indonesia, Depok, 16424, Indonesia

ABSTRACT

Introduction/Main Objectives: This study aims to estimate the impact of capital inflows on property prices and financial system stability (FSS) in ASEAN-5 and the simultaneous relationship between the two dependent variables. During the observation period of this study, there were large capital inflows to ASEAN 5 countries after the 2008-2009 financial crisis; on the other hand property prices showed an increase in that period. **Background Problems:** This study indicates the simultaneous relationship between two dependent variables. In fact, using only a single equation for variables that have a simultaneous relationship can cause endogeneity problems, so the results obtained become unreliable/ biased. **Novelty:** The novelty of our research is we fill a gap in the previous studies by examining the relationship of property prices and financial system stability with the simultaneous method so as to solve the endogeneity problem that exists. **Research Methods:** We use the 2SLS simultaneous panel model to solve endogeneity problems. **Finding/ Results:** The results show that the massive capital inflows to ASEAN-5 countries caused a significant increase in property prices. **Conclusion:** This study confirms that property prices and financial system stability have simultaneous relationships. On the one hand, the impact of property prices on the financial system stability is positive and significant. On the other hand, testing the effect of the financial system stability on property prices does not show significant results.

ARTICLE INFO

Article information:

Received on 29 September 2020. Received in revised version 11 February 2021. Received in revised version 7 November 2021. Received in revised version 14 November 2021. Accepted on 1 December 2021

Keywords:

property price, financial system stability, capital inflows, 2sls, simultaneous analysis

JEL Code:

C15, G01, G12

* Corresponding Author at Department of Economics, Faculty of Economics and Business, Universitas Indonesia, Jl. Prof. Dr. Sumitro Djojohadikusumo, Depok 16424, Indonesia.
E-mail address: Sonia.anggunandini@gmail.com (author#1), telisa97fe@yahoo.com (author#2),

INTRODUCTION

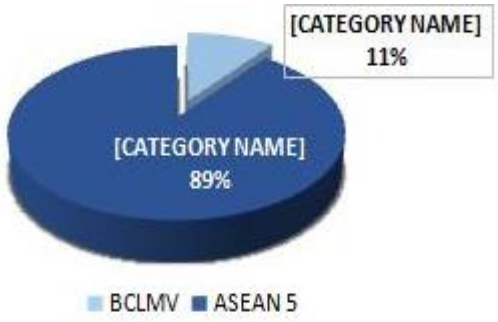
Financial stability is closely related to the sustainability and resilience of an economy. In other words, financial system instability or financial crises can cause economic conditions to deteriorate (Gunadi et al., 2013).

Yiu and Sahminan (2015) proved that financial crises that have occurred throughout history such as the Asian one in 2008, the global financial crisis, and the European debt crisis are caused by bursting property price bubbles. The considerable impact of the property market on the health of financial institutions and macroeconomic activities is not a new phenomenon. It is generally believed that fluctuations in property prices have played a role in the business cycles of economies. Therefore, the issue of property price movements and their links to the financial sector and macroeconomy has come to the attention of the monetary authorities and financial system regulators.

The Global Financial Crisis (GFC), also known as the Subprime Mortgage Crisis in 2008, was caused by the bursting of property price bubbles. The GFC caused developed countries to experience a severe recession. The U.S. Federal Reserve responded to this situation by implementing a quantitative easing (QE) policy to stimulate and revive economic conditions. QE is a monetary policy whereby the money supply is increased, which will cause interest rates to fall and encourage the real sector to get cheap funds to increase its production capacity so that the economy can return to life. This resulted in an abundance of liquidity that was not able to be absorbed by the domestic economy.

Furthermore, there was an outflow of funds from the US to countries promising higher yields than domestic ones. Developing countries are a destination for US investors because their yields are higher. The ASEAN-5 group is included in the list of developing countries that attract investors. Compared to other ASEAN countries, ASEAN-5 countries are more attractive as an investment destination because they account for 89 percent of the total ASEAN GDP, which, in 2012, reached USD 2.31 trillion, to which ASEAN-5 countries contributed the largest share (USD2.1 trillion). It can be seen in Figure 1 that, together, the ASEAN-5 group is very dominant compared to the contribution provided by Brunei Darussalam, Cambodia, Lao PDR, Myanmar, and Viet Nam (BCLMV) GDP, which only amounted to around 11 percent of the total ASEAN GDP in 2012.

Figure 1. Composition of ASEAN GDP in 2012

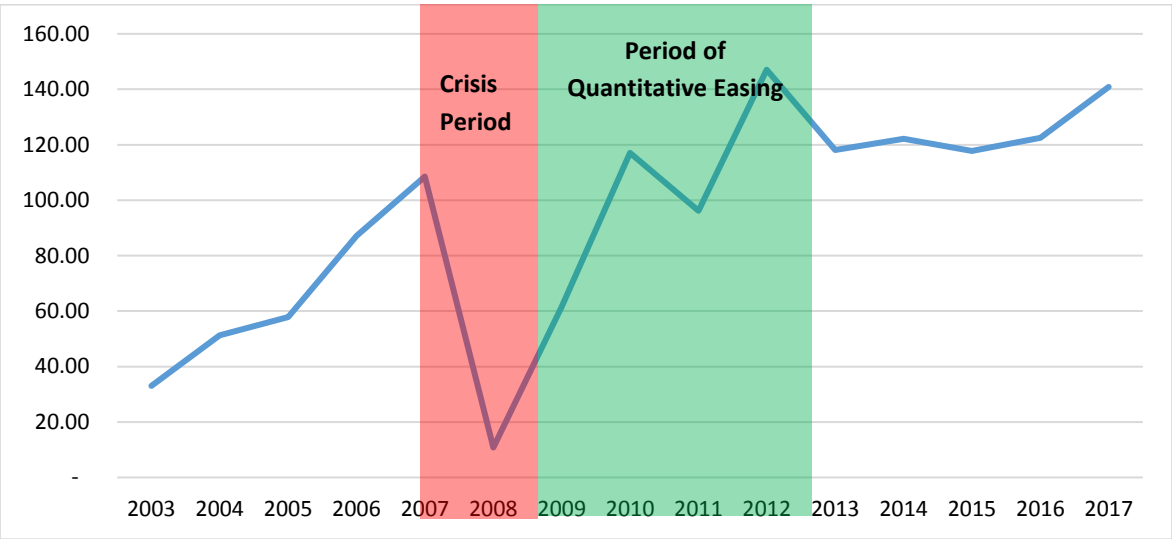


Source: data aseanstat.org, compiled by the author

In addition, during the QE 2009 to 2012 period, the growth of the Gross Domestic Product (GDP) in the ASEAN-5 was also very good, namely in the range of 4.7 percent. Figure 2 demonstrates that during the QE 2009 to 2012 period, there were significant capital inflows to ASEAN-5 countries after previously declining during the 2008 global financial crisis.

Calvo, Leiderman, and Renhart (1996) explain that it is essential to study capital inflows from developed to developing countries. Although capital inflows can help deepen and expand financial markets and provide more funds for the economy, capital inflows can also create excessive property price increases and, at the same time, can destabilize the financial sector.

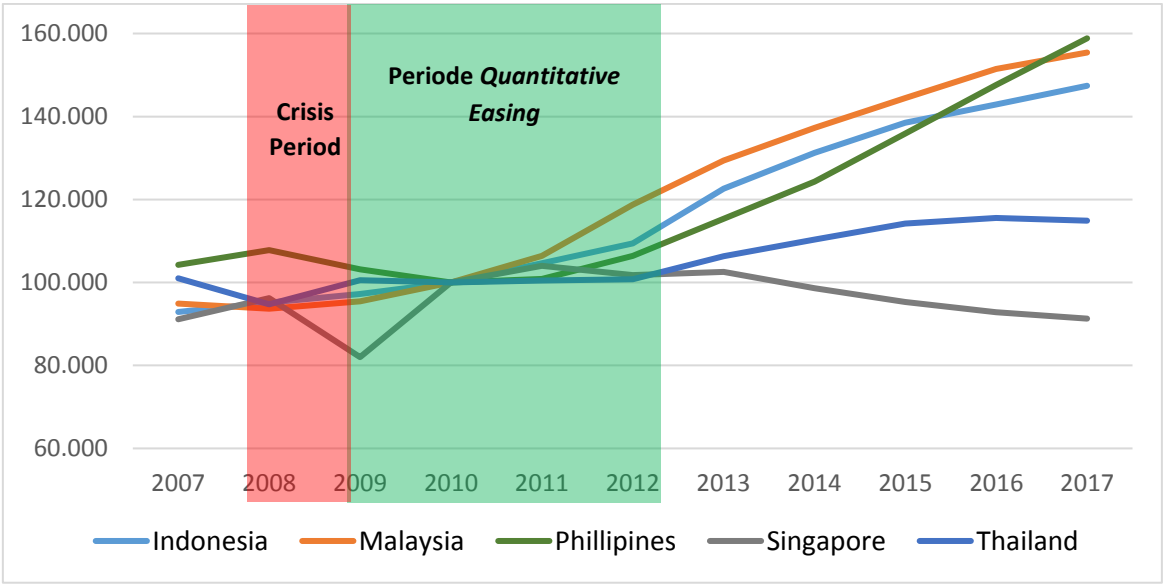
Figure 2. Capital Inflows to ASEAN 5 Period 2003-2017 (in billion dollars)



Source: World Bank data, compiled by the author

Yiu and Sahminan (2015) found a link between abundant global liquidity and property prices in the ASEAN-5 economies. According to their research, with the stable economic conditions and rapid urbanization in the ASEAN-5 region, this immense capital inflow caused property prices in those economies to increase during the QE period. Property prices during the crisis and the QE period can be seen in Figure 3 which shows that, during the crisis in 2008, there was a decline in property prices. Furthermore, during the period when the QE policy began, property prices began to show an increase. The increase is also in line with Yiu and Sahminan's (2015) research that capital inflows have a positive and significant effect on property prices in ASEAN-5 economies.

