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## **HAS SECONDARY MORTGAGE MARKET PROMOTE HOUSE AFFORDABILITY? EVIDENCE FROM INDONESIA**

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### **Abstract**

The advantage of secondary mortgage market establishment to decrease housing cost, theoretically, had been mentioned frequently in domestic and international research. However, research on this matter in Indonesia is still limited to narrative descriptive. This research engages sequential explanatory design by utilizing empirical evidence from financial perspective to analyse the impact of securitization to the yield spread premium from monthly data ranging from June 2017-April 2021. In quantitative phase, this research found that either securitization volume or the launch of new series of asset backed securities (ABS) significantly affects mortgage rate, contrary to aggregate mortgage volume, prepayment risk, and yield curve risk. In the qualitative phase, it is explored that the reason of securitization's stagnation is market unreadiness.

**Keyword:** Housing, securitization, asset backed securities, mortgage, yield, Indonesia

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## **INTRODUCTION**

The need of shelter was categorized by Maslow (1943) in his Hierarchy of Needs as physiological need, the most basic need. Yet, from the data of Central Bureau of Statistic (BPS) only 80,10% of families in Indonesia own a house in 2020. Studies by Rohman (2020), Christie & Ayem (2021), Pradana (2019), and Agatha & Priana (2020) were held to find the determinants of mortgage distribution. All the studies concluded that mortgage lenders' rate of return has significant negative impact to the mortgage distribution. Thus, the higher mortgage rates, the less mortgage will be channelled. The problem arise as Indonesia's mortgage rate is placed 25th from 108 observed countries, the highest in ASEAN (Numbeo, 2021). This finding matches the fact that Indonesia's mortgage to GDP ratio is the lowest in ASEAN.

The Government had set the function of housing and public facility one of the National Priorities. In 2021, this function's spending increased by 60,9% to Rp33.228,5 billion from 2020's outlook. Despite the multiplier effect it intends to enhance, spending is a burden to the Government's fiscal capacity. To bridge the need of affordable housing and Government's capacity, Lea & Chiquier (1999) underlined the role of secondary market in developing country.

## **RESEARCH BACKGROUND**

Bank is considered most exposed to liquidity and interest rate risk. It has the potential of relative inefficiency, since saving institutions have higher cost ratio than capital market lenders. Besides, maturity mismatch tends to happen if long-term mortgages distributed are mainly funded by short-term deposits. To solve this problem, a new model that include the role of a special institution in the secondary market that helps mortgage lenders to control liquidity risk and interest rate risk by manages the role related to liquidity, rediscounting, or secondary mortgage facility (Lea & Chiquier, 1999).

Passmore et al (2002) found that this entity generally lowers mortgage rate. Later in 2005, Passmore et al found that this entity could lower mortgage cost by 7 basis points. Kolari et al (1998), Naranjo & Toevs (2002), and Sabry & Okongwu (2009) had studied the topic in the USA, whereas Harun & Othman (2007) did the research in Malaysia. Their studies prove that mortgage securitization can lower mortgage rates that result in more affordable housing.

Indonesia had started its secondary mortgage market construction in 2005 by the establishment of PT. Sarana Multigriya Finansial (PT SMF). PT SMF is the secondary mortgage company of Indonesia, similar as Fannie Mae (Federal National Mortgage Association and Freddie Mac (Federal Home Loan Mortgage Corporation) in the USA. Previous study on PT SMF was done by Prasetyowati (2013) and Harikusuma & Ubed (2020), but these studies are mostly narrative-descriptive and haven't provide empirical evidence of the company's impact.

Since the introduction, measurement to review the impact of secondary mortgage market to the affordability of housing should be done. Therefore, this research aims to examine the effects of securitization to the yield spread premium in the primary residential mortgage market in Indonesia. After the effect is measured, the reason behind the phenomenon will be explored.

## REVIEW OF SELECTED LITERATURE

Previous studies in Indonesia had proven that mortgage rate is an important factor of housing affordability. The study conducted in sharia bank and conventional banks by Rohman (2020), as well as state banks by Djati (2017) and Amal (2015) agree that bank's rate of return has significant negative impact on mortgage distribution. Further, Novianti (2020) found that mortgage rate has significant negative impact on it as well.

Lea & Chiquier (1999) had mentioned the benefits of securitization, namely increase of fund availability to the mortgage lender and decrease of mortgage credit cost. It was done through more efficient risk allocation national diversification. Empirical studies conducted abroad had tried to prove the theory. Some of the studies and its content are listed in Table 1.

