Impact of Monetary Policy on Firm's Risk-taking Position and Investment Decision

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ผลกระทบจากนโยบายการเงินต่อความเสี่ยงและการตัดสินใจลงทุนของบริษัท

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สารนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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สกลวัฒน์ เสนีย์โกศล : ผลกระทบจากนโยบายการเงินต่อความเสี่ยงและการตัดสินใจลงทุนของบริษัท. (Impact of Monetary Policy on Firm’s Risk-taking Position and Investment Decision) อ.ที่ปรึกษาหลัก : อ. ดร.นราพงศ์ ศรีวิศาล

วิกฤตเศรษฐกิจครั้งล่าสุดส่งผลให้นโยบายการเงินมีแนวโน้มถูกใช้เพื่อกระตุ้นสภาวะเศรษฐกิจที่ซบเซามากขึ้น ทั้งนี้ผลกระทบของนโยบายการเงินส่งผลต่อพฤติกรรมของบริษัททั้งด้านความเสี่ยงและการตัดสินใจลงทุน. งานวิจัยชิ้นนี้มีเป้าหมายในการค้นหาผลกระทบของนโยบายการเงินทั้งจากต่างประเทศและภายในประเทศต่อพฤติกรรมของบริษัทในภูมิภาคเอเชียตะวันออกเฉียงใต้ โดยใช้ข้อมูลของบริษัทในตลาดหลักทรัพย์ 5 แห่งในภูมิภาคนี้. งานวิจัยชิ้นนี้ใช้ Expected Default Frequency และตัวแปรหุ้นในการลงทุนเพื่อวิเคราะห์ความเสี่ยงและการตัดสินใจการลงทุนของบริษัท. ทั้งนี้งานวิจัยชิ้นนี้ใช้แบบจำลอง panel fixed effect regression และ fixed-effect logistic model เพื่อวิเคราะห์ผลกระทบของนโยบายการเงินต่อพฤติกรรมความเสี่ยงและการตัดสินใจลงทุนของบริษัทตามลำดับ. งานวิจัยชิ้นนี้มีการจำแนกกลุ่มของข้อมูลตามลักษณะจำเพาะของบริษัท (กลุ่มที่ไม่ใช่บริษัทการเงินและกลุ่มบริษัทการเงิน). ในงานวิจัยชิ้นนี้ได้มีการทดสอบตัวแปรในการวิเคราะห์ความเสี่ยงในกลุ่มบริษัทการเงินเพื่อครอบคลุมผลของนโยบายควบคุมทุนสำรองขั้นต่ำ. ผลของงานวิจัยได้แสดงให้เห็นถึงความสำคัญของนโยบายการเงินต่างประเทศที่ส่งผลต่อพฤติกรรมของบริษัททั้งด้านความเสี่ยงและการตัดสินใจลงทุน ทั้งนี้บริษัทกลุ่มการเงินยังได้รับผลกระทบจากนโยบายการเงินภายในประเทศโดยเฉพาะอย่างยิ่งในด้านการตัดสินใจลงทุน. ในขณะที่การทดสอบตัวแปรวิเคราะห์ความเสี่ยงในกลุ่มบริษัทการเงินได้แสดงให้เห็นความสำคัญของนโยบายควบคุมทุนสำรองขั้นต่ำที่มีต่อพฤติกรรมของกลุ่มบริษัทการเงิน.

สาขาวิชา	การเงิน	ลายมือชื่อนิสิต	....
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Sakolwat Seneekosol : Impact of Monetary Policy on Firm’s Risk-taking Position and Investment Decision. Advisor: Narapong Srivisal, Ph.D.

The recent economic crisis drives monetary policy to boost the economic situation. However, the side effect of monetary policy also dilutes firms' behavior in both risk-taking and investment decisions. This research investigates the effect of monetary policy from the international and local level using firms in 5 Southeast Asia stock markets. The risk and investment decision measurement technique in this paper using Expected Default Frequency and the investment dummy variables. The risk-taking model is based on panel fixed effect regression and the investment decision model is using a fixed-effect logistic model. This paper also extends the analysis to cover the different characteristics of firms (Non-bank and Bank). This paper also examines the extension on risk measurement in banking firms, Distance to capital, to observe the impact of capital adequacy policy in the banking business. The empirical results provide evidence of strong foreign monetary policy impact on all types of firms' behavior. Moreover, the banking firms also affected by local monetary policy especially their investment decision. Lastly, the risk measurement technique extension also proves the significance of capital adequacy policy in the banking business.

Field of Study:	Finance	Student's Signature ....
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Introduction and Literature Review

The recent economic circumstance which takes a long period of recovery from the latest crisis push the monetary policy authorities to adopt ease monetary policy both conventional and unconventional policy (Taylor, 2009). The traditional policies to boost the economic situation are lowering policy rates to promote economic activities, allow inflation to increase, and decrease the unemployment rate as Philippe Curve relationship. While the current situation makes conventional policies reach their limit, most of the major central banks adopt new techniques as unconventional tools which are Quantitative Easing (QE) to stimulate economic growth, financial conditions and reach the central bank's inflation goal (Bernanke, 2012). While these techniques are in use, the side effects of these techniques are concerned by many market participants both from the internal market and external market in many aspects e.g., international liquidity shocks (Schnabl, 2012) international spillover effect (Stanley, 2014), and international credit supply (Morais et al., 2019). The major policy effects on firm's activities are changing their risk-taking behavior (Altunbas et al., 2014) and investment decision (Charoenwong et al., 2021) due to these policy actions lead to the low return of government bond on the local market which pushes local firms to reach-for-yield on their investment (Diamond & Rajan, 2012). Especially for banking business, these policy actions amplify these types of firms to increase their borrowing and lending activities (Matsuyama, 2007), increase default probability (Kishan & Opiela, 2012), and the policies also generate higher risk-taking position to banking industries (Rajan (2005) , Adrian and Song Shin (2010), and Stein (2013)). With the globalization of the world financial market, the effect of Quantitative

Easing by major countries spillover to other countries around the world especially emerging market (Rey (2013), and Rajan (2014)) since emerging market like Southeast Asia always attracts the investors due to high potential of growth in the new-born market and the economic conditions which accommodate firm expansion, e.g., lower wages, the capacity of labor and tax holiday policies. While the international unconventional monetary policies are adopted to stimulate the major economy, the local monetary policy also plays an important role in the firm's risk-taking as well (Jiménez et al., 2014). Both external and internal impacts of monetary policy might affect market actions in an inappropriate way which can damage market stability and whole market confidence. As the main duty of the central bank to manage market stability and create a good investment environment, the central banker should be aware of these side effects and wisely adopt the policies to absorb both external and internal shock to balance market stability goals and market stimulation. Thus, the monetary policies should set at the appropriate level to generate adequate economic conditions with proper firm investment and firm risk-taking position.

To identify the effect of monetary policy on the risk-taking position of a firm, the technique of Altunbas et al. (2014) contribute the way to observe risk-taking position by using the expected default frequency (EDF) method as a proxy of the firm's risk-taking position. The main analysis uses a change of expected default frequency in quarterly frequency with local monetary policy. In contrast with recent papers that analyze the effect of monetary policy on the firm's risk-taking, we extract the monetary policy shocks which are exogenous with the local stock market to observe the real effect of monetary policy.

Moreover, we also improve our analysis of the effect of quantitative easing shock as an unconventional monetary policy adopts by major economies.

To identify the effect of quantitative easing policy on the firm's investment decision, Charoenwong et al. (2021) provide the dummy variable to capture the firm's investment period in quarterly frequency. The dummy variable is used to represent the period in which the firm decides to expand its investment by using long-term debt or capital funding. The analysis of investment decisions is limited to the effect of the Japanese government's quantitative easing policy. In opposite to the literature, we extend our analysis to cover the effect of both local conventional policy and quantitative easing from other major economies including the US, UK, EU, and Japan on a firm's risk-taking and investment decision.

To generate the monetary policy shocks from both conventional and unconventional policy, Romer and Romer (2004), Caldara et al. (2016), Shirota (2019), and Mumtaz and Theodoridis (2020) use regression on the Taylor-rule concept to extract conventional policy shock. The regression link between the local policy rate and macroeconomic variables on their estimation. This relationship is based on the loss function of the inflation targeting framework which shows the trade-off between the GDP gap and inflation gap while implementing the monetary policy. For unconventional policy shock, Morais et al. (2019) create the proxy by using the change in the asset balance sheets of major central banks as a share of their country's GDP which mainly represents the size of unconventional policy relative to the size of the country to standardize across the country.