Figure 3. Property Price Index in ASEAN 5



Source: National regulatory agencies, CEIC Data, Colliers International, compiled by the authors

The relationship between capital inflows and property prices is empirically explained by Aziz and Shin (2013). They showed that capital inflows entered through the purchase of bonds at local securities companies. The results of the issuance of bonds by local securities companies were deposited in local banks. In this way, national banks experience abundant liquidity, which urges them to channel their funds through lending to the public. Based on the global savings glut hypothesis proposed by Bernanke (2005), abundant liquidity conditions cause banks to adopt a policy of easing the disbursement of funds, which is indicated by a decrease in interest rates. This causes the demand for property to increase. The supply curve will be inelastic because there is a lagged supply in the property market in the short term. Thus, the current increase in demand cannot be matched by existing supply conditions. In other words, there is a shortage so, ultimately, property prices will increase (Bernanke (2005), Himmelberg, Mayer, and Sinai (2005), Bernanke (2008), Taylor (2009), Adam, Marcet, and Kuang (2011)).

As explained earlier, the source of several financial crises that have occurred throughout history has been the bursting of the property price bubbles; this is according to the Global Savings Glut Hypothesis which states that the bubbles originated from large capital inflows. Thus, the abundance of liquidity that occurred in ASEAN-5 economies after the 2008 global financial crisis is interesting to study and also needs to be observed in terms of two aspects, namely: (i) how the influence of capital inflows on property prices in the ASEAN-5 region, and (ii) how the effect of property prices on financial system stability in the ASEAN-5 region.

Furthermore, research by Hofmann (2004), Zhu (2005), and Barras (1994) states that financial system stability (FSS) can affect property prices. Under stable FSS conditions, banks will tend to expand credit as indicated by lower interest rates, including interest rates for property sector loans. This will then increase the demand for property. On the other hand, as explained earlier, the supply curve's nature in the property market is inelastic in the short term, resulting in shortages that cause property prices to rise. In the next phase, Barras (1994) explains that the increased demand for property provides positive expectations for developers to build properties in large numbers (building boom). Due to the lagged supply at the time of the completion of the property development, it turns out that the demand for property is not as appropriate (lower) as expected. In other words, the property that has been built is not sold (oversupply), which causes the price to decline.

Based on the background that was developed, it is not only property prices that influence financial system stability, but also the opposite occurs. Existing research separately discusses these two conditions or uses a single/one-way equation, as conducted by Che et al. (2011), Landier et al. (2017), Flannery and Lin (2015), Balakrishan (2012), which examines the effect of property prices on financial system stability. In contrast to these studies by Hofmann (2004) and Zhu (2005), Barras (1994) examines the opposite, namely the effect of financial system stability on property prices.

Whereas when the independent variable is potentially caused by the dependent variable (reverse causality between property price and financial system stability), it means that there has been a simultaneous[1] relationship between the two variables. Furthermore, Baltagi (2005) explain that using only a single equation for

[1] The notion related to the explanation of the simultaneous relationship (reverse causality) has been explained by many previous studies, such as Levitt (1997), Levitt (2002), Baltagi (2005), Lynch, Scott M. (2011), and Antonakis et al (2014).

variables that have a simultaneous relationship can cause endogeneity problems (correlation between independent variable regression and errors/disturbances). According to Baltagi (2005), the endogeneity problem is a serious problem in econometrics which can cause bias/ invalid OLS estimation results. Therefore, this study will examine the relationship between property prices and financial system stability by resolving the research gap with the simultaneous equation method[2] to solve the endogeneity problem.

Hence, the research questions for this paper are: (i) Do capital inflows have an effect on property prices in the ASEAN-5 region, (ii) Do property prices have an effect on financial system stability in the ASEAN-5 region, and vice versa (iii) Does financial system stability have an effect on property prices in the ASEAN-5 region.

LITERATURE REVIEW

1. Property Market and Property Price Formation: Theoretical Overview

The workings of the property market and the formation of property prices can be explained through neoclassical economic theory. According to this theory, price formation results from the interaction of supply and demand based on the scarcity principle, utility function, and production function, which is also related to the profit maximization principle (Lee, 2003). Demand for property is not only consumption demand for personal use, but also demand from speculators and property developers for investment purposes (Roehner, 1999). Therefore, the ability to buy (income), uncertainty, and expectations also play an essential role in the demand for property. Furthermore, the supply of property is the number of properties available on the market with other constant factors influencing a supplier's decision to build property, such as costs and government intervention.

In a static approach, the essence of the economic theory shows that supply and demand act together to form a balance. Suppose there is a movement and/or shift in supply or demand. In that case, a new balance is generated (Maclennan, 1982), where the general conclusion is that price increases are caused by shortages and price decreases are caused by surpluses.

In contrast to the static approach, dynamic models can describe not only the fundamental mechanisms and systems of the property market but also long-term and short-term phenomena.

Assuming everything is constant, the demand condition will increase at every equilibrium level in the long run. The increase is because of population and income increase over time. As demand increases over time, to meet demand, property supply will also increase at each equilibrium level in the long run. As a result, the property demand curve, in the long run, will be linear and upward sloping in the long-run model.

In the short term, an increase in population has minimal impact on demand for property. Changes in demand for property are more due to speculation or investment motives, so the business cycle (stable conditions, bubbles, or crises) will significantly determine a person's expectations. Furthermore, it will ultimately influence the decision to buy or sell the property (Tse (1997), Johansen & Somette (1999), Kauko (2001). Changes in the short-run demand pattern will change the demand curve to be nonlinear. Meanwhile, the supply curve is also nonlinear in the short run because property development takes a long time, resulting in a lagged supply or when there is an excess supply of unsold new

[2] Further explanation regarding the simultaneous equation method can be found in the Research Methodology Chapter.

properties, vacant properties, and used properties for sale (Levin & Wright, 1997).

2. Determinants of Property Prices

2.1. The Effect of Capital Inflows on Property Prices: Theory and Empirical

Several studies have discussed the relationship between property prices and capital inflows in developed countries, especially when there was a dramatic appreciation of property prices in the United States during the booming period from 2000 to 2006, and the following year in 2007, there was a bust.

Through the global savings glut hypothesis, Bernanke (2005), Mendoza, Quadrini, and Rios-Rull (2007), Bernanke (2008), Caballero, Fahri, and Gourinchas (2008), Caballero and Krishnamurthy (2009) argue that excess savings in developing countries, especially China and emerging Asian economies, are looking for safe and high-quality financial assets. Their economies cannot provide it because of the US Treasury and Agency markets' depth, diversity, and security, and these savings largely flow into the United States. A global savings glut, large capital inflows to the US, cause US property prices to be higher, arguing that low-interest rates (driven by large capital inflows) encourage massive lending on the property, which increases demand for property. It becomes a significant determinant of higher property prices during the boom period, which corresponds to the studies by of Bernanke (2005), Himmelberg, Mayer, and Sinai (2005), Bernanke (2008), Taylor (2009), Adam, Marcet, and Kuang (2011).