**Table 1:** Resume of Literature Review

No.	Research	Resume
1.	Jameson et al (1992)	Mortgage collateralization, credit risk, yield curve risk, and aggregate mortgage volume significantly affect yield spread premium in the USA. This study used multiple linear regression and t-test.
2.	Kolari et al (1998)	Implementing cointegration analysis, this study found that 10% of securitization increase trigger 20 basis points decrease of mortgage yield spread.
3.	Todd (2001)	Securitization has no significant impact to mortgage rate but lower the initial payment. Thus, increase savings.
4.	Naranjo & Toevs (2002)	In the increase of \$1 billion securitization, yield spread will decrease by 8 basis points.
5.	Liu & Skully (2005)	Securitization significantly affect yield spread premium in Australia. This study used multiple linear regression and t-test.
6.	Harun & Othman (2007)	Study in Malaysia using cointegration analysis found that increase of 1% securitization affects yield spread premium to decrease by 0,8 basis points. But the effect is later neutralized by prepayment risk.
7.	Lehnert (2007)	Based on the vector autoregression (VAR) analysis securitization has very little effect to yield spread. Increase of \$10 billion securitization affects yield spread to decrease by 0,5-0,6 basis points.

No.	Research	Resume
8.	Sabry & Okongwu (2009)	Securitization lower cost of credit and the increase of securitization has significant positive impact to the amount of mortgage credit per capita.
9.	Khasyanova & Samsonov (2020)	This study used propensity score matching in Russia and found that securitization don't benefit the originator a lower funding cost or profitability increase.

*Source: Resumed by Author*

In Indonesia, Prasetyowati (2013) described the definition and benefits of securitization with literature review. Literature review also used by Harikusuma & Ubed (2020) to underline PT SMF's role to provide funding to lend to mortgage lenders and to facilitate securitization. From juridical aspect, Doyoharjo (2008) had explained the concept, organization, and implementation of securitization in Indonesia. On the other hand, Ananto et al (2018) implementing normative juridical approach. Hence, we know that the research conducted in Indonesia has yet addressed empirical evidence of the benefit of securitization as secondary mortgage market's main activity to lower yield spread premium that promote more affordable housing.

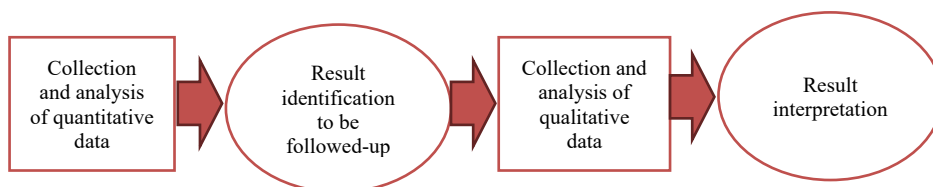
## **METHODOLOGY**

This research implements mixed method research with sequential explanatory design. Amaratunga et al (2002) stated that both quantitative and qualitative methods have weaknesses. Quantitative method tends to be inflexible and artificial. Besides, since the method focus on what is or what has been recently, it is hard for policymakers to infer what changes and actions should take place in the future. On the other hand, it is harder to control the pace, progress, and endpoints of research process of the qualitative method. Policymakers also tend to give low credibility to the result of qualitative method.

To tackle these weaknesses, this research engages the mixed method. Sugiyono (2019,40) stated that a more comprehensive, valid, reliable, and objective data could be derived from mixed method. Thus, it can improve the credibility of the result. Besides, Creswell & Creswell (2018) mentioned that mixed method provides more complete argument and stronger evidence. Since mixed method provide more comprehensive perspective (Creswell & Creswell, 2018), the inflexibility of quantitative method would be suppressed. As the result, policymakers would have a highly credible research result and able to infer what action should take place in the future.