This paper also contributes to the literature on monetary policy's effect on risk-taking position. Ease monetary policy may stimulate higher risk-taking of the firm as discussed by Rajan (2005), Adrian and Song Shin (2010),Stein (2013), and Altunbas et al. (2014). The empirical evidence of the effect of monetary policy on risk-taking can be diversified into two-level. The first level is the local level which affects their economy as justified by Jiménez et al. (2014), Dell'Ariccia et al. (2017), and Morais et al. (2019). The second level is the international level which is affected by ease policy rates and Quantitative easing by major economies to credit supply on emerging countries as tested by Rey (2013), Miranda-Agrippino and Rey (2015), Bruno and Shin (2015a), Bruno and Shin (2015b), and Morais et al. (2019). Monetary policy not only affects risk-taking but also the firm’s investment decision. According to Tobin (1969), easing monetary policies affect current production and capital accumulations of the firm due to market valuation and reproduction cost. In particular, the empirical evidence by Charoenwong et al. (2021) also provides the effect of quantitative easing policy in Japan on a firm’s investment decision due to lower their cost of capital and bankruptcy risks. Another explanation supports the effect of easing monetary policy induce firm investment is a lower cost of capital might attract firm to inefficient allocation their investment due to “empire-building” investment strategy by the CEO or agency problem in the firm (Jensen (1986), and Pinkowitz et al. (2006)).

Finally, we contribute the literature of risk-taking measurement for banking business as discussed by Sy and Chan-Lau (2006). The banking firms have special characteristics and regulations, known as Basel III or capital adequacy ratio, which control their asset quality and quantity. As mentioned earlier, the regulation control ratio between a safe asset and a risky asset implies the based status for all banking firms. The effect of these regulations surely reduces the risk of banking businesses taking risks relative to other businesses.

Figure 1: Scatter plot between Change in EDF and local MPS

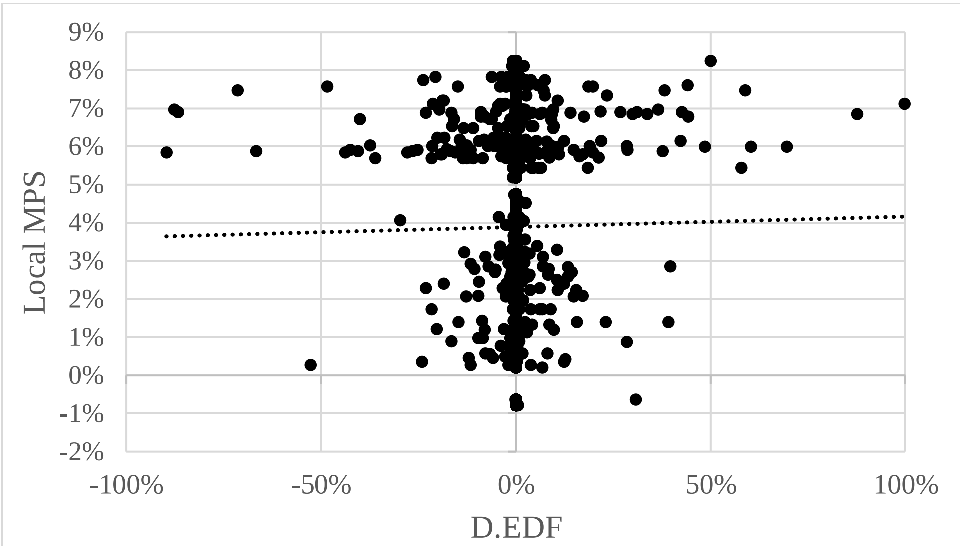

Figure 2: Scatter plot between Change in EDF and MPS US

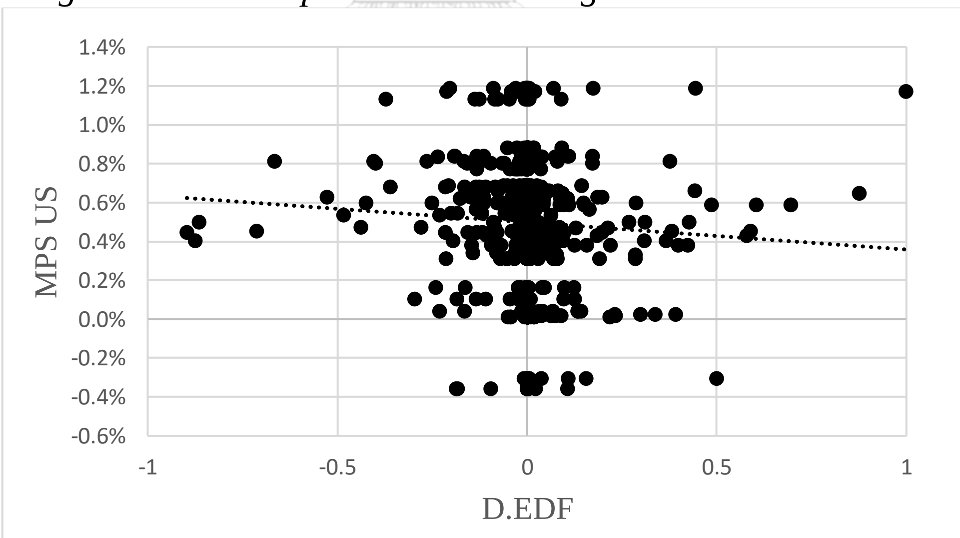

Figure 1 shows the scatter plot between Change in EDF and local MPS. This table provides the positive relationship between these two variables. This might refer to the effect of monetary policy on a firm's risk-taking behavior. The contractionary local monetary policy might increase a firm's risk-taking behavior. While figure 2 provides the scatter plot between Change in EDF and Foreign MPS. The negative relationship between these two variables might refer to the effect of foreign monetary policy that has a different effect on local firms' risk-taking behavior. The contractionary foreign monetary policy might decrease local firm's risk-taking behavior. This evidence motivates my research to question the effect of local and foreign monetary policy on a firm's risk-taking position. Furthermore, this paper also questions the different effects between local and foreign monetary policy on a firm's risk-taking behavior.

My key contribution is analyzing the change in the firm's risk-taking by both conventional monetary policy shocks and unconventional monetary policy shocks which allow us to capture the effect of each type of policy on the risk of firms. Moreover, this paper also analyzes the monetary policy spillover effect from the major economy on the local firm's risk-taking position. While the monetary policy might affect the firm's risk-taking position, this paper also analyzes the impact of both conventional and unconventional monetary policy on a firm's investment decision which provides a deep analysis of both the quantity and quality of the firm's investment. Lastly, my analysis also provides empirical evidence of monetary policy's effect on the firm's action which should be considered by local central banks as their duty to maintain financial stability.

In this paper, my study focuses on the effect of both local and foreign monetary policy including both conventional and unconventional policy on Southeast-Asia firm's risk-taking behavior and their investment decision which limits 5 main stock markets in Southeast Asia. We also focus our analysis on (I) whether local conventional monetary policy shocks affect local firm's risk-taking position and their investment decision, (II) whether foreign conventional monetary policy shocks affect Southeast Asia firm's risk-taking position and their investment decision, (III) whether foreign unconventional monetary policy shocks affect Southeast Asia firm's risk-taking position and their investment decision, (IV) whether local unconventional monetary policy shocks affect local firm's risk-taking position and their investment decision. (V) whether the effect between local and foreign conventional monetary policy affects both risk-taking position and investment decision on local firms differently. (VI) whether the effect between local and foreign unconventional monetary policy affects both risk-taking position and investment decisions of local firms differently.

As discussed, earlier research question, this section aims to link the economic logic and state the result expectation for answer all research questions. First, I expect the negative effect of local conventional monetary policy shocks on the firm's investment decision because when central banks adopt the contractionary monetary policy, local firms might face negative shocks of higher investment cost. As mentioned by Diamond and Rajan (2012), higher investment cost shocks create uncertainty on firms that refer to the cost of random demand. These effects distort the firm's action to accumulate more capital to maintain its utility level which refers to higher investment or higher chance to make an investment decision. While firms make investment decisions at higher investment costs, I also expect a higher risk-taking position of local firms because of their risky investment decision. While the foreign conventional monetary policy might affect local firm's investment decisions and risk-taking position in the same way as a local conventional monetary policy due to higher foreign policy rate might create capital outflow and lower local credit supply which will increase local loan rate and firm's investment cost. As discussed earlier, higher local investment cost distorts the local firm's actions to expand its investment and taking a higher risk-taking position.