2.2. Financial System Stability on Property Prices: Simultaneous Relations

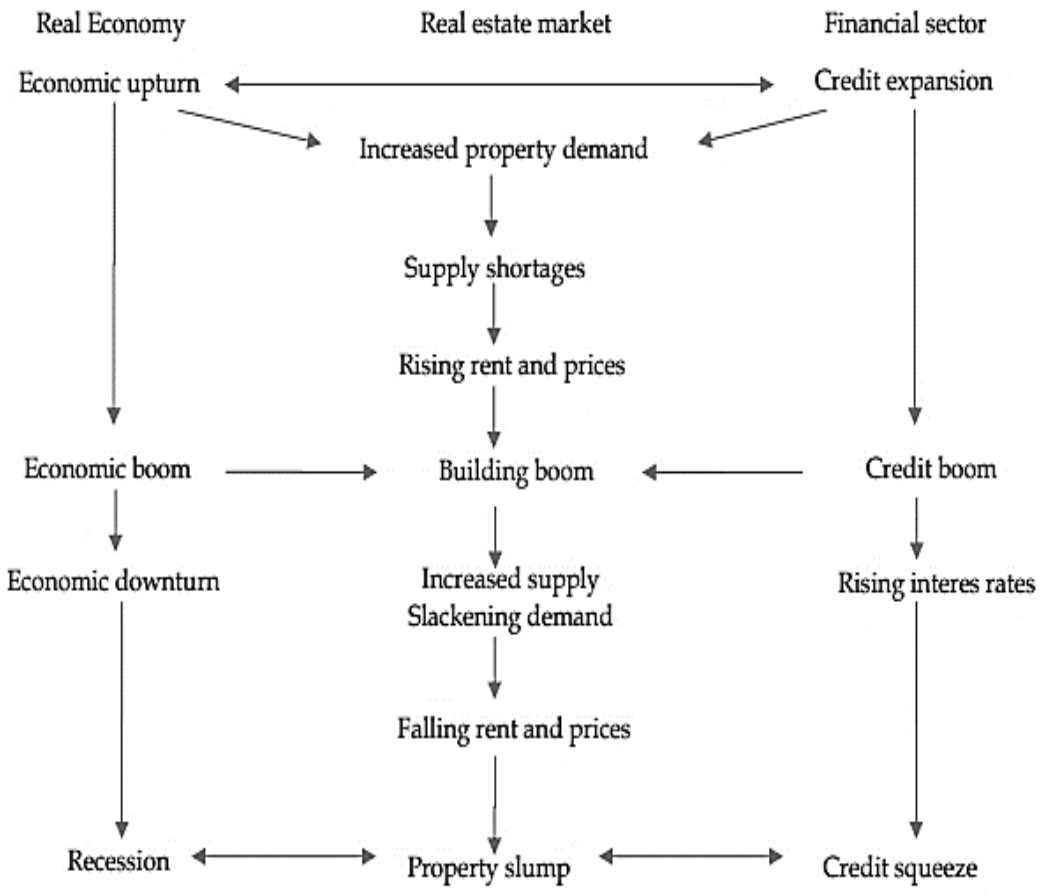
This cannot be separated from the overall economic conditions in explaining the effect of financial system stability on property prices (Figure 4). Barras (1994) explains that financial system stability tends to be good in good economic conditions (domestic and global). It will encourage the financial sector to expand credit, for example, by reducing interest rates for property loans to reduce the risk premium or increase the expected capital gain. Thus, demand for property will increase, then property prices will gradually increase due to the inelastic nature of the supply curve in the property market in the short run.

Conversely, changes in property prices also strongly influence financial system stability (Figure 4). One of the effects of changes in property prices on financial system stability can be explained by using research results from Reinhart and Rogoff (2009). They show that the six major historical episodes of banking crises in developed countries since the mid-1970s were all related to the collapse of the property sector. They documented that this pattern can also be found in many emerging market crises, including the 1997-1998 crisis that hit countries in the Asian region and the 2008-2009 crisis, which was a global financial crisis, with a similar, significant decline in property prices in developed and developing market countries.

In addition, property price movements can have a major impact on banking performance. In particular, a fall in property prices may cause the banking sector to be depressed through a variety of channels, for example, through an increase in the cost of bad borrowing in property lending or through a deterioration in the financial condition of borrowers and banks themselves, or indirectly through a contraction in transaction finance and economic activity.

Property loans are one of the most critical components of a bank loan. These loans account for a third, sometimes even more than half, of total bank loans in most developed countries. A fall in property prices implies lower returns in the property industry, so property loans are more likely to default. This reduces the profitability of bank loans and increases the bank's bad debt burden as well.

Figure 4. Property Market Cycle Mechanism



Source: Barras (1994)

The credit risk exposure of property loans also greatly depends on the use of the loans. A property mortgage loan is usually considered very secure, as property is more like consumer goods, and the repayment of these loans often comes from household property income, which is relatively stable. By contrast, loans to developers and constructors for commercial purposes are much riskier. Repayment of these loans is supported by the sale or rental price generated from the property upon completion. A fall in property prices implies a deterioration in the financial position of developers and constructors. Therefore, they are unable to borrow new funds, which are essential for project completion. When the property under construction is left unfinished, the collateral value drops nearly to zero, and the commercial mortgage loan is considered a default. The increase in bad credit in the retail property sector has been a significant contributor to several banking crises, such as financial difficulties in the early 1990s in many industrialized countries and the 1997 East Asian crisis to the global financial crisis of 2008 - 2009.

METHOD, DATA, AND ANALYSIS

1. Data

The data used in this study are secondary data with a panel data estimation model consisting of time series data and cross-sections with annual periods of 2003-2017 and crossing from ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore, and Thailand). Table 1 shows the entire data set.

Table 1. Data Sources

No	Variable	Unit	Data Sources
1	Property Price Index	Index	Indonesia, Malaysia, and Singapore: CEIC Thailand: Government Housing Bank, Bank of Thailand Philippines: Colliers International The data source refers to the Sahminan (2017)
2	Capital inflows per GDP	Percent	World Bank Data
3	GDP per capita growth	Percent	World Bank Data
4	Loan Interest Rate	Percent	World Bank Data
5	Financial Stability Index (FSI) • Non Performing Loan (NPL) • Stock price volatility • Bond Yield	Index (0 to 1)	Each of the data used to weight the FSI index was obtained from CEIC
6	Unemployment Rate	Percent	World Bank Data
7	VIX CBOE	Index	Federal Reserve Economic Data

Source: author's illustration

2. Variable Operational Definitions and Data Measurement

The formation and operational definition of the dependent and independent variables will be explained further in the following sections.

2.1. Dependent Variables

This study surmises that there is a simultaneous relationship between endogenous variables. There are two dependent variables used in this study: the Property Price Index and the Financial Stability Index. The measurement of variables is explained as follows.

a. Property Price Index

The variable used to reflect property prices is the real residential property price. This variable is chosen because residential property prices are easier to identify than commercial property prices. The commercial property market has several unique characteristics, such as longer construction delays, long-term rents, and fluctuating revenue streams, which cause the commercial and residential property cycle to show a different pattern. In addition, the commercial property cycle may be out of sync across regions and sectors. Depending on the elasticity of the offer, delay in development, asset endurance, and funding methods, various types of a commercial property may have different dynamics.

b. Financial Stability Index (FSI)

The creation of an index to describe the condition of a country's financial stability has been carried out by several studies. In this research, the financial system stability index measurement as applied in Romania named Aggregate Financial Stability Index (AFSI) as developed by Albulescu (2010). By using the min-max method, where the financial system stability index is called Aggregate Financial Stability Index (AFSI). Following is the formula used:

$$I_{it}n = \frac{I_{it} - Min\,(I_t)}{Max\,(I_t) - Min\,(I_t)} \quad (1)$$

Where:

$I_{it}n$: the index value of each indicator that has been normalized

I_t : the value of each indicator during the period t

$Min\,(I_t)$: the minimum value of each indicator for a certain time period

$Max\ (I_t)$: the maximum value of each indicator in a certain time period

By using the min-max method, clear boundaries can be obtained to interpret the index value. A value of 0 indicates the worst condition, and a value of 1 means the best condition in a country's financial stability system, following Cheang and Choy (2009).

The formation of FSI in developing countries is generally formed by looking at and considering the development structure of the two classification parts, namely intermediary institutions (banking) and sectors in the financial markets (Cardalelli, 2006). So, to form the index, three composite variables are needed as indicators that reflect banking risk, stock market risk, and bond market risk. In this study, the measuring variable reflecting banking risk in the FSI is the Non-Performing Loan (NPL). Stock market risk uses the stock price index variable by processing the data to obtain returns and the value of the stock price index volatility through the GARCH method. Furthermore, 10-year government bond yields are used to measure bond market risk.

2.2. Main Independent Variable

Capital inflows per GDP. The capital inflows data used in this study are gross capital inflows data presented to the gross domestic product (GDP). The capital inflows variable was chosen with consideration of previous research. Tillmann (2013) looked at how property prices responded to capital inflows and found that capital inflows significantly made property prices higher.

2.3. Control Variables

a. GDP per Capita Growth

The GDP per capita growth variable is included in the model estimation to control domestic economic conditions. Property prices are expected to rise during periods of strong economic growth and fall during periods of weak economic growth. Yiu and Sahminan (2015), Allen et al. (2016), and Nneji et al. (2015) demonstrated that economic growth is one of the macroeconomic variables that significantly affect property price movements. Some empirical studies have shown the importance of economic growth for house price movements. Glindoro et al. (2011) give an example for Asia-Pacific economies. In their paper, they illustrate the existing literature that shows that house price movements are closely related to a common set of macroeconomic variables and market-specific conditions. Hofmann (2004) and Tsatsaronis and Zhu (2004) also examine the determinants of house prices in several industrialized economies. One of the main exogenous variables is economic growth and has been shown to have significant explanatory power.

b. Loan Interest Rate

The determinants of property prices are in many ways similar to other assets, namely the required rate of return (long-term interest rate plus risk premium) as a discount factor.

c. Unemployment Rate

The Unemployment Rate is used because it is closely related to the performance of banks as one kind of financial institution. Bank performance can deteriorate if the unemployment rate increases because a high unemployment rate implies that more people will have difficulty paying debts to banks which will increase NPLs.

d. Volatility of Stock Price Index (VIX)

The VIX index is an index of market volatility calculated by the Chicago Board Options Exchange (CBOE). This index is used as a barometer for market uncertainty. This research incorporates the VIX variable into the model, referring to empirical studies con-

ducted by Filardo et al. (2016) and Miranda-Agrippino et al. (2015). They use the VIX index as a proxy for the global financial cycle that can affect asset price movements, including property prices.