Sequential explanatory design is chosen since the design match the aim of this research. This design collects data in sequential order. Quantitative data are first collected and analysed. In this research, this phase will provide the "what is", the effect of securitization to the yield spread premium. The result also informs what the types of participants to be purposely selected for the qualitative

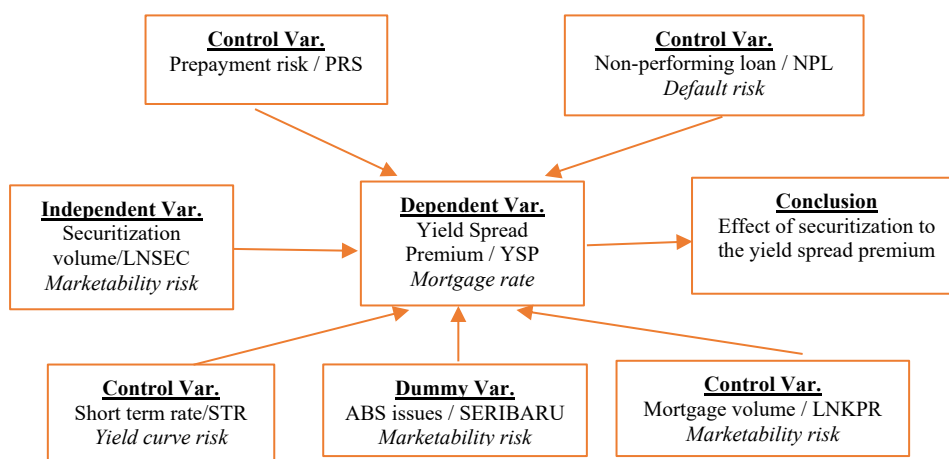
phase and what question to be asked to them. This will then build the second analysis (QUAN→qual). The flow of sequential explanatory design derived from Creswell (2018) is shown in the following Figure 1.



**Figure 1: Research Flow**  
 Source: Creswell & Creswell (2018)

### 1. Quantitative phase

The framework of the analysis and research model are below:



**Figure 2: Analytical Framework**  
 Source: by Author

The data used for quantitative phase are monthly time series data from June 2017-April 2021 period. Previous study such as Kolari et al (1998) and Harun & Othman (2007) use time series data as well. Other data are collected from document tracing, thus considered secondary data, from Otoritas Jasa Keuangan (OJK), Asset-Backed Security (ABS) Performance Report from PT SMF, Indonesia Bank Statistics, and Survei Perbankan from Bank Indonesia, as well as government securities yield history from trusted sites.

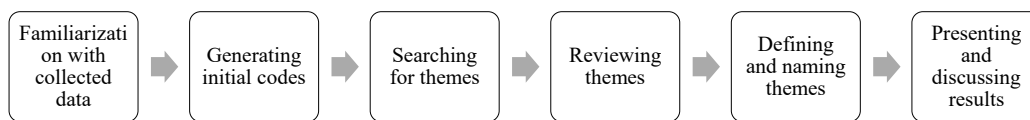
Microsoft Office Excel was utilized to collect and build worksheet. The data then cleaned and exported to STATA version 16 to be tested. The test

consisted of statistic descriptive, diagnostic test, regression, and goodness of fit test.

## 2. Qualitative phase

Qualitative phase is built after the result of quantitative phase is defined. Quantitative phase's result is the case study for qualitative phase in this research. Qualitative phase utilized deep interview with purposive sampling and literature review. Thematic analysis to the interview results then run to present final thematic scheme that portrayed the findings.

Although secondary mortgage market in Indonesia had been built since 2005 with the establishment of PT SMF, the first ABS as the product of mortgage securitization by PT SMF (SMF-BTN01 series) was first published just in December 2015. The recency of this security could result in the limited knowledgeable investor. Up until the end of this research's observation period, the originator of the securities is also limited to two state-owned banks. Considering that, policymaker is the group that hold the most information about secondary mortgage market dynamics.



**Figure 3: Thematic Analysis Phase**

*Source: Labra et al (2019)*

Among the knowledgeable policymakers, this research had interviewed 4 staff of Directorate of Restricted State Asset. The interviewees are the members of KND IIC Section which directly involved in the supervision PT SMF as the Minister of Finance's representative in General Meeting of Shareholders. The experiences of the interviewees related to PT SMF's effectivity measurement, State Equity Participation (PMN) decision making, as well as the review of PT SMF's annual work plan would made them the most knowledgeable source for this research to unveil the phenomenon behind the effect of securitization on the yield spread premium. This matches Sekaran & Bougie (2016)'s requirements to choose the most appropriate and best positioned interviewees to obtain the best information needed. The interview results then undergo six thematic analysis phases as mentioned by Labra et al (2019) in Figure 3.

To process the data, Atlas.ti 9 application was used. Lastly, credibility, transferability, dependability, and confirmability of the result was checked.