Second, I expect a negative effect of contractionary unconventional monetary policy on a local firm's investment decision. The unconventional monetary policy mainly supports the firm's balance sheet by allowing the central bank to hold a firm's debt. While contractionary monetary policy is implemented, the central banks decrease their firm's debt purchase or lower their firm's balance sheet support which increases a firm's risk awareness. Thus, firms with higher risk awareness will carefully select their investment or hard to make an investment decision. The lower level of investment decision also affects the lower firm's risk-taking position. For foreign unconventional monetary policy as mentioned by Fratzscher et al. (2018), The effect of unconventional monetary policy spillover from the US market to the emerging market mainly boosts the emerging stock market. I expected the large credit supply from major countries' unconventional monetary policy to Southeast Asia stock market which creates over credit supply in the local market and decreases a firm's investment rate. Thus, the lower firm's investment rate creates positive shocks on firms to receive a higher utility level and tend to accumulate lower capital assets and lower their investment decision. Lastly, the lower firm's investment decision led to a lower firm's risk-taking position.

Data

In this section, we discuss the data and individual firm variables, along with the method of extract monetary policy shock from both conventional monetary policy and unconventional monetary policy, and the process to measure the risk-taking and investment decisions of each firm. Our data set starting from January 2010 to December 2019 in the quarterly frequency on 5 main Southeast Asia stock markets including SET 50 (Thailand), VN 30 (Vietnam), FTSE KLCI (Malaysia), PSEi Composite (Philippines), and Jakarta LQ45 (Indonesia). The five selected stock markets are well organized with strong market data availability. The firms in each market might change across a research time frame. Thus, this paper includes all the firms from 2010 to 2019 which be a part of these market index. The number of firms in SET 50, VN30, FTSE KLCI, PSEi Composite, and Jakarta LQ 45 is 97, 60, 53, 47, and 98 firms, respectively. The local policy rate in our analysis comes from the announced policy rate by each country's central bank which is Bank of Thailand Repurchase Market Rates 1 Day, State Bank of Vietnam Refinance rate, Malaysia Overnight Policy Rate, Central Bank of Philippines Overnight Reverse Repurchase Agreement, and Bank Indonesia Reference Interest Rate at the end of the quarter. The process of extract monetary policy shock in Taylor-rule is related to some macroeconomics variables, economic growth, inflation rate, and global economic situation, which is denoted by real GDP growth, consumer price index (CPI) growth, and global index return respectively in the frequency of quarterly. All control variables in our analysis can be distinguished into two main groups. The first group is the firm's specific characteristics which reflect the status of each firm differently which mainly based on the balance sheet data represented by 5 variables (I) market-to-book ratio, (II) cost-to-total-income ratio, (III) leverage ratio, (IV) log of total asset and (V) capital-to-asset ratio for bank firms, and. These variables mainly reflect 3 prospects (I) efficiency, (II) debt capability, and (III) size. The firm's characteristic control variables mainly use to clean the effect of individual firm characteristics which differs across firms. The second group is macroeconomics variables which status the different economic conditions and financial landscape in each country-specific by 3 variables e.g. (I) government bond yield, and (II) stock price index return. The government bond yield is denoted by the difference between the ten-year government bond yields and the three-month interbank rate which mainly reflects the investment cost in each country. The house price index return is denoted by the return of the REITs fund in each country to capture the change in housing investment opportunities which is one of the firm's investment channels. The stock price index returns capture by the return on the stock market in each country which is another way of the firm's investment opportunity. Country control variables mainly absorb the effect of a specific country's condition which varies across the country. Due to our question focus on the effect of monetary policy on risk-taking and investment decisions we need to control all these variables to create ceteris paribus. Due to the data limit of macroeconomic variables and monetary policy tools in each country, the data in our analysis is an unbalanced observation.

In our analysis, I adopt three main variables; two main variables related to firm behaviors which are risk-taking position and investment decision and the last one is monetary policy shock. A risk-taking position can measure by using the expected default frequency (EDF) with the extension provided by Bharath and Shumway (2008) and Sy and Chan-Lau (2006). In this paper, we separate our firms into two main groups based on their behavior and regulations which are non-banking firms and Banking firms. Thus, our risk-taking proxy between these two groups is different. For non-banking firms, we adopt Naïve distance to default from Bharath and Shumway (2008). While banking firms have strong regulation on their capital reserve e.g., Capital adequacy ratio, standard naïve distance to default might not reflect the true riskiness of these firms. According to Sy and Chan-Lau (2006), This paper provides the adjustment on the standard Merton model to analyze the risk-taking of the banking business. In this paper to analyze banking firms, we adjust standard Naïve distance to default with the extension of Sy and Chan-Lau (2006).

The expected default frequency model assumes asset value data to be distributed as the normal distribution. The expected default frequency is the cumulative distribution function of negative distance to default.

$$Expected\ Default\ Frequency = \phi(-DD)$$

While standard distance to default (DD) calculation required observed asset value which hardly to observe in the real-world situation, the main extension of Bharath and Shumway (2008) is introducing Naïve distance to default method which investigates firm asset value based on firm's balance sheet data which relate asset value, the left-hand side of the balance sheet, equal to a combination of equity value and debt value to analyze firm's risk-taking position by using the following equation.

$$Naïve\ Distance\ to\ Default = \frac{ln\left[\frac{(E + Naïve\ D)}{Naïve\ D}\right] + (r_{it-1} - 0.5\ Naïve\ \sigma_V^2)T}{Naïve\ \sigma_V\sqrt{T}}$$

The variables in distance to default include Equity value of the firm (E) which is firm market capitalization, Current value of debt (Naïve D) which is a combination of Long-term debt, Current portion of long-term debt and Note payables, Return of firm's stock (r_{it-1}), This to reflect the reality on the firm's asset growth rate should be, Volatility of asset value ($Naïve\ \sigma_V$) and Time (T). One of the different points between Naïve Distance to Default from the original setting in the Merton model is using the return of the firm's stock rather than risk-free rate due to the assumption in the original Merton model is too conservative relative to the real situation. The firm's assets should grow at the same rate as a firm return, not the risk-free rate. Another assumption of Naïve distance to default is not made only approximation on the firm's asset value but also assume volatility of asset value ($Naïve\ \sigma_V$) as well which calculate by following equation based on the portion of debt and equity of firm concept.

$$Naïve\ \sigma_V = \frac{E}{(E + Naïve\ D)}\sigma_E + \frac{Naïve\ D}{(E + Naïve\ D)} Naïve\ \sigma_d$$

While the approximation on volatility is to adopt in this model, another main assumption to complete this approximation in this model is the volatility of debt ($Naïve\ \sigma_d$) should relate with a volatility of equity (σ_e). The volatility of debt in the Naïve distance to default model assumes this relation by the following equation.

$$Naïve\ \sigma_d = 0.05 + 0.25\sigma_e$$

The linear equation uses to reflect the relation between the risk of debt and the risk of equity when firms go near distress situations. This equation has two main components. First, the constant term reflects market standard deviation which not different across firms. Second, the correlation term between equity and debt standard deviation.

As mentioned earlier, another extension in this research is adding distance to capital in the case of banking firms rather than using distance to default for all kinds of firms. The distance to capital by Sy and Chan-Lau (2006) gives a more realistic assumption of distance to default for banking firms that have additional regulation of capital adequacy ratio on them to holding cash as a minimum requirement. Thus, the regulation on this kind of firm affects their chance to default difference from a non-bank business. The distance to a capital formula is setting as the equation below.

$$Distance\ to\ Capital = \frac{ln\left(\frac{V}{\lambda L_t}\right) + \ (\mu -\ 0.5\ \sigma^2)T}{\sigma\sqrt{T}}$$

The equation likes distance to default in the original Merton model with adding the Lambda term. This Lambda reflects the capital adequacy ratio as the following equation.

$$\lambda = \frac{1}{1 - PCAR_i}$$

While $PCAR_i$ denoted by central bank adequacy regulation in each country. Combining two models give the additional version of distance to capital with asset value defining method for specific analysis on banking firms in the expected default frequency model by this equation.

$$Naïve\ Distance\ to\ Capital\ = \frac{ln\left(\frac{E\ +\ Naïve\ D}{\lambda Naïve\ D}\right) + (r_{it-1} - 0.5\ Naïve\ \sigma_V^2)T}{Naïve\ \sigma_V\ \sqrt{T}}$$

From the equation of EDF, the possible weakness of this method is this model sensitive to stock price. Thus, it is possible that the observed changes at the firm individual level are not actually because of changes in risk-taking behaviors.

For investment decision proxy in this paper based on Charoenwong et al. (2021), The firm's investment decision is a dummy variable equal to one if in that quarter the firm raises their fund by using seasonal equity offering or debt offering and set to zero otherwise.

$$I_{i,q} \begin{cases} = 1 \; if \; firm \; i \; has \; SEO \; or \; DO \; in \; q; \\ = 0 \; otherwise. \end{cases}$$

A seasonal equity offering is detected by a change in the number of outstanding shares. While debt offering is detected by a change in long-term debt in a firm's balance sheet.