3. Method of Analysis

As the background has been built, the similarity model in this study is as follows:

$$PP = f(FSI, \text{lag pp}, ci\_pergdp, g\_gdppercap, ir) \quad (2)$$

$$FSI = f(PP, ci\_pergdp, u, vix, oer) \quad (3)$$

where,

PP	: Property Price Index
FSI	: Financial System Stability Index
ci_pergdp	: Capital Inflows/ GDP
g_gdppercap	: GDP per capita growth
ir	: Loan Interest Rate
lagpp	:Property Price Index in the previous period
u	:Unemployment Rate
vix	:Chicago Board Option Exchange (CBOE) Index
oer	:Exchange Rate (Local Currency/ USD)

In this study, as explained in the literature review, shows that, on the one hand, property prices will be influenced by financial system stability and other macroeconomic variables. On the other hand, financial system stability is affected by property prices and other macroeconomic variables. As has also been explained in the introduction to this paper, when the independent variable is potential caused by the dependent variable (reverse causality between property price and financial system stability), it means that there has been a simultaneous relationship between the two variables. The notion of this simultaneous relationship has been explained by many previous studies, such as Levitt (1997), Levitt (2002), Baltagi (2005), Lynch, Scott M. (2011), and Antonakis et al (2014).

A simultaneous relationship between the two variables is thought to cause endogeneity problems (correlation between regression of independent variables with errors/disturbances) (Baltagi, 2005). Solving these problems requires an instrumental variable method to obtain consistent estimation parameters. Therefore, solving using ordinary OLS can also lead to biased regression results.

By using the ASEAN-5 countries (cross-section) as the research objects and using the observation period from 2003 to 2017 (time series), this research requires the development of a model called the dynamic simultaneous panel equation model.

Existing approaches to solving simultaneous panels only accommodate static models such as those developed by Baltagi (1981), Prucha (1985), and Balestra, Varadharajan-Krishnakumar (1987). On the other hand, the dynamic panel equation model is built with a single equation (not accommodating simultaneous models) developed by Arellano (2003). Furthermore, to accommodate the dynamic simultaneous panel equation model, this study refers to the development of the Matyas and Lovrics (1990) models that have modified the simultaneous equation model, which was previously a static model, into a dynamic simultaneous panel model.

Matyas and Lovrics (1990) and Mitze (2010) first kept using the static simultaneous equation model as the initial framework in developing dynamic simultaneous panel equation models. Based on the static simultaneous equation, they replicated the Monte Carlo simultaneous equation to be developed into simultaneous panel equations dynamic. Specifically, the steps in developing a dynamic simultaneous panel equation are as follows:

3.1. Panel Data Simultaneous Equation Model Framework

The basic framework for the general model of simultaneous equations for panel data referring to Baltagi (2005) is as follows:

$$Y\Gamma + X\beta + U = 0 \quad (4)$$

Where:

$Y = [y_1, \dots, y_M]$ is a matrix $(NT \times M)$ of endogenous variables,

$X = [X_I, \dots, X_K]$ is a matrix $(NT \times K)$ of exogenous variables,

$U = [u_1, \dots, u_M]$ is a matrix $(NT \times M)$ of residues,

$\Gamma = [\gamma_1^*, \dots, \gamma_M^*]$ is a parameter matrix $(M \times M)$ related to endogenous variables,

$\beta = [\beta_1, \dots, \beta_M]$ is a parameter matrix $(K \times M)$ related to predetermined variables,

N is the number of individuals observed and is the length of time-series.

From the simultaneous general equation model of panel data that was built to solve the endogeneity problem, the general structural equation *j*th, can be written as follows:

$$y_j = Y_j\alpha_j + X_j\beta_j + u_j = Z_j\gamma_j + u_j \quad (5)$$

where $j = 1, \dots, M$; y_j is $(NT \times 1)$; Y_j is $(NT \times M_j)$; X_j is $(NT \times K_j)$; $Z_j = [Y_j, X_j]$ and $\gamma'_j = [\alpha'_1, \beta'_1]$. The focus of a problem is the correlation between the regression variables on the right-hand side of the equation with the error or disturbance variables (Baltagi, 2005). Thus, the estimation model in this study will focus on the structure of the error component which is the result of residual decomposition as follows:

$$u_1 = Z_\mu\mu_j + v_j \quad (6)$$

where $Z_\mu = (I_N \otimes e_T)$; I_N and I_T respectively are the identity matrix of N and T; e_N and e_T each one is a vector of order N and T; and $\mu'_j = (\mu_{1j}, \mu_{2j}, \dots, \mu_{Nj})$ and $v'_j = (v_{11j}, v_{22j}, \dots, v_{NTj})$ is a vector of pure residual effects with a mean of zero and the covariance matrix as follows:

$$\mathrm{E}\begin{pmatrix}\mu_1\\ v_1\end{pmatrix}(\mu'_1, v'_1) = \begin{bmatrix}\sigma^2_{\mu 11} I_N & 0\\ 0 & \sigma^2_{v11} I_{NT}\end{bmatrix} \quad (7)$$

Where there are endogenous variables on the right-hand side in Z_1. In this case, namely:

$$E(u_1, u'_1) = \Omega_{11} = \sigma^2_{v11}\, I_{NT} + \sigma^2_{\mu 11}\,(I_N \otimes J_T) \quad (8)$$

Thus, it can be concluded that the first structural equation (5) has a typical variance-covariance matrix of the one-way error component model. The next step is to transform equation (5) with $Q = I_{NT} - P$ with $P = (I_N \otimes \bar{J}_T)$ to get:

$$Q_{y1} = QZ_1\gamma_1 + Qu_1 \quad (9)$$

Let $\tilde{y}_1 = Qy_1$ dari $\tilde{Z}_1 = QZ_1$ using 2SLS equation (5) with $\tilde{X} = QX$ as a collection of instrument variables using 2SLS.

3.2. Static case by Monte Carlo Model

The simple model that Monte Carlo built as the basis of his research is then converted into a dynamic model, namely:

$$y_{1it} = y_{2it}\alpha_1 + X_{1it}\alpha_2 + u_{2t},$$
$$y_{2it} = y_{1it}\beta_1 + X_{2it}\beta_2 + u_{2t}. \quad (10)$$

Referring to the explanation of Matyas and Lovrics (1990), which explains the static model of Monte Carlo above, the system has two endogenous and two exogenous variables so there is no identification problem. The data generating process was based on the generation of the variables X_1 and X_2 and the reduce form of the model (see eq. 10). First of all, we have generated the variables X_1 and X_2 with the following process:

$$\begin{cases} X_{1i0} = \epsilon_{1i0}/(1-\gamma_1) \\ X_{1it} = X_{1it-1\gamma 1} + \epsilon_{1it} \end{cases}$$

Supposing that the process is stationary, (i = 1,…, N)

And

$$\begin{cases} X_{2i0} = \epsilon_{2i0}/(1-\gamma_2) \\ X_{2it} = X_{2it-1\gamma 2} + \epsilon_{2it} \end{cases}$$

Supposing that the process is stationary, (i = 1,…, N)

Where,

$\epsilon_{1it} \sim N(0, \sigma_{\epsilon 1})$,

$\epsilon_{2it} \sim N(0, \sigma_{\epsilon 2})$,

In the above model, $(\gamma_1, \gamma_2 > 1)$ is the initial values were the simple ϵ noise variables. The y_1 variable can be obtained using the above variable and the reduced form for the first equation. Then, by using the second equation, the form of the structure produces the variable y_2. In order to control the data generation process, the author creates another y_1 variable from the structural form and - obviously - the same as that obtained from the reduced form. Furthermore, Monte Carlo matches the latent variables obtained from the structural form $(u_{1it} = y_{1it} - (y_{2it}\alpha_2 + X_{1it})$, and $u_{2it} = y_{2it} - (y_{1it}\alpha_2 + X_{2it}))$ with those generated with the random variable generator and used in the reduced form.

3.3. Dynamic Panel Data Equation

As explained earlier, Matyas and Lovrics (1990) modify static simultaneous equations into dynamic models. In this paper, from equation 10, we have modified the model of the static case - besides the lagged endogenous variable in the first equation - a supplementary exogenous variable in the second equation to have enough instrumental variables for the estimation. The basis of the analysis is the following model.

$$y_{1it} = y_{2it}\alpha_1 + y_{1it-1}\alpha^* + X_{1it}\alpha_2 + u_{1t},$$

$$y_{2it} = y_{1it}\beta_1 + X_{2it}\beta_2 + X_{3it}\beta_3 + u_{2t}. \quad (11)$$

As we mentioned before, the above equation is a modification of the general model (see. Eq. 4) and the static simultaneous equation that has been described in Equations 10 by adding the endogenous lag variable. The way to generate endogenous and exogenous variables is the same as static simultaneous equations. However, the process starts from the initial value of the dependent lagged variable. As with our reference paper, we chose the simplest solution. We generated additional observations for the residuals and exogenous variables and, using these in the reduced form, obtain the initial values of the endogenous variables.