## EMPIRICAL RESULTS

### 1. Quantitative phase

In the quantitative phase, this research implemented statistic descriptive test, diagnostic tests to find measurement error, specification error, multicollinearity, autocorrelation, and non-normality, regression, and goodness of fit test. The regression model of this research after Prais-Winsten transformation is:

$$YSP_t = 46,99756 + 0,1635419 LNSEC_t + 0,2929387 PRS_t + 0,3806987 NPL_t - 7,14166 LNKPR_t - 0,4566454 STR_t + e_t$$

where:

$$e_t = 0,4736153 e_{t-1} + v_t$$

Coefficient of dummy variable SERIBARU was not added to the constant as the result of its *p-value* being 0,205, more than significance level of 5%. This means that  $H_0$  that new issues of ABS don't significantly impact YSP couldn't be rejected. From the F-test and determination coefficient analysis, it is concluded that this model is a good fit and simultaneously explains 81,25% of YSP changes.

With significance level of 5%, the result of t-partial test that shows each independent variable impact to the YSP is shown in Table 2.

**Table 2:** Impacts of Independent and Control Variables to the Dependent Variable

Variable	P >   t	Condition	Impact to YSP
LNSEC	0,654	P >   t   more than 5%	Insignificant
PRS	0,002	P >   t   less than 5%	Significant
NPL	0,227	>   t   more than 5%	Insignificant
LNKPR	0,000	P >   t   less than 5%	Significant
STR	0,000	P >   t   less than 5%	Significant
SERIBARU	0,205	>   t   more than 5%	Insignificant

Source: Resumed by Author

As stated by Benoit (2011), in the linear model,  $\beta$  directly reflects the change of Y for every change of X (it reflects elasticity). Hence, it can be interpreted that:

- For each percent of increase in prepayment risk (PRS), yield spread premium (YSP) wil increase by 0,29%.
- For each percent of increase in short-term rate (STR), yield spread premium (YSP) will decrease by 0,46%.

Different from PRS and STR, LNKPR impact to YSP is in linear-log model. The literal interpretation of this model, as stated by Benoit (2020) is each

unit of change in  $\log X$  will increase  $Y$  by  $\beta$  unit. Refers to Benoit (2011) and Ahmad (2020) the impact of LNKPR to YSP can be interpreted as:

- a. YSP will decrease by 7,14% if outstanding mortgage nominal multiplied by basis value  $e$  (2,71828). This is referred as  $\log X + 1 = \log X + \log e = \log(eX)$ .
- b. Each percent of increase in outstanding mortgage nominal will result in the decrease in YSP by 0,0714%. This is referred as  $\Delta Y = \beta \cdot \log ([100 + p]/100)$  with  $p$  is percentage of increase in  $X$ . In small value of  $p$  Benoit (2011) stated that  $\log ([100 + p]/100) \approx p/100$ . Hence, for every 1% increase in  $X$ , the impact on  $Y$  is  $\beta/100$ .

Unlike the previous research results of the significance of securitization impact to the yield spread premium such as Liu & Skully (2005) in Australia, Kolari et al (1998), and Naranjo & Toevs (2002) in the USA, this research found that securitization in Indonesia have no significant impact to yield spread premium. It indicates that the affordability of housing cost is not significantly impacted by the current securitization level. This finding is similar with Todd (2001), Lehnert (2007), and Harun & Othman (2007).

On the other hand, prepayment risk consistently significantly affects the yield spread premium. This finding strengthens the research by Jameson et al (1992) which stated that prepayment risk has significant effect at 10% significance level. Meanwhile, Kolari et al (1998) stated that prepayment risk has a cointegration nature in the long term with yield spread premium. Harun & Othman (2007) said the same thing. These results prove that mortgage lenders pay close attention to the risk of early repayment from debtors. This risk is also used as an indicator of the risk assessment of mortgage distribution.

Non-performing loan (NPL) has no significant effect to the yield spread premium. This finding corroborates the findings of Kolari et al (1998). The insignificance of NPL occurred because banks have carefully assessed debtors' eligibility of mortgage. Government through Central Bank (Bank Indonesia/BI) and Financial Service Authority (Otoritas Jasa Keuangan/OJK) also actively implements policies to keep the NPL level.

Interest rate of short-term government bonds has significant effect to the yield spread premium. This variable was utilized to capture the effect of yield curve risk. The significance of this variable indicates that the bank has considered the effect of short-term interest rate volatility/changes in the price of financial instruments. Yield curve risk also stated to be a part of interest rate risk which must be managed according to Article 4 paragraph (1) letter b of OJK Regulation No. 18/POJK.03/2016.