The method of extract monetary policy shock proposed by Morais et al. (2019) has two main monetary policy shocks which are conventional monetary policy shocks and unconventional monetary policy. The conventional monetary policy shock extracts by using the residual of Taylor-rule regression which regressing local policy rate with both local and US rate of change in real GDP and rate of change in CPI. In this paper I decide to drop US market variables and substitute with the global index because of our research group, small open economy countries, related to all major counties' policies including the US, UK, EU, and Japan. Thus, the global index might be an appropriate proxy to reflect the global economic situation which affects monetary policy action in each country. Moreover, the main question in this paper is related to the effect of all monetary policy from major countries, not limited only to US monetary policy. The global index in this context can reflect the overall market situation around the world which mainly depended on major country economic situations and related to monetary policy demand by the major central banks. The conventional monetary policy regression is following this equation.

$$Local\ Policy\ Rate_i = \beta_1 GDP_i + \beta_2 CPI_i + \beta_3 Global\ Index + \mu_i ;$$

While $Monetary\ Policy\ Shock$ equal to μ_i from regression.

The main theory supports this relationship between the local policy rate and economic variables are based on standard monetary policy goals which aim to stimulate economic growth and stabilize the overall price level. Thus, the monetary policy rate is a function of economic growth and inflation. This shocks technique extracts the residual of the regression and uses this residual as a shock proxy of conventional monetary policy. Due to concern on the endogeneity problem on our regression, the shocks extracting technique on monetary policy variables is one way to clean out these possible endogeneity problems.

While unconventional monetary policy shock is the real rate of change in the central bank's balance sheet asset as a share of GDP. The idea of this proxy is based on the fact of quantitative easing policy which creates a large change in the asset side of the central bank sheet when the policy is implementing. One weakness of this unconventional monetary policy proxy is this proxy might not be proper for the local central bank that does not adopt the unconventional monetary policy because the local central bank balance sheet might expand by other factors e.g., currency appreciation.

This paper has data limitations due to data available which can be separated by the model. In Pooled data analysis, the standard and spillover model contain data from 5 countries. While non-bank and bank analysis in both models contain only 4 countries excluding Vietnam due to bank data unobservable problem. The local QE robustness check model contains only 3 countries excluding Vietnam and the Philippines because of unobserved local central bank’s balance sheet in a quarterly time frame. For the distance to capital analysis in bank firms, the data cover only 4 countries excluding Vietnam because of bank data limitation as mentioned earlier.

Table 1: Summary Statistics of the Variables Used in the Regression (2010 - 2019)

VARIABLES	Number of Observation	Mean	SD	Min	Max
DEDF	10,774	8.55e-05	0.0357	-0.897	0.999
InvDec	10,774	0.532	0.499	0	1
LocalMPS	10,774	0.0389	0.0231	-0.00788	0.0823
LocalQE	8,088	0.878	1.117	0.000760	2.813
MPSUS	10,774	0.00498	0.00338	-0.00361	0.0119
MPSEU	10,774	0.00371	0.00346	-0.00186	0.0114
MPSUK	10,774	0.00432	0.00181	0.00107	0.00846
MPSJP	10,774	1.22e-05	4.57e-05	-0.000128	0.000111
QEUS	10,774	21.14	3.074	15.40	25.50
QEEU	10,774	29.97	7.540	20.10	40.30
QEUK	10,774	16.85	4.715	7.700	23.20
QEJP	10,774	64.52	29.39	22.90	103.5
MTB	10,774	1.348	196.7	-20,368	274.8
CTTI	10,774	1.658	163.6	-13,957	8,187
Lever	10,774	112.4	633.5	0	35,931
TA	10,774	2.652e+07	1.188e+08	78.29	1.490e+09
GovYield	10,774	0.0215	0.0383	-0.0306	0.504
SP	10,774	0.0297	0.0729	-0.177	0.237
Number of Stock	356	356	356	356	356

Table 2: Summary Statistics of the Non-bank Firm's Variables Used in the Regression (2010 - 2019)

VARIABLES	Number of Observation	Mean	SD	Min	Max
DEDF	9,653	0.000126	0.0375	-0.897	0.999
InvDec	9,653	0.523	0.500	0	1
LocalMPS	9,653	0.0392	0.0232	-0.00788	0.0823
LocalQE	7,167	0.877	1.116	0.000760	2.813
MPSUS	9,653	0.00498	0.00336	-0.00361	0.0119
MPSEU	9,653	0.00370	0.00344	-0.00186	0.0114
MPSUK	9,653	0.00430	0.00180	0.00107	0.00846
MPSJP	9,653	1.20e-05	4.56e-05	-0.000128	0.000111
QEUS	9,653	21.15	3.063	15.40	25.50
QEEU	9,653	30.07	7.553	20.10	40.30
QEUK	9,653	16.92	4.709	7.700	23.20
QEJP	9,653	64.96	29.39	22.90	103.5
MTB	9,653	1.304	207.8	-20,368	274.8
CTTI	9,653	1.690	172.8	-13,957	8,187
Lever	9,653	111.3	668.5	0	35,931
TA	9,653	1.607e+07	8.425e+07	78.29	1.490e+09
GovYield	9,653	0.0216	0.0381	-0.0306	0.504
SP	9,653	0.0299	0.0733	-0.177	0.237
Number of Stock	324	324	324	324	324

Table 3: Summary Statistics of the Bank Firm's Variables Used in the Regression (2010 - 2019)

VARIABLES	Number of Observation	Mean	SD	Min	Max
DEDF	1,078	-0.000275	0.0110	-0.296	0.107
DEDFDC	1,078	-0.000260	0.0101	-0.280	0.0885
InvDec	1,078	0.619	0.486	0	1
LocalMPS	1,078	0.0365	0.0224	-0.00788	0.0823
LocalQE	921	0.882	1.123	0.000760	2.813
MPSUS	1,078	0.00497	0.00350	-0.00361	0.0119
MPSEU	1,078	0.00379	0.00358	-0.00186	0.0114
MPSUK	1,078	0.00439	0.00184	0.00107	0.00846
MPSJP	1,078	1.29e-05	4.67e-05	-0.000128	0.000111
QEUS	1,078	21.11	3.143	15.40	25.50
QEEU	1,078	29.30	7.414	20.10	40.30
QEUK	1,078	16.45	4.715	7.700	23.20
QEJP	1,078	61.68	29.12	22.90	103.5
MTB	1,078	1.727	0.772	0.571	5.093
CTTI	1,078	1.373	2.139	-34.84	33.74
Lever	1,078	120.4	94.15	4.178	982.9
TA	1,078	1.212e+08	2.598e+08	83,142	1.417e+09
GovYield	1,078	0.0191	0.0362	-0.0306	0.504
SP	1,078	0.0277	0.0682	-0.138	0.237
CTA	1,078	14.17	3.258	4.500	25.56
Number of Stock	32	32	32	32	32

Table 4: Regression Variables Description

VARIABLES	Variables Description	Source
DEDF	Change in the EDF at the bank level (previous quarter) Calculated EDF by using Distance to Default	Authors' calculations
DEDFDC	Change in the EDF at the bank level (previous quarter) Calculated EDF by using Distance to Capital	Authors' calculations
InvDec	dummy variable equal to 1 if the firm has debt or equity raising equal to 0 otherwise	Authors' calculations
LocalMPS	Residual from Taylor rule equation by using local inflation and GDP	Authors' calculations
LocalQE	Local central bank's asset as a percentage of their GDP	Authors' calculations
MPSUS	Residual from Taylor rule equation by using US inflation and GDP	Authors' calculations
MPSEU	Residual from Taylor rule equation by using EU inflation and GDP	Authors' calculations
MPSUK	Residual from Taylor rule equation by using UK inflation and GDP	Authors' calculations
MPSJP	Residual from Taylor rule equation by using Japan inflation and GDP	Authors' calculations
QEUS	Federal Reserve's asset as a percentage of US GDP	Bloomberg
QEEU	European Central Bank's asset as a percentage of EU GDP	Bloomberg
QEUK	Bank of England's asset as a percentage of UK GDP	Bloomberg
QEJP	Bank of Japan's asset as a percentage of Japan GDP	Bloomberg
MTB	Firm's Market to Book Ratio	Bloomberg
CTTI	Firm's Cost to Total Income Ratio	Bloomberg
Lever	Firm's Leverage Ratio	Bloomberg
TA	Firm's Total Asset	Bloomberg
GovYield	The gap between the 10-year government bond yield and the 3-m interbank rate	Authors' calculations
SP	Stock Market Return	Bloomberg
CTA	Banking Firm's Capital to Asset Ratio	Bloomberg