Thus, referring to equations 11, the dynamic simultaneous panel equation in this paper is as follows:

$$pp_{it} = \alpha_0 + fsi_{it}\alpha_1 + pp_{it-1}\alpha^* + ci_{it}\alpha_2 + g\_gdppercap_{it}\alpha_3 + ir_{it}\alpha_4 + u_{2t}$$

$$fsi_{it} = \beta_0 + pp_{it}\beta_1 + ci_{it}\beta_2 + U_{it}\beta_3 + vix_{it}\beta_4 + oer_{it}\beta_5 + {}_{u_{2t}} \quad (12)$$

Thus, according to the perspective of this paper, the transformation from static to dynamic is to add the lagged endogenous variable (lagpp) in the first equation, as well as supplementary exogenous variables in the second equation (which not included in the first equation, namely u,vix, and oer) to have enough instrumental variables for the estimation.

RESULT AND DISCUSSION

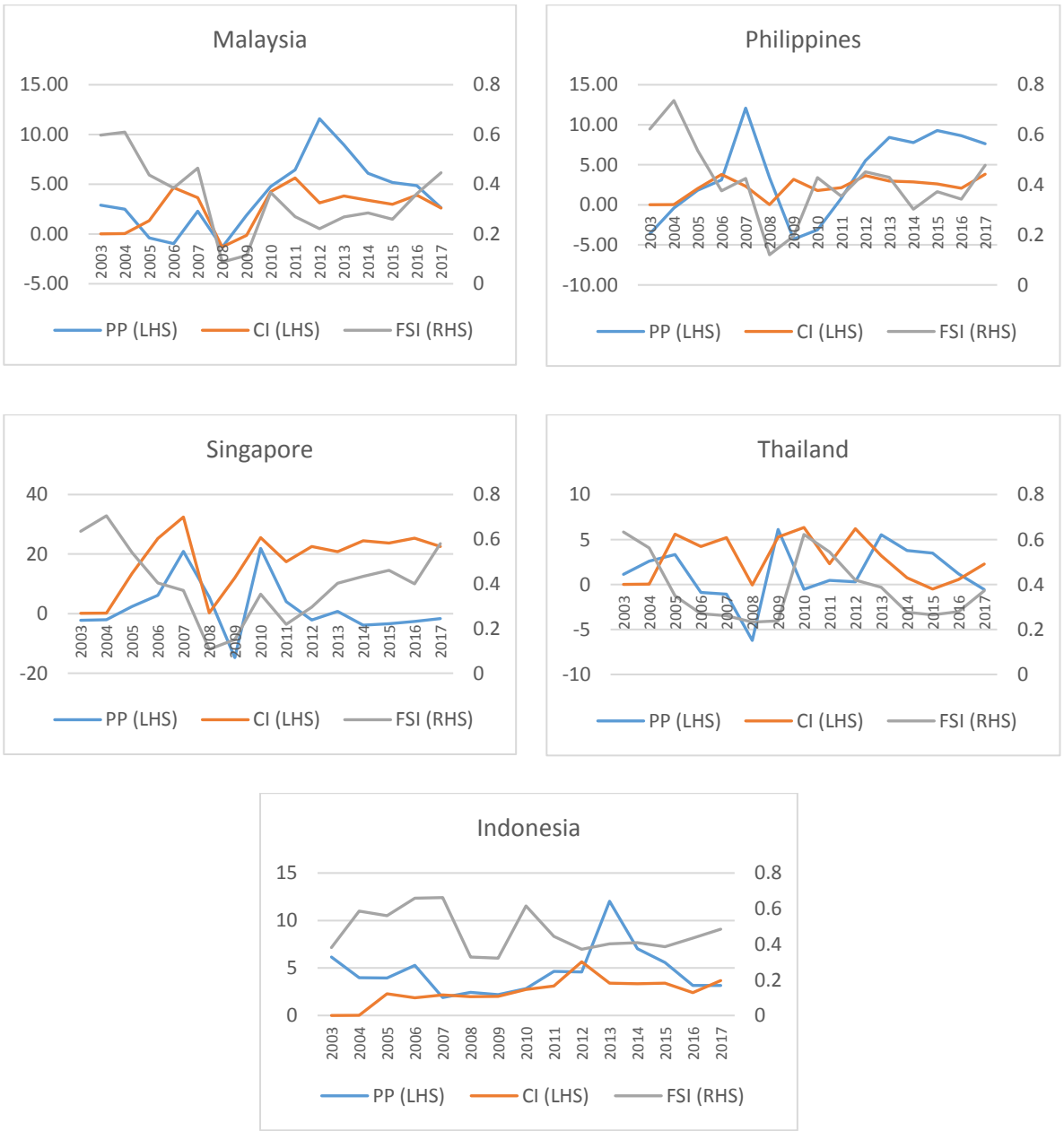
1. Descriptive Statistics

Before discussing the estimation results, the authors will explain the relationship between capital inflows, financial system stability index, and property price index, as shown in Figure 5. The hypothesis built in this study is that capital inflows have a positive and significant effect

both on the property price index and on the financial system stability index in ASEAN 5 countries. This hypothesis is supported by the results of the study (Favilukis et al., 2012). Furthermore, capital inflows will impact the property price index by increasing people's purchasing power for the property. As a result, liquidity will be abundant, and there will be an increase in the ability of banks to provide credit to the public, including property loans. Eventually, interest rates will fall, and property prices will increase.

The global crisis in 2008, which began with the subprime mortgage crisis in the United States, caused volatility in the property market in ASEAN 5 countries. The property sector bubble disrupted financial system stability in these countries.

Figure 5. Growth of Property Prices, Capital Inflows, and Financial Stability Index in ASEAN 5



Source: National authorities, World Bank, CEIC Data, Colliers International, edited by the authors

The hefty capital outflows during the global financial crisis during the period 2008-2009 are shown in Figure 5. The decline in capital inflows caused the collapse of the financial systems in the ASEAN-5 countries, which also led to a sharp decline in property prices during the crisis period. After the global financial crisis, economic conditions in ASEAN-5 began to improve in 2010 and positively impacted people's purchasing power, including purchasing power in the property sector. The existence of quantitative easing policies in developed countries had spurred large capital inflows in developing countries. The percentage of capital inflows to Indonesia in the 2010-2012 period increased to 5.6 percent of GDP from previously only 1.9 percent of GDP during the global financial crisis period.

Malaysia experienced an increase in capital inflows to 5.63 percent of GDP in 2010-2012 after previous large capital outflows, causing net capital flows to become negative, namely -1.3 percent of GDP during the GFC period. In the Philippines, capital inflows reached 3.6 percent of GDP after previously only 0.02 percent during the GFC period. The global financial crisis created swift capital outflows of 32.2 percent of GDP in Singapore. Still, after the crisis ended, the rebound from capital inflows in Singapore reached 25.5 percent of its total GDP in 2012. Thailand experienced an increase in capital inflows in 2010-2012 to 6.3 percent of GDP, which previously experienced deficient net capital flows in 2008-2009 in the range of -0.05 percent of GDP.

It can be seen in Table 2 that Singapore has the highest average property price index compared to other ASEAN-5 countries, with an average index of 121.53. The high property prices in the country are balanced with the income of the people, most of whose work is concentrated in the service sector, and the country's poverty rate is the lowest compared to other ASEAN-5 countries.

The lowest property price index is found in Thailand, with an average index of 104.06. This can be caused by demographic problems faced by the country in terms of the rapidly shrinking working-age population (ranked number 3 globally). So, the income-earning population decreases and this causes demand for property to also decrease.

As for capital inflows data, the highest average value is in Singapore, which is 17.76 percent of its total GDP. This is reasonable because Singapore is a Financial Hub in the Southeast Asian region where the government is very supportive of its financial sector. Besides this, Singapore is considered to be one of the Four Asian Tigers and one of the world's financial and technology centers.