Increase in short-term investment interest rates that is faster than the increase in long-term interest rates could make the risk gap between short-term and long-term investments smaller. Therefore, mortgage lenders wouldn't expect



a higher rate of return as risk compensation from long-term investments such as mortgages. Thus, mortgage interest rates decrease as research results show a significant negative effect of STR on YSP.

## **2. Result Identification**

Other proxy of marketability risk than securitization, namely volume of mortgages, has significant negative effect to the yield spread premium. In fact, the effect is the largest compared to other variables with the coefficient of -7.14166. In the other words, the increasing volume of outstanding mortgages can reduce mortgage interest rates. Thus, it can be concluded that marketability risk is an indicator to determine the expected return on mortgage distribution.

The insignificant effect of securitization to the yield spread premium indicates that volume of securitized mortgages is not the proxy of marketability risk considered by mortgage lenders to determine the expected return. The insignificant effect of dummy variable SERIBARU to the yield spread premium strengthens the indication. From this phenomenon, a common thread can be drawn that the current mortgage securitization activity has not been able to achieve its objectives according to Article 2 of Presidential Regulation No. 19 of 2005, which is to create sustainable housing finance that is affordable for the public. Therefore, the reason behind it needs to be identified to identify the right actions to optimize the role of securitization in the affordability of house prices.

## **3. Qualitative phase**

In the qualitative phase, thematic analysis was performed. At the beginning of the analysis, 56 initial codes were generated. The process then followed by axial coding and categorization to define the themes.

Preliminary research in quantitative phase found that the effect of securitization was not significant to the mortgage rate. Interviewee KA agreed that securitization activity is not yet optimized. Member of the OJK Board of Commissioners, Hoesen, in Haryono (2021) said that the development of securitization instruments in the domestic financial market is still limited. The reasons addressed are as follows:

### *a. Market unreadiness*

PT SMF mentioned the main condition to build a secondary mortgage market is the existence of a strong primary mortgage market. There are four aspects that are required to build a secondary mortgage market; originators who are willing to sell their mortgage collection rights, investors who are willing to buy mortgage securitization products, regulations that support efficient transactions, and a sufficient volume of high-quality mortgage so that transactions are sustainable.

*a.1 Interest of ABS investor*

Haryono (2021) stated that investors are not familiarized yet with ABS. Interviewee KA also address that this instrument is not as liquid as other instrument such as sovereign bond. Research from Tenaga Pengkaji Restrukturisasi, Privatisasi, dan Efektivitas Kekayaan Negara Dipisahkan/TPRPEKND (2021) stated that 45.96% of the outstanding value of Class A ABS is held/bought by PT SMF itself. This worth IDR 1.72 trillion from outstanding value of IDR 3.74 trillion. As stated by Interviewee PL3, PT SMF did the role of standby buyer to stimulate the market.

PT SMF had issued EBA Ritel (Retail ABS) and plan to publish EBA Syariah (Sharia ABS) as product diversification. To support the diversification, interviewee PL3 underlined that ABS should have an easy-to-access and simple purchase channel. By now, ABS transaction channel is still limited to BNI Sekuritas, different from sovereign bond that has more partners and easier transaction method. This could lead to less informed market and less familiarized ABS.

*a.2 Interest of mortgage lenders/originators*

Interviewees PL2 and KA address that the originators still prefer other liquidity source than to secure its mortgage. The first reason is securitization has higher funding cost than other financing source. Astuti (2011) found that interest expense from third party funds (DPK) in the form of demand deposits is 3.04%, 3.41% for IPO, 10.25% for bond issuance, and 9.25% for securitization. The use of short-term deposit to finance long-term investment exposes the mortgage lenders to the greater risk of maturity mismatch.

The term of “true sale” transactions of mortgage in securitization also raises doubts for the prospective originator. “True sale” transaction results in the transfer of mortgage from the originator’s book to the issuer's book. This decreases the amount of originator’s asset. Director of PT. BTN, Iman Nugroho Soeko (in Primadhyta, 2017) said that banks with single-digit credit growth tend to reject securitization. The decrease in assets is feared to be unfavorable for banks’ investors. This has become an obstacle to lure potential originators. In the observation period, only 2 originators securitized their mortgage, namely PT Bank Tabungan Negara (Persero) Tbk and PT Bank Mandiri (Persero) Tbk. in 7 series of ABS.