Methodology

As discussed earlier, I use the regressions to identify the effect of monetary policy shocks (local conventional policy shocks, local unconventional policy shocks, foreign conventional policy shocks, and foreign quantitative easing policy shocks) on a firm's risk-taking and firm's investment decision. For the risk-taking model, the fixed effect panel data regression model is used to observe the effect of monetary policy on the firm's risk-taking position with the specific characteristic of data in each country. With the expected endogeneity problem on our regressor, we adopt Arellano-Bond estimators to deal with the possibility of endogeneity. For the investment decision model, I use a fixed effect logit model due to our regressand is a dummy variable. The fixed effect term in our logit model regression creates a heterogeneity problem. Thus, a conditional logit estimator is introduced to do with this specific problem in my investment decision model. As mentioned earlier about the difference between banking firms and non-banking firms, I also extend my analysis on each type of firm separately to observe the different firm characteristics between these groups which might affect their risk-taking and investment decisions differently. Lastly, I check the robustness of risk-taking measurement by comparing the result between standard distance to default model by Bharath and Shumway (2008) and extension distance to capital model by Sy and Chan-Lau (2006) on banking firms.

A. Risk-taking position

The regression between expected default frequency and monetary policy shocks is used to analyze the risk-taking of firm effect by both conventional and unconventional monetary policy. Our main objective is to understand the effect of monetary policy on the firm's risk-taking position which might come from local policy shocks or spillover of foreign policy shocks. For simplicity, the first model investigates the effect of local conventional monetary policy on a local firm's risk-taking position which aims to reflect the effectiveness of the local monetary policy.

To analyze the effect of conventional monetary policy, our based line model is following equation (1), which is a fixed effect panel regression model that relates the expected default frequency of each firm pair in a quarter to the quarterly lagged of conventional monetary policy shocks.

$$\Delta EDF_{i,t} = \theta \Delta EDF_{i,t-1} + \beta_1 MPS_{i,t-1}^{country} + \beta_2 MPS_{i,t-2}^{country} + \beta_3 MPS_{i,t-3}^{country} + \alpha_i + \delta X_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Our baseline model can explain the effect of conventional monetary policy on the firm's risk-taking position. In equation (1), $\Delta EDF_{i,t}$ represents a change in risk-taking of firm i at time t which is the difference between EDF of firm i at time t and t-1. The regressor $MPS_{i,t-k}^{country}$ is the k-quarter-lagged local policy rate shock of country = [Thailand, Vietnam, Malaysia, Philippines, Indonesia]. The 3 lagged monetary policy based on the statement of Friedman and Schwartz (1982) provides an approximation of monetary policy lag around 6 to 9 months. Thus, my monetary policy variables should follow the suggested lag for 3 quarters. Besides, $X_{i,t-1}$ is the one-quarter lagged of firm-specific control variables (balance sheet information) and country-specific (macroeconomic variable in each country). These variables create a ceteris paribus effect to control firm business cycles and country economic performance. Furthermore, a set of control variables clean the effect of monetary policy shock from other specific changes in firm activity and the country's economic situation. The regression in equation (1) also includes fixed effect variables that aim to absorb the difference of unobservable culture, behavior, and financial landscape in different firms or countries, data time-varying, and correlation among firms and countries in our analysis. As mentioned earlier on the possibility of an endogeneity problem on term $\Delta EDF_{i,t-1}$, Arellano-Bond estimator is used to dealing with this problem as instrument variables. As discussed earlier, I expected to observe a significant positive on the coefficient of local conventional monetary policy terms which refer to local contractionary conventional monetary policy led to a higher firm's risk-taking position.

To extend my analysis covers the effect of both foreign conventional and unconventional monetary policy, I extent equation (2) over the baseline model which adding foreign monetary policy both conventional and unconventional. The main purpose of equation (2) is to prove the spillover effect of foreign monetary policy on local firms.

$$\begin{aligned}\Delta EDF_{i,t} = {} & \theta \Delta EDF_{i,t-1} + \beta_1 MPS_{i,t-1}^{country} + \beta_2 MPS_{i,t-2}^{country} + \beta_3 MPS_{i,t-3}^{country} \\ & + \pi_1 MPS_{i,t-1}^{US} + \pi_2 MPS_{i,t-2}^{US} + \pi_3 MPS_{i,t-3}^{US} + \pi_4 MPS_{i,t-1}^{UK} \\ & + \pi_5 MPS_{i,t-2}^{UK} + \pi_6 MPS_{i,t-3}^{UK} + \pi_7 MPS_{i,t-1}^{EU} + \pi_8 MPS_{i,t-2}^{EU} \\ & + \pi_9 MPS_{i,t-3}^{EU} + \pi_{10} MPS_{i,t-1}^{JP} + \pi_{11} MPS_{i,t-2}^{JP} + \pi_{12} MPS_{i,t-3}^{JP} \\ & + \pi_{13} qe_{t-1}^{US} + \pi_{14} qe_{t-2}^{US} + \pi_{15} qe_{t-3}^{US} + \pi_{16} qe_{t-1}^{UK} + \pi_{17} qe_{t-2}^{UK} \\ & + \pi_{18} qe_{t-3}^{UK} + \pi_{19} qe_{t-1}^{EU} + \pi_{20} qe_{t-2}^{EU} + \pi_{21} qe_{t-3}^{EU} + \pi_{22} qe_{t-1}^{JP} \\ & + \pi_{23} qe_{t-2}^{JP} + \pi_{24} qe_{t-3}^{JP} + \alpha_i + \delta X_{i,t-1} + \varepsilon_{i,t} \qquad (2)\end{aligned}$$

The equation (2) has two extension term from baseline model which is the foreign conventional monetary policy term which denoted by $MPS_{i,t-k}^{US,UK,EU,JP}$ measures the conventional monetary policy shocks in each major country at lag k and the unconventional monetary policy term which denoted by $qe_{t-k}^{US,UK,EU,JP}$ measures the annual real change in the central bank's asset balance sheet over their country GDP at lag k. As mentioned by many economists on the globalization of the world economy, the spillover effect of foreign monetary policy might be one possible reason to distort the local firm's risk-taking position. I expect to observe the significant positive on the coefficient of foreign conventional monetary policy terms which to reflect foreign contractionary conventional monetary policy led to a higher firm's risk-taking position. For the coefficient of foreign unconventional monetary policy, I expect a significant positive sign because the size of foreign unconventional monetary policy directly links to credit supply spillover from major countries on the local market which and changes the risk awareness of local firms and firm's risk-taking position.

Due to the current trend of monetary policy which many central banks adopt an unconventional monetary policy with or without announcement, this extension on equation (3) will capture the effect of unorthodox policy by the local central banks which might affect the firm's risk-taking position unanticipatedly.

$$\begin{aligned}\Delta EDF_{i,t} = {} & \theta \Delta EDF_{i,t-1} + \beta_1 MPS_{i,t-1}^{country} + \beta_2 MPS_{i,t-2}^{country} + \beta_3 MPS_{i,t-3}^{country} \\ & + \gamma_1 qe_{t-1}^{country} + \gamma_2 qe_{t-2}^{country} + \gamma_3 qe_{t-3}^{country} + \pi_1 MPS_{i,t-1}^{US} \\ & + \pi_2 MPS_{i,t-2}^{US} + \pi_3 MPS_{i,t-3}^{US} + \pi_4 MPS_{i,t-1}^{UK} + \pi_5 MPS_{i,t-2}^{UK} \\ & + \pi_6 MPS_{i,t-3}^{UK} + \pi_7 MPS_{i,t-1}^{EU} + \pi_8 MPS_{i,t-2}^{EU} + \pi_9 MPS_{i,t-3}^{EU} \\ & + \pi_{10} MPS_{i,t-1}^{JP} + \pi_{11} MPS_{i,t-2}^{JP} + \pi_{12} MPS_{i,t-3}^{JP} + \pi_{13} qe_{t-1}^{US} \\ & + \pi_{14} qe_{t-2}^{US} + \pi_{15} qe_{t-3}^{US} + \pi_{16} qe_{t-1}^{UK} + \pi_{17} qe_{t-2}^{UK} + \pi_{18} qe_{t-3}^{UK} \\ & + \pi_{19} qe_{t-1}^{EU} + \pi_{20} qe_{t-2}^{EU} + \pi_{21} qe_{t-3}^{EU} + \pi_{22} qe_{t-1}^{JP} + \pi_{23} qe_{t-2}^{JP} \\ & + \pi_{24} qe_{t-3}^{JP} + \alpha_i + \delta X_{i,t-1} + \varepsilon_{i,t} \qquad (3)\end{aligned}$$

In equation (3), The regressor $qe_{t-k}^{country}$ measures the local unconventional monetary policy at lag k. The local unconventional monetary policy in equation (3) mainly tracks the effect of the local central bank's balance sheet which might change to stimulate the economy and distort local firm's actions cause firms to change their risk-taking position. In this model, I expect the coefficient of local unconventional monetary policy to significantly positive with the same concept as the foreign unconventional monetary policy which already I discussed earlier.