Table 2. Descriptive Statistics

	Indonesia	**Malaysia**	**Philippines**	**Singapura**	**Thailand**	**ASEAN-5**
Property Price Index						
Mean	111.12	113.31	111.02	121.53	104.06	112.21
Max	138.71	155.42	158.84	153.55	115.54	158.84
Min	99.35	91.81	88.59	80.60	94.74	80.60
Capital Inflows per GDP						
Mean	2.54	2.53	2.22	17.76	2.76	5.56
Max	5.65	5.63	3.83	32.45	6.34	32.45
Min	0.00	-1.30	0.02	0.14	-0.51	-1.30

	Indonesia	Malaysia	Philippines	Singapura	Thailand	ASEAN-5
Financial Stability Index						
Mean	0.52	0.64	0.58	0.59	0.61	0.59
Max	0.67	0.90	0.87	0.88	0.76	0.90
Min	0.33	0.38	0.25	0.29	0.36	0.25
GDP per capita growth						
Mean	4.11	3.29	3.85	3.52	3.39	3.63
Max	4.91	5.49	5.90	13.22	6.99	13.22
Min	3.24	-3.28	-0.46	-3.56	-1.19	-3.56
Loan Interest Rates						
Mean	13.36	5.33	7.58	5.34	5.08	7.34
Max	16.94	6.49	10.18	5.38	6.27	16.94
Min	11.07	4.54	5.53	5.28	4.33	4.33
Unemployment Rate						
Mean	5.73	3.30	3.46	3.61	1.00	3.42
Max	8.06	3.69	4.05	5.93	1.54	8.06
Min	4.05	2.87	2.35	1.69	0.49	0.49
GDP per capita						
Mean	2,642.00	8,385.96	2,105.26	44,514.55	4,720.90	12,473.73
Max	3,846.86	11,183.73	2,988.95	57,714.30	6,595.00	57,714.30
Min	1,064.51	4,463.68	1,010.55	23,573.63	2,358.93	1,010.55
Exchange Rate (*Local Currency*/ USD)						
Mean	10350.83	3.57	47.72	1.44	34.79	2087.67
Max	13396.00	4.30	56.04	1.74	41.8	13396.00
Min	8577.13	3.06	42.23	1.25	30.49	1.25
VIX CBOE	For all countries					
Mean	19.35					
Max	32.69					
Min	11.09					
Obs	15	15	15	15	15	75

Source: Author's calculations

The average financial system stability index in the ASEAN-5 countries in the period 2003-2017 shows a relatively stable number where all ASEAN-5 countries have an average index above 0.5. Malaysia has the highest average financial system stability index compared to other countries because it has the most developed financial markets in the ASEAN region. Together with Singapore, it is expected to lead the integration of the ASEAN banking market.

Indonesia's GDP per capita has grown rapidly (more than other ASEAN-5 countries) over the past few decades (despite an economic slowdown between 2011-2015) with an average growth of 4.11 percent. However, this high growth is accompanied by a high Gini coefficient which shows that the income distribution in this country is very uneven, with 43,000 rich people in Indonesia (representing only 0.02 percent of the country's total population) contributing 25 percent of Indonesia's GDP. In addition, although Indonesia has the highest GDP per capita growth, the value of GDP per capita of this country is still far below other ASEAN-5 countries, namely Singapore, Malaysia, and Thailand.

Another interesting point can be seen from the maximum value of Singapore's per capita

GDP growth which reached 13.22 percent, in sharp contrast to its minimum value of -3.56 percent. This country is very dependent on international trade. When there was a decrease in demand from the United States and other countries when they experienced a crisis in 2009, Singapore's GDP growth sharply reduced to minus that year. However, a strong rebound occurred in 2010. The record high per capita GDP growth reached 13.22 percent of GDP because it was supported by the recovery in global economic conditions and the rapid growth of the manufacturing sector in Singapore that year, which reached 28 percent.

Furthermore, two macroeconomic indicators, namely loan interest rates and unemployment rates, indicate that Indonesia has relatively higher figures than other ASEAN-5 countries. Indonesia is the only ASEAN-5 country that applies interest rates above one digit, namely 13.36 percent.

In addition, this study uses the CBOE VIX index as an indicator that represents a measure of global uncertainty. The data shows that the highest VIX index of 32.69 was found in the 2008 observation sample. This indicates that in 2008 there was a global shock where the global financial crisis had occurred that year. Finally, the exchange rate variable is used in this study to control the foreign exchange market conditions concerning the stability of the financial system in ASEAN-5 as we know that those countries have a free-floating system.

2. Estimation Results

The econometric analysis of the panel data in this study uses a non-stationary test, a simultaneity test because of the alleged simultaneous relationship between endogenous variables in the equation, and a dynamic simultaneous panel data test.

2.1. Estimation Results using the 2SLS Method

In the first model, we explain what affects the Property Price. At the same time, the second model explains what affects the Financial Stability Index. We present them successively below.

a. The Model I (where the dependent variable is Property Price)

The Table 3 below describes some of the variables affected by the Property Price variable, divided into primary and control variables.

b. The Main Variable of Model I (where the dependent variable is Property Price Index)

- The impact of Financial Stability Index (FSI) on Property Prices

The financial system stability index variable has no significant effect on the property price index. This can occur for several reasons. First, there is a wide gap in the ASEAN-5 financial system. Inequality in the depth of the financial sector and differences in systemic risk in the event of turmoil create a prudent policy standard in each country. The diverse conditions that occur will undoubtedly allow the results of estimations to be neutral because, in different circumstances, the prudential policies in the financial sector will certainly be different. So, the financial system stability that occurs in each country will certainly also be different. This contributed to the influence of the financial system stability index on property prices in ASEAN-5 economies.

Setting weights on financial system stability indicators will be very challenging with the current diversity in the financial systems. Equating each weight in each country may be the weakness of this study in its effort to capture the financial system stability index in the ASEAN-5 group. This is a gap in this research that can be developed in the future.

Table 3. Estimation Results of Equation 12 (The Dependent: Property Prices Index)

Dependent Variable: Property Price Index	Coefficient (St. Error)
C	0.542**
	(0.288)
Financial Stability Index	0.048
	(0.128)
Capital inflows per GDP	0.002***
	(0.000)
GDP per capita growth	0.006
	(0.005)
Loan Interest Rates	-0.019***
	(0.005)
Lag 1 Property Price Index	0.904***
	(0.065)
R-squared	0.902
Wald Chi2	2193,2
Prob > chi2	0.000

Notes: numbers in parentheses are standard error values; ***, **, * are of significance at levels 1, 5, 10 percent, respectively.

Source: Author's calculations

- The impact of Capital Inflows on Property Prices

The estimation results show that capital inflows have a positive and significant effect on property prices. The estimation coefficient indicates that increasing one unit of capital inflows per GDP will increase the property price index by 0.002 percent. The empirical evidence from the results can be explained through several scenarios. First, large capital inflows result in abundant liquidity in recipient countries, so, in these conditions, banks are urged to relax lending policies which will ultimately increase property prices. Second, capital inflows in the form of foreign demand for domestic real estate will directly increase demand for property, so aggregate demand is shaped not only by the domestic market but also by foreign demand. It can also lead to a sizable cumulative increase in demand, which will undoubtedly push property prices to a higher level. The experience of the United States in the period before the 2008 crisis also showed a massive surge of capital inflows into the country, which was channeled into mortgage loans, which then had a significant impact on increasing property prices in the country. In addition, a positive and significant relationship between the two variables is in line with Tilmaan (2013), which explains that the inflow of capital contributes to the surge in property prices.

c. The Control Variable of Model I (where the dependent variable is Property Price Index)

- The impact of GDP Per Capita Growth on Property Prices

Adopting the treatment carried out by Yiu and Sahminan (2015) to obtain robust regression results, this study includes GDP per capita growth to control the domestic economic conditions. The estimation results of this study indicate that GDP growth per capita has a positive but not significant impact on property prices. The positive direction of per capita

income growth towards property prices is consistent with Allen et al. (2016) and Post and Berkhout (2014) because increased incomes will give people the ability to buy property. However, the empirical results of this study do not show a significant effect, although the direction remains positive. This indicates that property prices in ASEAN-5 countries are more influenced by variables outside of per capita income growth. In addition, property prices in ASEAN-5 countries will also highly depend on demographic characteristics such as population, urbanization, consumer confidence, and also institutional factors (such as housing ownership policies, housing contracts, housing taxes, and housing finance systems) that vary so play an essential role in the property market in each of the ASEAN-5 countries.

- The effect of Loan Interest Rates on Property Prices

The estimation results of this study indicate that interest rates have a negative and significant effect on the property price index in ASEAN-5 countries. The interest coefficient of - 0.019 indicates that statistically increasing the interest rate by one unit will reduce the property price index by 0.019 percent. The research of Nneji, Brooks, and Ward (2015) explains the link between interest rates and property prices. A policy of increasing the rates can increase loan rates, reducing demand for property and causing property prices to decline.

The interest rate is an important control variable in researching determinants of property prices. Some literature even makes interest rates the most important explanatory variable, such as the research of Abraham and Hendershott (1992); Iacoviello and Minetti (2003); Himmelberg et al., (2005); Adams and Fuss (2010). Himmelberg, Mayer, and Sinai (2005) argue that house prices are more sensitive to long-term interest rates. In addition, research by Agnello and Schuknecht (2011) shows that interest rates significantly influence the probability of boom and bust in the property market during the period 1980-2007. The negative relationship between interest rates and house prices is also explained by Domingo and Fulleros (2005), Goddard and Marcum (2012), and Hott and Monnin (2008). They explain that interest rate growth can increase funding costs. Thus, it not only prevents potential buyers from owning housing but can also reduce the liquidity of the property market and prolong the sale period.