From the explanation above, there is an indication that the prospective originators don’t have complete understanding on the benefit of securitization. Santoso et al (2014) also found that the understanding of prospective originators is still inadequate. In this matter, PT SMF should intensify its effort to promote and increase the originators’ knowledge on mortgage securitization benefit.

Another way to overcome the reluctance of prospective originators to securitize their assets due to asset transfer is the covered bond. Interviewees

stated that PT SMF does plan to develop covered bond in 2021-2022. Securitization products are allowed to be published in the form of debt securities or participation letters. Thus, covered bond as securitization product aside from ABS are considerable.

Gambro et al (2009) stated that there are some significant differences between covered bonds and ABS in United States. First, there is no transfer of asset from the originator to the publisher's book. Besides that, the mortgages could be replaced if it's not performing.

### *a.3 Standardized mortgage*

PT SMF has strict standards regarding mortgage receivables that can be securitized. General requirements of the mortgage are stated in OJK Regulation No. 11/POJK.03/2019. These conditions include generating cash flow, being owned and under the control of the Originator, and being transferable to the Issuer. In addition, PT SMF also has 32 special selection criteria to maintain the quality of mortgages that can be securitized.

The increase in the value of outstanding mortgages will increase the potential for quality mortgages. Therefore, PT SMF provide loan facility as an effort to increase the volume of high-quality mortgages. However, the increase in the loan facility disbursement and mortgage volume are not in line with the increase in the volume of securitization, as stated by interviewee KA.

Different from Indonesia that only has one set of selection criteria of mortgage to be securitized, USA has different criteria for different mortgage characteristics. According to Weiss & Jones (2017), conventional mortgages in the USA can be divided into conforming and nonconforming categories. Conforming means "suitable"; with criteria of mortgage that can be securitized by Fannie Mae and Freddie Mac. This criterion is usually a certain credit score. These suitable mortgages will be directed to Fannie Mae and Freddie Mac.

If non-conforming mortgages value is above the limit of securitization by Fannie Mae and Freddie Mac, the mortgage will be categorized as a jumbo loan and directed to be securitized with insurance from the Government through Ginnie Mae. Finally, for mortgages that originated from debtors with high risk, securitization can be accommodated in other private ABS issuers. This helps the absorption of mortgages into secondary market activities in the form of securitization. Although the criteria applied by PT SMF is a form of prudentialism, implementation of securitization in the USA is still important to be taken note of to expand securitization potential.

### *a.4 Supporting regulation*

In addition to the core regulations such as Presidential Regulation No. 19 of 2005 and its amendments or Government Regulation No. 5 of 2005 and its amendments, technical regulations related to transactions are also required. From

the banking side, OJK Regulation No. 11/POJK.03/2019 and OJK Regulation No. 23/POJK.04/2014 was issued.

Regulation that brings significant changes to PT SMF is the issuance of Presidential Regulation Number 100 of 2020 and Government Regulation Number 57 of 2020. With this regulation, PT SMF's mandate is expanded. PT SMF can now also expand into project financing, collateralized loans, paripassu loans, warehousing, investments, etc. The expansion of this mandate gives PT SMF better flexibility in carrying out its activities. Interviewee PL2 stated that this mandate expansion will be monitored and supervised continuously so that the benefit to the housing sector is still vivid.

However, problem arises as the flexibility still can't be utilized completely because the revision of previous OJK Regulation regarding Secondary Mortgage Facility is yet published. This make the previously mentioned activities are not officially mandated yet, as stated by Interviewees. One of the activities postponed by for this matter is the distribution of construction loans (Heliantopo in Rahma, 2021). Thus, regulations that support PT SMF's flexibility and mandates should be published immediately.

*b. Different condition of benchmark countries*

Indonesia's secondary mortgage market is with those of benchmark countries such as the USA and Malaysia. This can be seen from the form of secondary mortgage company in the countries. PT SMF in Indonesia is a state-owned company. 100% of its shares is owned by the Government. This is different from secondary mortgage facilities in United States, Fannie Mae and Freddie Mac, which, although sponsored by the government, are wholly private-owned (Weiss & Jones, 2017).

Different condition happens with Cagamas, secondary mortgage company of Malaysia. 20% of Cagamas shares are owned by the Malaysia Central Bank (Bank Negara Malaysia) and the rest is owned by commercial and investment banks. Interestingly, the role of the central bank in mortgage facility was also proposed by Lea & Pollock (1996) during a joint study with the Financial and Monetary Analysis Agency (Badan Kebijakan Fiskal/BKF) to obtain the concept of the first secondary mortgage facility in Indonesia.