B. Investment decision

While the monetary policy shocks might affect the risk-taking position of firms, the investment decision of the firm might affect by the policy shocks due to credit supply excess, reach-for-yield behavior, or spillover from the global market. Therefore, to analyze the effect of monetary policy shocks on a firm's investment behavior, equation (4) which is the baseline model to analyze a firm's investment decision comes from equation (1) while changing the regressand variable to the investment decision dummy variable.

$$I_{i,t} = \theta \Delta EDF_{i,t-1} + \beta_1 MPS^{country}_{i,t-1} + \beta_2 MPS^{country}_{i,t-2} + \beta_3 MPS^{country}_{i,t-3} + \alpha_i + \delta X_{i,t-1} + \varepsilon_{i,t} \qquad (4)$$

Equation (4) is used to specify the effect of local conventional monetary policy shocks on the firm's investment decision. The dependent variable $I_{i,t}$ corresponds to the investment decision dummy variables which equal to 1 when seasonal equity offering or debt offering occurs in period t. the regressors in equation (4) are similar to equation (1) which include conventional monetary policy shocks, fixed effect, and set of control variables. As I mentioned earlier, control variables and fixed effect terms are including in equation (4) to isolate the effect of monetary policy shocks and sharply capture the real effect of monetary policy shocks on a firm's investment decision. The baseline model mainly focuses only on the effect of local conventional monetary policy shocks on firm investment decisions. As discuss earlier, I expect a significant positive coefficient of local conventional monetary policy because contractionary monetary policy creates random demand shock on local firms and decreases their utility. This phenomenon pushes local firms to accumulate more capital which refers to higher investment decisions.

As discussed by many famous economists about the spillover effect of monetary policy both foreign conventional and unconventional monetary policy, I also extend the baseline model to observe these effects on a firm's investment decision as equation (5)

$$\begin{aligned} I_{i,t} = {} & \theta \Delta EDF_{i,t-1} + \beta_1 MPS_{i,t-1}^{country} + \beta_2 MPS_{i,t-2}^{country} + \beta_3 MPS_{i,t-3}^{country} \\ & + \pi_1 MPS_{i,t-1}^{US} + \pi_2 MPS_{i,t-2}^{US} + \pi_3 MPS_{i,t-3}^{US} + \pi_4 MPS_{i,t-1}^{UK} + \pi_5 MPS_{i,t-2}^{UK} \\ & + \pi_6 MPS_{i,t-3}^{UK} + \pi_7 MPS_{i,t-1}^{EU} + \pi_8 MPS_{i,t-2}^{EU} + \pi_9 MPS_{i,t-3}^{EU} + \pi_{10} MPS_{i,t-1}^{JP} \\ & + \pi_{11} MPS_{i,t-2}^{JP} + \pi_{12} MPS_{i,t-3}^{JP} + \pi_{13} qe_{t-1}^{US} + \pi_{14} qe_{t-2}^{US} + \pi_{15} qe_{t-3}^{US} \\ & + \pi_{16} qe_{t-1}^{UK} + \pi_{17} qe_{t-2}^{UK} + \pi_{18} qe_{t-3}^{UK} + \pi_{19} qe_{t-1}^{EU} + \pi_{20} qe_{t-2}^{EU} + \pi_{21} qe_{t-3}^{EU} \\ & + \pi_{22} qe_{t-1}^{JP} + \pi_{23} qe_{t-2}^{JP} + \pi_{24} qe_{t-3}^{JP} + \alpha_i + \delta X_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

The variables $MPS_{i,t-k}^{US,UK,EU,JP}$ and $qe_{t-k}^{US,UK,EU,JP}$ reflect foreign conventional monetary policy shocks and foreign unconventional monetary policy shock, respectively. This model also proves the significant effect of monetary policy spillover and side effects that distort a firm's investment decision. I expect to observe a positive significant coefficient of foreign conventional monetary policy terms that reflect foreign contractionary conventional monetary policy tend to increase a firm's investment decision. For the coefficient of foreign unconventional monetary policy, I expect a positive significant sign because the larger size of foreign unconventional monetary or easing unconventional monetary policy creates larger credit supply spillover effects from major countries to the local market which decreases firm's risk awareness and increase firm's investment decision.

As discussed on the Risk-taking model, equation (6) extends to observe the local unconventional monetary policy. The importance of this extension is observing the impact of the local central bank's balance sheet on a local firm's investment decision. Moreover, this extension can detect the unannounced unconventional monetary policy of the local central bank which intervene local market. The extension variables, $qe_{t-1}^{country}$, reflect the effect of the local central bank's asset balance sheet which might affect the firm's investment decision due to unconventional monetary policy increase local credit supply.

$$\begin{aligned} I_{i,t} = {} & \theta \Delta EDF_{i,t-1} + \beta_1 MPS_{i,t-1}^{country} + \beta_2 MPS_{i,t-2}^{country} + \beta_3 MPS_{i,t-3}^{country} \\ & + \gamma_1 qe_{t-1}^{country} + \gamma_2 qe_{t-2}^{country} + \gamma_3 qe_{t-3}^{country} + \pi_1 MPS_{i,t-1}^{US} + \pi_2 MPS_{i,t-2}^{US} \\ & + \pi_3 MPS_{i,t-3}^{US} + \pi_4 MPS_{i,t-1}^{UK} + \pi_5 MPS_{i,t-2}^{UK} + \pi_6 MPS_{i,t-3}^{UK} + \pi_7 MPS_{i,t-1}^{EU} \\ & + \pi_8 MPS_{i,t-2}^{EU} + \pi_9 MPS_{i,t-3}^{EU} + \pi_{10} MPS_{i,t-1}^{JP} + \pi_{11} MPS_{i,t-2}^{JP} \\ & + \pi_{12} MPS_{i,t-3}^{JP} + \pi_{13} qe_{t-1}^{US} + \pi_{14} qe_{t-2}^{US} + \pi_{15} qe_{t-3}^{US} + \pi_{16} qe_{t-1}^{UK} \\ & + \pi_{17} qe_{t-2}^{UK} + \pi_{18} qe_{t-3}^{UK} + \pi_{19} qe_{t-1}^{EU} + \pi_{20} qe_{t-2}^{EU} + \pi_{21} qe_{t-3}^{EU} + \pi_{22} qe_{t-1}^{JP} \\ & + \pi_{23} qe_{t-2}^{JP} + \pi_{24} qe_{t-3}^{JP} + \alpha_i + \delta X_{i,t-1} + \varepsilon_{i,t} \qquad (6) \end{aligned}$$

I also expect the coefficient of local unconventional monetary policy to significantly positive with the same idea as the foreign unconventional monetary policy which already I discussed earlier.

The investment decision analysis by these 3 models enhances our analysis to go deep down on factor induce risk-taking of firms which might come from their investment decision as to the main causes of change in the risk-taking position of a firm. Moreover, the models also explain the important role of both local and international monetary policy on the firm's decision.

C. Bank versus Non-bank

As mentioned earlier about the different characteristic between banking firms and non-banking firms, I also separate my analysis on each type of firm to observe the different effect of both conventional and unconventional monetary policy on each type of firms which might have a different result because of the different behavior of credit requirement. For banking firms, monetary policy might not have a large impact on their behavior because financial intermediately gain profit from the gap between deposit and lending which follows the trend of monetary policy. While non-banking firms might receive a huge impact on their investment action because monetary policy relates directly to their investment cost.

D. Robustness Check for Distance to Capital

Lastly, I check the robustness of the firm's risk measurement technique. This paper modifies the distance to the default model of Bharath and Shumway (2008) with the extension of Chan-Lau and Amadou (2006), Distance to Capital, to specialize in the capture banking business. While the kinds of literature using only distance to default model of Bharath and Shumway (2008) for all kinds of firms. I am also curious about the reliable and significant effect of this extension on risk-taking measurement. Thus, I also compare the result between using distance to default model of Bharath and Shumway (2008) on both types of firms and the extension Distance to Capital version of Sy and Chan-Lau (2006) on banking business.