- The impact of Property Price Lag on Property Prices

The estimation results in Table 3 show a positive and significant relationship between the previous period property prices and the current property prices. In addition, the coefficient also shows persistence in the growth of property prices in the ASEAN-5 economies. This indicates that the expectations of both speculators and investors in seeing past property prices play an important role in current prices, where prices that held stable in the previous period had a positive influence on current property prices in ASEAN-5.

d. The Model II (where the dependent variable is Financial Stability Index)

Furthermore, the estimated results of the financial system stability equation as the dependent variable are explained in Table 4.

Table 4. Estimation Results of Simultaneous Panel Equations (Dependent: FSI)

Dependent Variable: ***Financial Stability Index (FSI)***	**Coefficient (St. Error)**
C	0.389
	(0.425)
Property Price Index	0.142*
	(0.086)
Capital inflows per GDP	-0.006***
	(0.001)
Unemployment Rate	-0.061***
	(0.015)
VIX CBOE	-0.011**
	(0.004)
Exchange Rate	-1.412***
	0.000
R-squared	0.426
Wald chi2	288.93
Prob > chi2	0.000

Notes: numbers in parentheses are standard error values; ***, **, * are of significance at levels 1, 5, 10 percent, respectively

Source: Author's calculations

e. The Main Variable of Model II (where the dependent variable is Financial Stability Index)

- The effect of Property Prices on the Financial Stability Index

The simultaneous panel model estimation results show that property prices positively affect financial system stability in ASEAN-5 countries, where a one percent increase in the property price index will increase the financial system stability index by 0.142 units. So, this study indicates that rising property prices will increase financial system stability in ASEAN-5 economies. Conversely, a decline in property prices will disrupt the financial systems there. The results of this study are supported by many studies linking the collapse of the property market to the financial crisis in 2008, where the collapse worsened the state of the financial system in various countries. The real estate crisis can have significant consequences for the economy. Research from Iacoviello and Neri (2010), Leamer (2007), and Reinhart and Rogoff (2009) found that falling house prices are at the heart of many financial crises. Another study is Barell (2010), who found that bank capital adequacy is not weighted, bank liquidity and property prices have an impact on the probability of a banking crisis.

- The impact of Capital Inflows on Financial Stability Index

Theoretically, capital inflows move from a country with a lower rate of return to a country with a higher rate of return. Capital inflows increasing the availability of capital also help recipient countries in terms of consumption smoothing and increasing investment. In addition, capital flows can encourage economic growth in recipient countries. However, in several crises that have occurred throughout history, there have been instances of heavy capital inflows followed by massive withdrawals of capital from recipient countries, resulting in disrupted financial system stability in those

countries. The rapid increase in global liquidity and large-scale net capital flows to developing countries have raised serious concerns about the adverse effects on receiving countries where excess liquidity could lead to overheating, exchange rate appreciation pressures, inflationary pressures on consumer and asset prices, and other risks to financial stability.

This study confirms the findings that the Capital Inflows parameter, when it is negative, affects the financial system stability index in a way that is statistically significant. Rodrik and Subramanian (2009) also support the same argument. An increase in capital inflows by one would reduce the financial system stability index by 0.006 units. Large capital inflows will cause recipient countries to have abundant liquidity, so banks are forced to channel loans. In this case, banks will relax their policies to increase non-performing loans, which are part of the financial system stability index.

f. The Control Variable of Model II (where the dependent variable is Financial Stability Index)

- The impact of Unemployment Rate on Financial Stability Index

The simultaneous panel model estimation results show a negative and significant relationship between the unemployment rate and financial system stability in ASEAN-5 countries. Increasing one unit of the unemployment rate can reduce the financial system stability index by 0.061 units. The negative relationship between the two variables can be explained because an increase in unemployment will lead to the possibility of an increase in the community who are unable to pay their debts or, in other words, when someone has already borrowed money. Still, in the future, the person is fired from his job, so they are no longer able to pay debts to cause non-higher-performing loans (NPL). The increase in NPL ratios has resulted in increased financial system instability due to the deteriorating performance of banks as financial institutions.

Furthermore, when viewed terms of the financial system in ASEAN-5 countries, it can be seen that banking institutions still dominate it. Therefore, when there is an increase in NPLs, it will certainly directly affect the stability of the financial system in the ASEAN-5 region, which will worsen. In addition, in emerging market countries such as those in ASEAN-5, the unemployment rate is also relatively high, which could jeopardize the stability of the financial system in the region. If the unemployment rate is not controlled, it is feared that it will threaten the strength of the financial system in the ASEAN-5 area.

- The impact of the Volatility of Stock Price Index on the Financial Stability Index

The simultaneous panel model estimation results show a negative and significant influence of the CBOE VIX variable on financial system stability in ASEAN-5 countries with a coefficient of -0.011, which means an increase of 1 unit of the VIX index will cause the financial system stability index to decrease by 0.011 units. The negative relationship between the two variables can be explained because VIX represents global financial market volatility expectations. An increase in the VIX index increases expectations of global financial market volatility, which can reduce bank loans, cause prices on asset markets to fall, and cause instability in the financial systems of ASEAN-5 countries. Rey (2018) explains that financial system stability in countries with more credit flows is more sensitive to the global cycle represented by the VIX variable as a variable that provides an overview of global financial conditions.

This phenomenon is indicated accurately when looking further at the descriptive statistics previously explained. During the global financial system turmoil/global financial crisis in 2008, the market responded very quickly, as indicated by the rapidly increasing VIX CBOE index value or, in other words, uncertainty increases. Increased uncertainty causes market players, in this case, investors, to withdraw their funds from the financial markets, which in turn will cause the stock values to plummet. This then presses the stability of the financial system in all ASEAN-5 countries.

CONCLUSION AND SUGGESTION

The empirical results of this study indicate that capital inflows have a strong influence on rising property prices. Furthermore, our model shows that large capital inflows have a negative and significant impact on financial system stability. This study also demonstrates that there is a simultaneous relationship between property prices and financial system stability in ASEAN-5 countries. On the one hand, property prices have a positive and significant influence on financial system stability, thus indicating the importance of keeping property price movements stable to ensure the financial system is in good condition. On the other hand, financial system stability does not significantly affect property prices. This indicates that property prices are more influenced by other determinant variables, such as macroeconomic conditions reflected by economic growth. The economic fundamentals of ASEAN-5 countries that are strong and supported by macroprudential policies in ASEAN-5 countries have been effectively applied to mitigate the risk of crisis if capital outflows occur on a large scale. Strong per capita income growth conditions are positively, but not significantly, correlated to property prices. Low-interest rates have proven to lead to a significant increase in property prices.

In addition, the CBOE VIX variable, which reflects the volatility of the global financial cycle, has a negative and significant impact on the stability of the financial system in ASEAN-5 countries. Finally, this study found that an overly depreciating exchange rate can cause a financial system to become unstable. A low exchange rate causes a mismatch in currency, which will ultimately lead to instability in the broader economy by increasing the current account deficit and the financial system's stability, namely the deterioration of the debtor's balance sheet.

Implication/ Limitation and Suggestions

This research has a limitation because it does not look at the relationship between property prices and financial system stability in each country even though these relationships could be different given their differing characteristics and differences in the policies regarding property development. In addition, due to the substantial diversity among financial systems and financial stability in ASEAN-5 countries, our model could not capture the influence of FSI on PP. This may be because the weight we put on the financial system stability index is the same in each country, even though it should be different, according to the level of depth of the financial system of each country. This is a research gap that could be developed.

REFERENCE

Adam, K., Kuang, P., & Marcet, A. (2011). House price booms and the current account. *NBER Macroeconomics Annual*, *26*(1), 77-122.

Adams, Z., & Füss, R. (2010). Macroeconomic determinants of international housing markets. *Journal of Housing Economics*, *19*(1), 38-50.

Albulescu, C. T. (2010). Forecasting the Romanian financial system stability using a stochastic simulation model. *romanian journal of economic Forecasting*, *13*(1), 81-98.

Allen, L., Barnes, C., & Lynch, H. (2016). The role of macroeconomic fundamentals in the determination of house prices. *Journal of Applied Business and Economics*, *18*(5).

Andaiyani, S., & Falianty, T. A. (2017). Asean Credit Growth and Asset Price Response To Global Financial Cycle. *Buletin Ekonomi Moneter dan Perbankan*, *20*(2), 203-228.

Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2014). Causality and endogeneity: Problems and solutions. The Oxford handbook of leadership and organizations, 93-117.

Arellano, M. (2003). *Panel data econometrics*. Oxford university press.

Azis, I. J., & Shin, H. S. (2013). How do global liquidity phases manifest themselves in Asia. *Asian Development Bank*.

Balestra, P., & Varadharajan-Krishnakumar, J. (1987). Full information estimations of a system of simultaneous equations with error component structure. *Econometric Theory*, 223-246.

Baltagi, B. (2005). *Econometric analysis of panel data*. New York: John Wiley & Sons.

Baltagi, B. H. (1981). Simultaneous equations with error components. *Journal of econometrics*, *17*(2), 189-200.