*c. Urgency of PT SMF's effectivity and health measurement standard*

Lastly, PT SMF's effectivity and health measurement standard is urgent to be set. The Ministry of State-Owned Enterprise/SOE (Badan Usaha Milik Negara/BUMN) has two regulations related to the assessment of the health level of SOEs. The first regulation is the Decree of the Minister of SOEs No. KEP-100/MBU/2002 that regulate non-financial service SOEs and financial service SOEs, except for SOEs which are formed by separate laws. SOE Minister

Regulation No. PER-10/MBU/2014 then provides more specific regulations, but still excludes PT SMF.

In 2018, OJK released the criteria for the health level of PT SMF as a secondary mortgage facility in OJK Regulation No. 4/POJK.05/2018. Its elements include liquidity ratios, capital ratios, asset quality, and allowance for possible losses on assets and allowance for impairment losses. Although the elements are provided, the details of the amount have not yet been determined in this OJK Regulation and will be determined later. But, in the observation period, the later regulation was not published yet.

The unstandardized measurement tools result in the different conclusion in the company's health and effectivity. Asymmetric information between the management, investor, policymaker, and originator creates difficulty to make a relevant decision. Thus, measurement tools for PT SMF should be standardized and the OJK Regulation on it should be published.

## **CONCLUSION AND REMARKS**

The construction of the secondary mortgage market in Indonesia began when a secondary mortgage company, PT SMF, was established in 2005. This research was conducted to provide empirical evidence of the effects of mortgage securitization activities facilitated by PT SMF in Indonesia to the yield spread premium. Then, further analysis of the causes of the effects were conducted.

This research engages explanatory sequential design of mixed method. The quantitative phase aims to examine the effect of the securitization and issuance of Asset Backed Securities (ABS) to the yield spread premium. The result found that mortgage securitization as well as ABS issuance in Indonesia has not been able to influence or reduce yield spread premium. Thus, it can yet promote housing affordability.

This finding is different from the results of previous studies by Jameson et al (1992), Kolari et al (1998), Naranjo & Toevs (2002), Passmore et al (2005), Liu & Skully (2005), and Sabry & Okungwu (2009) in the United States which proved the benefits of the secondary mortgage market to reduce mortgage interest rates. Therefore, this study conducted a further analysis to find the cause of securitization stagnation in Indonesia by performing qualitative phase with interview and literature review.

The first cause is market unpreparedness which is marked by the lack of public interest in ABS investment, lack of interest of banks/mortgage lenders to perform securitization, lack of supply of high-quality mortgages that are followed up with securitization, and technical regulations that have not been issued. The differences between the secondary housing finance market conditions in the benchmark countries and in Indonesia also create several limitations. Last, the absent of the standard of health level and effectivity measurement of PT SMF

also potentially prevents fact-based decision making by the policymakers. Some of the action that can be done by PT SMF regarding the results are:

1. Determine the target market for ABS according to the characteristics of each age group. For example, Retail ABS are more suitable for retail investors <30 years old because the population makes up >50% of capital market investors but the asset value is small so Retail EBAs can gain collective benefits. For this reason, the promotion method can also be adapted to the character of people aged <30 years, for example by using social media.
2. To facilitate access to ABS purchases, PT SMF can collaborate with more EBA distribution partners from financial technology (fintech) companies or e-commerce sites that have advantages in terms of service features and ease of transactions.
3. Covered bonds should be developed seriously to answer the main doubts of original creditors, the transfer of credit assets.
4. Comparative studies can be carried out between Indonesia and benchmark countries such as the United States and Malaysia to find the best model for companies in the secondary housing finance sector and their activities.

A specific set of indicators should be made regarding the level of effectiveness and health of company in the secondary mortgage sector. Unique key indicators that can accurately describe the effectiveness and health of the company based on its unique characteristics are important to provide more objective decision.

For further researchers, this research was conducted with limited time, cost, manpower and mobility, so it cannot avoid shortcomings. Further researchers can use time series analysis techniques with a longer observation period. Thus, the horizon of the research results will be wider and the relationship between securitization and mortgage interest rates can be identified from a short-term and long-term perspective. In addition, further researchers can use other research methods to enrich the point of view or add sources in the interview. Operational definitions of variables in further research can also be modified if to get a truly objective relationship between variables.

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## APPENDIX A: FINDING THE PROXIES

Previous research used various proxies to convey the meaning of the variables. List of variables, its proxies, and the references that are used in this research shown in Table A.