Result

Our analysis can be divided into 4 parts by the group of data that we use in our analysis. In each part, I discuss the effect of monetary policy on a firm's risk-taking position and their investment decision. I start my discussion by using pooled data as a broad analysis of monetary policy on Southeast Asia's firm behavior. While the second discussion focuses only on the effect of monetary policy on the non-bank firms which covered more than 80 percent of total firms in the market. The third discussion focuses on banking firms which have different characteristic relative to non-banking firms. This different characteristic of money demand might make each type of firm react to the effect of monetary policy differently. The fourth discussion mainly discusses on risk measurement modifier on banking firms' regulations and compare the result between traditional and modified risk measurement technique.

A. Pool data analysis

The pooled data results are reported in Tables 5 and 6. Both tables include three regression results. The first column is the result of the baseline model (local monetary policy shocks model), the second column is the result of the spillover model (foreign monetary policy spillover), and the third column is the result of the local QE model. The result will not contain monetary policy shocks from the Bank of Japan because the shocks from Taylor rule regression are not statistically significant. One remark on these shocks result which is not statistically significant is coming from merely change in the Bank of Japan's policy rate from 2010 to 2019.

Table 5: Pooled Data Risk-taking Regression Result

	(1)	(2)	(3)
VARIABLES	Standard Model	Spillover Model	Local QE Robustness Check
L.DEDF	-0.296***	-0.296***	-0.296***
	(0.0549)	(0.0547)	(0.0111)
L.LocalMPS	0.00663	0.00506	0.0249
	(0.0249)	(0.0308)	(0.0964)
L.MPSUS		0.367*	0.537**
		(0.214)	(0.232)
L2.MPSUS		0.268	0.349*
		(0.232)	(0.206)
L2.MPSUK		-1.207**	-1.876***
		(0.601)	(0.652)
L3.QEUS		-0.00301	-0.00416*
		(0.00223)	(0.00247)
L.LocalQE			0.000605
			(0.00968)
Lever	6.61e-06***	6.65e-06***	6.67e-06***
	(1.83e-06)	(1.82e-06)	(5.81e-07)
SP	-0.0149**	-0.0121**	-0.0203**
	(0.00631)	(0.00583)	(0.00954)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 shows dynamic relationships of a firm's risk-taking position between periods. The EDF of pooled data is negatively related by itself in the last period. This negative relationship implies the firm's behavior to stabilize their risk reverse to their mean level. This behavior also matches with the real situation that when the risk level is high, firms might face a higher chance of loss on their risk exposure. Thus, firms adjust their investment to receive decrease their risk exposure and lower their risk level. On the other hand, firms that have a low risk level relative to their mean might receive low investment returns. Therefore, these firms react by expanding their investment too risky assets to receive a higher return. From all models, the local monetary policy shocks

(LocalMPS) might not statistically significant enough to prove their effect on a firm's risk-taking. This result reflects the power of local central bank conventional monetary policy which might not be an effective tool to control a firm's risk level. However, the spillover model provides interesting results of foreign monetary policy which can be separated into two main groups. First, the foreign conventional monetary policies from the Federal Reserve (MPSUS) and the Bank of England (MPSUK). The effect of foreign conventional monetary policy on a firm's risk-taking behavior might inconclusive because of the different signs between MPSUS and MPSUK. As mentioned earlier, I expect a positive sign because the firms react to their negative shocks by relocating their investment into more risky assets. This expectation supports the effect of MPSUS on firms' risk-taking positions. However, the effect of MPSUK on firms' risk-taking position is negative which paradox with my expectation. One possible explanation for this paradox is the positive effect of UK conventional monetary policy might come from the substitution behavior of local firms. The increased foreign conventional monetary policy might shift the firm's loan in foreign term into a local term which decreases their cost of borrowing and decrease the firm's default chance. In the local QE model, the result is closed to the spillover in terms of significant level and sign direction. However, the unconventional monetary policy variables in this result are not significant. These insignificant unconventional monetary policy variables can be explained by the characteristic of the QE proxy mentioned earlier. From all control variables in risk-taking models, the results have some significant variables which are Leverage ratio (Lever) and Stock market return (SP). The leverage ratio has a positive relationship with the firm's risk-taking. The expansion of a firm's debt while shareholder equity is unchanged increases their chance to get default surely enlarges their risk-taking position. On the other hand, the Stock market return has a negative relationship with the firm's risk-taking. When a stock market return is high, overall firms in the market should perform better and their chance to default will be lower.

Table 6: Pooled Data Investment Decision Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	0.245	0.231	0.224
	(0.690)	(0.695)	(0.694)
L.LocalMPS	-5.118	-10.06**	-4.709
	(3.891)	(4.214)	(6.287)
L.MPSUS		23.31**	3.805
		(11.65)	(13.79)
L.QEUS		0.0492	-0.0984
		(0.106)	(0.118)
L.QEEU		0.0763	0.0397
		(0.0493)	(0.0585)
L.QEUK		0.0179	0.0183
		(0.0572)	(0.0683)
L.QEJP		0.00671	-0.00249
		(0.0326)	(0.0392)
L.LocalQE			0.462
			(0.539)
SP	-0.482	-0.348	-1.426**
	(0.341)	(0.428)	(0.558)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 reflects the effect of monetary policy on a firm's investment decision. The standard model which includes only local monetary policy has not strong evidence enough to show the relationship between monetary policy on firms' investment decisions. However, the spillover model which includes foreign monetary policy provides strong evidence to support the effect of both local and foreign conventional monetary policy on firms' investment decisions. The local conventional monetary policy hurts the firm's investment decision. The higher interest rate can reflect the higher cost of borrowing. The higher investment cost directly decreases the willingness to expand investment from the firm's perspective. The foreign conventional monetary policy (MPSUS) has a positive effect on a firm's investment decision. when foreign monetary policy increases, it might reflect foreign strong economic growth and lead to high order from a foreign country to local firms. The increased foreign monetary policy might induce local firms' expectation to expand their investment to serve the possible upcoming order from a foreign country. Lastly, the foreign unconventional monetary policy and other control variables might not have enough evidence to support their relevance to the firm's investment decision. While the local QE model provides results that differ from the spillover model. Most variables except for stock market return (SP) are insignificant. The negative sign on the stock market return variable might be explained by the stock market return increase overall stock price. Thus, the increasing firm's equity in the imperfect information market led to a sharp decrease in the firm's expenditure Kouser et al. (2016) which transparent to a decrease in the firm's investment decision.

B. Non-bank versus Bank analysis

In the prior section, my analysis covers all types of the firm regarding their characteristic of money demand and supply as the baseline of my analysis. As mentioned earlier about the different characteristics of firms, I also extend my analysis to cover this difference. The firm data has been divided into two main groups by characteristic of money demand and supply which is non-bank firms and Bank firms. The results from both tables are closed to the results of pooled data analysis since most of the data in pooled data analysis is non-bank firms. However, the significant level of each variable is different which shows the variant effect of monetary policy on different types of firms.

Table 7: Non-bank's Risk-taking Regression Result

	(1)	(2)	(3)
VARIABLES	Standard Model	Spillover Model	Local QE Robustness Check
L.DEDF	-0.296***	-0.297***	-0.298***
	(0.0547)	(0.0103)	(0.0118)
L.LocalMPS	0.00824	0.00303	0.0323
	(0.0266)	(0.0634)	(0.109)
L.MPSUS		0.424**	0.596**
		(0.192)	(0.262)
L2.MPSUS		0.312*	0.392*
		(0.179)	(0.233)
L2.MPSUK		-1.334**	-2.056***
		(0.519)	(0.736)
L3.QEJP		0.000806	0.00132*
		(0.000581)	(0.000799)
L.LocalQE			-0.000614
			(0.0109)
MTB	-4.20e-06	-4.15e-06**	-4.79e-06**
	(6.44e-06)	(1.76e-06)	(2.02e-06)
Lever	6.68e-06***	6.73e-06***	6.78e-06***
	(1.89e-06)	(5.34e-07)	(6.17e-07)
SP	-0.0157**	-0.0129*	-0.0223**
	(0.00691)	(0.00712)	(0.0108)
Constant	-0.000811*	0.0215	0.0361*
	(0.000489)	(0.0141)	(0.0212)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 shows the effect of monetary policy on non-bank firms' risk-taking behavior. As mentioned earlier about the result of non-bank firms, the sign of each variable and significant level of EDF, some foreign monetary policy variables, and some control variables are close to the result of pooled data. The local conventional monetary policy and the foreign unconventional monetary policy variables are rarely verified their effect on local firms' risk-taking in both standard model and spillover model. The remarkable of these results is the significance of US conventional monetary policy which has one more lagged of significance relative to pooled data analysis. These persistent of significant also reflect the ongoing effect of monetary policy on firms' risk-taking which might persistent over many periods. The results also contain the same paradox between US conventional monetary policy and UK conventional monetary policy as the pooled data result. While the local QE model result