Barras, R. (1994). Property and the economic cycle: building cycles revisited. *Journal of Property Research*, *11*(3), 183-197.

Bernanke, B. (2005). The Global Saving Glut and the US Current Account Deficit, Speech by the Chairman of the Federal Reserve Ben S. *Bernanke at The Homer Jones Lecture, St. Louis, Missouri*, *14*.

Bernanke, B. S. (2008). Speech: Chairman Ben S. Bernanke at the Federal Reserve System Conference on Housing and Mortgage Markets, Washington, DC: Housing, Mortgage Markets, and Foreclosures.

Bhagawati, J. N. (1998). The Design of Indian Development, India's Economic Reforms and Development: Essay for Manmohan Singh, Isher Judge Ahluwalia and IMD Little.

Bordo, M. D., Dueker, M. J., & Wheelock, D. C. (2000). Aggregate price shocks and financial instability: A historical analysis. *Economic Inquiry*, *40*(4), 521-538.

Caballero, R. J., & Krishnamurthy, A. (2009). Global imbalances and financial fragility. *American Economic Review*, *99*(2), 584-88.

Caballero, R. J., Farhi, E., & Gourinchas, P. O. (2008). An equilibrium model of" global imbalances" and low interest rates. *American economic review*, *98*(1), 358-93.

Cardalelli, R. (2006). How Do Financial Systems Affect Economic Cycle. *World Economics Outlook IMF*.

Che, X., Li, B., Guo, K., & Wang, J. (2011). Property prices and bank lending: some evidence from China's Regional Financial Centres. *Procedia Computer Science*, *4*, 1660-1667.

Cheang, N., & Choy, I. (2009). Aggregate financial stability index for an early warning system. *Macao monetary research bulletin*, *21*(1), 27-51.

Domingo, E. V., & Fulleros, R. F. (2005). Real estate price index: a model for the Philippines. *Press & Communications CH-4002 Basel, Switzerland*.

Ekananda, Dr. Mahyus. (2016). *Analisis Ekonometrika Data Panel: Teori Lengkap dan Pembahasan Menyeluruh bagi Penelitian Ekonomi, Bisnis, dan Sosial* (Edisi Kedua). Jakarta: Mitra Wacana Media.

Englund, P., & Ioannides, Y. M. (1997). House price dynamics: an international empirical perspective. *Journal of housing economics*, *6*(2), 119-136.

Falianty, T. A. (2016). Capital flows, macro prudential policy, and property sector: Indonesian Case in the Aftermath of Asian Crisis. *International Journal of Applied Business and Economic Research*, *14*(10), 6935-6959.

Favilukis, J., Kohn, D., Ludvigson, S. C., & Van Nieuwerburgh, S. (2012). International capital flows and house prices: Theory and evidence. In *Housing and the financial crisis* (pp. 235-299). University of Chicago Press.

Filardo, A., Genberg, H., & Hofmann, B. (2016). Monetary analysis and the global financial cycle: an Asian central bank perspective. *Journal of Asian Economics*, *46*, 1-16.

Flannery, M. J., & Lin, L. (2015). House prices, bank balance sheets, and bank credit supply. *Unpublished working paper*.

Glindoro, Eloisa T., Tientip Subhanij, Jessica Szeto and Haibin Zhu (2011), "Determinants of House Prices in Nine Asia-Pacific Economies," International Journal of Central Banking, 7(3): 163-204.

Goddard, G. J., & Marcum, B. (2012). *Real estate investment: a value based approach*. Springer Science & Business Media.

Gujarati, Damodar N. (2003). *Basic Econometrics* (Fourth Edition). Singapore: Mc. Graw-Hill.

Gunadi, I., Taruna, A. A., & Harun, C. A. (2013). Penggunaan Indeks Stabilitas Sistem Keuangan (ISSK) dalam Pelaksanaan Surveilans Makroprudensial. *WP BI No*, *15*.

Himmelberg, C., Mayer, C., & Sinai, T. (2005). Assessing high house prices: Bubbles, fundamentals and misperceptions. *Journal of Economic Perspectives*, *19*(4), 67-92.

Hofmann, B. (2004). The determinants of bank credit in industrialized countries: do property prices matter? *International finance*, *7*(2), 203-234.

Hott, C., & Monnin, P. (2008). Fundamental real estate prices: an empirical estimation with international data. *The Journal of Real Estate Finance and Economics*, *36*(4), 427-450.

Iacoviello, M., & Minetti, R. (2003). Financial liberalization and the sensitivity of house prices to monetary policy: theory and evidence. *The Manchester School*, *71*(1), 20-34.

Iacoviello, M., & Neri, S. (2010). Housing market spillovers: evidence from an estimated DSGE model. *American Economic Journal: Macroeconomics*, *2*(2), 125-64.

Illing, M., & Liu, Y. (2003). *An index of financial stress for Canada* (No. 2003-14). Bank of Canada.

Internazionale, F. M. (2018). Global Financial Stability Report: A Bumpy Road Ahead, aprile. *Washington (DC): Fondo Monetario Internazionale, disponibile alla URL: https://www. imf. org/~/media/Files/ Publications/GFSR/2018/April/ch1/doc/text. Ashx*.

Johansen, A., & Sornette, D. (1999). Critical crashes. *arXiv preprint cond-mat/9901035*.

Kauko, T. (2001). Combining theoretical approaches: the case of urban land value and housing market dynamics. *Housing, Theory and Society*, *18*(3-4), 167-173.

Landier, A., Sraer, D., & Thesmar, D. (2017). Banking integration and house price comovement. *Journal of Financial Economics*, *125*(1), 1-25.

Leamer, E. E. (2007). Housing is the business cycle (No. w13428). National Bureau of Economic Research.

Levin, E. J., & Wright, R. E. (1997). The impact of speculation on house prices in the United Kingdom. *Economic modelling*, *14*(4), 567-585.

Levitt, S. D. (1997). Using electoral cycles in police hiring to estimate the effects of police on crime. American Economic Review, 87(3), 270-290.

Levitt, S. D. (2002). Using electoral cycles in police hiring to estimate the effects of police on crime: Reply. American Economic Review, 92(4), 1244-1250.

Lynch, Scott M. (2011). Handbook of Aging and the Social Sciences || Stratification and Inequality Over the Life Course. 105–117. doi:10.1016/b978-0-12-380880-6.00008-3

Maclennan, D. (1982). *Housing Economics: An Applied Approach*. Longman.

Matyas, L., & Lovrics, L. (1990). Small sample properties of simultaneous error components models. *Economics Letters*, *32*(1), 25-34.

Mendoza, E. G., Quadrini, V., & Rios-Rull, J. V. (2007). *On the welfare implications of financial globalization without financial development* (No. w13412). National Bureau of Economic Research.

Miranda-Agrippino, S., & Rey, H. (2015). World asset markets and the global financial cycle. Cambridge, MA: *National Bureau of Economic Research*.

Mohan, R., & Kapur, M. (2010). Liberalization and regulation of capital flows: Lessons for emerging market economies. In *Implications of the Global Financial Crisis for Financial Reform and Regulation in Asia*. Edward Elgar Publishing.

Nneji, O., Brooks, C., & Ward, C. W. (2015). Speculative bubble spillovers across regional housing markets. *Land Economics*, *91*(3), 516-535.

Obstfeld, M. (2009). International finance and growth in developing countries: what have we learned?. *IMF staff papers*, *56*(1), 63-111.

Post, J. E., & Berkhout, T. (2014). Risk perceptions in the European real estate industry.

Prucha, I. R. (1985). Maximum likelihood and instrumental variable estimation in simultaneous equation systems with error components. *International Economic Review*, 491-506.

Reinhart, C. M., & Rogoff, K. S. (2009). The aftermath of financial crises. *American Economic Review*, *99*(2), 466-72.

Rey, H. (2015). *Dilemma not trilemma: the global financial cycle and monetary policy independence* (No. w21162). National Bureau of Economic Research.

Rodrik, D., & Subramanian, A. (2009). Why did financial globalization disappoint?. *IMF staff papers*, *56*(1), 112-138.

Roehner, B. M. (1999). Spatial analysis of real estate price bubbles: Paris, 1984–1993. *Regional science and urban economics*, *29*(1), 73-88.

Sá, F., Towbin, P., & Wieladek, T. (2012). Capital inflows, financial innovation and housing booms. *BIS Paper*, (64l).

Taylor, J. B. (2013). *Getting off track: How government actions and interventions caused, prolonged, and worsened the financial crisis*. Stanford: Hoover Institution Press.

Tillmann, P. (2013). Capital inflows and asset prices: Evidence from emerging Asia. *Journal of Banking & Finance*, *37*(3), 717-729.

Tse, R. (1997). Construction activity and adjustment of hosing stock. *Journal of'Real Estate and Construction*, *7*(1), 9-18.

Yiu, M. S., & Sahminan, S. (2015). Global liquidity, capital inflows and house prices in ASEAN economies.

Zhu, H. (2005). The importance of property markets for monetary policy and financial stability. *Real estate indicators and financial stability*, *21*, 9-29.