**Table A: Variable Description and References**

Variable	Description	References
YSP	Yield spread of conventional banks' average mortgage rate and government's securities with 20 years maturity	Harun & Othman (2007)
LNSEC	Natural log of securitized outstanding mortgage nominal (in trillion Rupiahs)	Jameson et al (1992), Kolari et al (1998), Naranjo & Toevs (2002), Harun & Othman (2007), Sabry & Okongwu (2009)
PRS	Yield spread of government's securities with 1 month maturity and government's securities with 10 years maturity	Kolari et al (1998), Naranjo & Toevs (2002), Harun & Othman (2007), Sabry & Okongwu (2009)
NPL	Nominal of non-performing loan divided by outstanding mortgage nominal (in trillion Rupiahs)	Naranjo & Toevs (2002)
LNKPR	Natural log of channelled mortgage in the observed month	Jameson et al (1992), Kolari et al (1998), Naranjo & Toevs (2002), Harun & Othman (2007), Sabry & Okongwu (2009)
STR	1Y government's security yield.	Jameson (1992)
SERIBAR U	New issue of ABS (dummy)	Jameson (1992)

Source: Resumed by Author

**APPENDIX B: PRAIS WINSTEN ESTIMATOR**

At the initial of the research process, this research implemented regular linear regression. But the result showed that there was autocorrelation in the model. This research used Durbin-Watson test for autocorrelation. Table B shows the limits of Durbin-Watson value limits for model with 47 observation and 6 independent variables (without intercept) with 95% degree of freedom.

**Table B: Durbin-Watson value limits**

dL	dU	4-dL	4-dU
1,2605	1,8290	2,7395	2,171

*Source: Resumed by Author*

To be declared free from autocorrelation, the model’s value (d) should be (1,8290 < d < 2,171). It turned out that d is 1,23876 with linear regression that indicates positive autocorrelation.

Payu (2016) mentioned that OLS autocorrelation results in the non-minimum variance even though the model is still linear and unbiased. This could fail the Gauss Markov assumption. To fix that, it is needed to estimate the correlation coefficient with Feasible Generalized Least Square / FGLS technique (Payu, 2016). This kind of model with more than 30 observations was mentioned by Payu (2016) to have more minimum mean square error with FGLS implementation than OLS. Specifically, FGLS with Cochrane-Orcutt is preferred for >30 observations model.

Regression equation with AR(1) error / first order serial correlation assumption as mentioned by Hill et al (2011) et al is:

$$y_t = \beta_1 + \beta_2 x_t + e_t \text{ where } e_t = \rho e_{t-1} + v_t$$

The equation can be reformed to:

$$\begin{aligned} y_t - \rho y_{t-1} &= \beta_1(1 - \rho) + \beta_2(x_t - \rho x_{t-1}) + v_t \\ y_t - \beta_1 - \beta_2 x_t &= \rho(y_{t-1} - \beta_1 - \beta_2 x_{t-1}) + v_t \end{aligned}$$

To get the  $\rho$  (rho/correlation coefficient),  $\beta_1$ , and  $\beta_2$ , values iteration procedure of Cochrane-Orcutt is performed. After  $\rho$  is defined, the transformation then implemented until the autocorrelation is fixed. Jameson (1992), too, performed Cochrane-Orcutt to transform the data.

The use of Cochrane-Orcutt decreases the observation value to (n-1). Hill (2011) stated that researcher could ignore this and proceed. This is not a big problem with a model with many observations. But, if the researcher wanted to maintain the observation number, the researcher could create transformation error (e) that has the same value with non-autocorrelated error (v). With error variance

equation  $\sigma_e^2 = \sigma_v^2 / (1 - \rho^2)$ , transformation is needed to make  $\sigma_t = \sigma_v$ . Thus, multiplication with  $\sqrt{1 - \rho^2}$  is performed. This Cochrane-Orcutt development is called Prais-Winsten estimator. Prais-Winsten estimator equation is below.

$$\sqrt{1 - \rho^2}y_1 = \sqrt{1 - \rho^2}\beta_1 + \sqrt{1 - \rho^2}\beta_2 + \sqrt{1 - \rho^2}e_1$$

This research performed FGLS technique with Prais-Winsten estimator. Based on the iteration performed, estimated  $\rho$  is 0,4736. This transformation changes d value of the model to 2,089722. ( $1,8290 < d < 2,171$ ). Thus, autocorrelation problem is fixed.

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