Table 8: Non-bank's Investment Decision Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	0.197	0.144	0.115
	(0.691)	(0.697)	(0.695)
L.LocalMPS	-6.218	-11.58***	-5.746
	(4.086)	(4.433)	(6.771)
L.MPSUS		31.40**	13.35
		(12.41)	(14.72)
L.QEUS		0.0805	-0.0727
		(0.113)	(0.126)
L.QEEU		0.0730	0.0580
		(0.0524)	(0.0624)
L.QEUK		0.0200	0.0168
		(0.0606)	(0.0729)
L.QEJP		0.0238	0.0119
		(0.0347)	(0.0419)
L.LocalQE			0.379
			(0.574)
SP	-0.458	-0.287	-1.553***
	(0.359)	(0.451)	(0.597)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

has one additional significant variable from the spillover model that is Japan's unconventional monetary policy (QEJP) with a positive sign. This positive sign is the same puzzle as UK unconventional monetary policy in the bank-firm result. Lastly, the local unconventional monetary policy is not significant that might come from unwell unconventional monetary policy proxy as discussed earlier.

Table 8 contain the result which reflects the effect of monetary policy on non-bank firms' investment decision. All results from Table 8 also closed to the result from Table 6 in terms of sign and significant level of local conventional monetary policy and some foreign conventional monetary policy variables. Other variables including foreign unconventional monetary policy and control variables are not strong enough to prove their effect on firms' investment decisions. The difference between pooled data result and non-bank firms result is the significant level of local conventional monetary policy in non-bank firms result has a stronger significant level relative to the pooled data result. This strong significance is good support evidence on the different characteristics between non-bank firms and bank firms that react to conventional monetary policy shocks differently.

After the discussion on non-bank firms' results which seem to dominate the result of pooled data analysis, the result of bank firm's data is unique relative to the pooled data and non-bank firm's results. The results show the effect of monetary policy which shade on bank firms differently as the supply of money in the economic system relative to other firms in the rest of the market which are the demand of money. The data in the standard and spillover model contain only 4 countries excluding Vietnam due to the limitation of capital to asset ratio are not available. The total number of bank firms in 4 countries is 29 firms with a total number of 988 observations across 10 years.

Table 9: Bank's Risk-taking Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	-0.285***	-0.285***	-0.282***
	(0.00453)	(0.0311)	(0.0341)
L.LocalMPS	-0.0369	-0.0474	0.000132
	(0.0369)	(0.0435)	(0.000538)
L3.MPSUK		0.440*	0.511*
		(0.259)	(0.307)
L3.QEEU		0.000977***	0.00112***
		(0.000309)	(0.000370)
L3.QEUK		-0.000851*	-0.000941
		(0.000496)	(0.000590)
L2.LocalQE			0.103*
			(0.0589)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9 provides evidence to support the effectiveness of the monetary policy on bank firms' risk-taking behavior. While the result from non-bank firms does not show the effect of local conventional monetary policy, the local conventional monetary policy has a weakly positive significant effect on bank firm's risk-taking behavior. As expected earlier the positive effect from the local conventional monetary policy on firms' risk-taking might come from the risk-shifting behavior to maximize their utility concerning monetary policy shocks. In addition, the foreign conventional monetary policy, UKMPS, also has a weakly positive significance which does not observe in pooled data analysis and non-bank firms' data. This linkage between UK monetary policy and local firms' risk-taking in Southeast Asia might come from the world financial landscape which the largest financial hub of the world located in

London, UK. Thus, the UK monetary policy directly hit the UK financial market and pass through the monetary impact to the world financial market and spread to the Southeast Asia market. Another interesting variable which also significant only in bank-firm data is foreign unconventional monetary policy. These imply the effect of foreign unconventional monetary policy might shift only the risk-taking behavior of banking firms. The impact of foreign unconventional monetary policy seems to be unclear due to the sign of QEEU are go against the sign of QEUK. My expectation on the effect of foreign unconventional monetary policy should negatively affect firms' risk-taking behavior as the expansion of quantitative easing push the supply of credit and decrease default probability which can be used as an explanation on QEUK. However, the QEEU which positively affect bank's risk-taking behavior can be explained by the reach for yield behavior that QE policy mainly decrease long term interest rate, reduce bank firm's cashflow and directly increase bank's firm chance to default. In the local QE model, the local unconventional monetary policy is significant that might come from the currency appreciation led to bank firms receive lower cash flow in terms of domestic currency and has a higher chance to default. While UK conventional monetary policy in this model is insignificant.

Table 10 shows the effect of monetary policy on banking firms' investment decisions. The huge difference between the banking firm's result and non-banking firm's result is significant of DEDF variable which reflects the firm's investment decision sensitivity to their risk level. The positive significance of the risk-taking variable can explain by the continuous investment behavior of firms. The higher DEDF might come firm's balance sheet expansion to investment in new projects which

Table 10: Bank's Investment Decision Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	28.46*	31.79*	-36.98
	(16.30)	(16.97)	(9,240)
L2.LocalMPS	-22.88	-36.86*	-0.102
	(16.71)	(18.99)	(0.447)
L3.LocalMPS	20.31	28.50*	0.248
	(13.39)	(15.45)	(0.449)
L.MPSUS		-31.91	283.2**
		(36.27)	(111.8)
L2.MPSUS		-20.18	308.0***
		(33.13)	(98.07)
L2.MPSEU		-188.9*	-389.3
		(104.5)	(272.0)
L.MPSUK		245.1**	-1,178***
		(118.3)	(338.0)
L2.MPSUK		16.98	-1,152***
		(101.1)	(389.8)
L3.QEUS		0.323	-3.860***
		(0.391)	(1.246)
L.QEEU		0.0317	1.025**
		(0.153)	(0.496)
L3.QEUK		0.108	1.286***
		(0.169)	(0.474)
L.LocalQE			61.21
			(47.38)
CTTI	0.0738**	0.0641*	0.201
	(0.0373)	(0.0369)	(0.376)
Lever	0.00660***	0.00768***	0.0187*
	(0.00200)	(0.00219)	(0.0112)
TA	-1.47e-10	-3.90e-10	8.62e-09**
	(8.31e-10)	(8.98e-10)	(3.48e-09)
GovYield	-4.437*	-6.002**	56.97
	(2.285)	(2.451)	(86.89)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

expand their balance sheet by fundraising via debt instrument or equity selling. While main analysis on monetary policy can separate into 3 main discussions. First, the local conventional monetary harms the banking firm's investment decision. The higher local monetary policy led to higher investment costs or higher costs of borrowing. Thus, banking firms surely slow down their investment and decrease their investment projects. Another remark on this local conventional monetary policy result is the significance over two lag variables which refer to the persistent effect of local conventional monetary policy might not fully affect banking firms' decision in one period. Moreover, the difference between signs on each lagged of local conventional can refer to market overreaction behavior which monetary policy tightening will slow down banking firms' investment expansion greatly in the first period and their investment expansion will reverse back after two-period pasts. Second, the foreign conventional monetary policy from the major economy has an inconclusive effect on banking firms' investment decisions. The result provides two significant foreign conventional monetary policy variables which have different sign between them. The MPSEU with negative sign delivers the support idea for firm's cost of borrowing similar effect as the local MPS because the higher foreign monetary policy led to money supply shift from the domestic market to the international market and increase the cost of borrowing in local countries. However, The MPSUK with positive signs might paradox with this explanation. One possible reason for this MPSUK is positive signs might come from the firms' expectation on tightening monetary policy refer to strong economic expansion. As mentioned earlier about the UK financial market is the world financial hub. The movement of macro policy in the UK also affects firms' expectations which including investment decisions as well. Thus, firms react to upcoming economic recovery by expanding their investment. Third, the foreign unconventional monetary policy has an insignificant sign as the pooled data and non-baking result. Regardless of monetary policy variables, 3 control variables including Cost to total income, Leverage ratio, and Government bond yield in this result reflect significant consequence on baking firms' investment decision. The cost to total income and Leverage ratio has a positive effect on banking firms' investment decision. The cost to total income reflects the firm's performance which directly links to the firm's ability to invest. Thus, firms with good performance relative to the market average surely have a higher probability to expand their investment. The leverage ratio reflects firms' debt relative to their shareholders' equity. Firms with higher debt comparing with their equity relative to firms with lower debt might refer to their interest bearing. Consequently, Bank firms with higher investment costs have a higher chance to invest in new projects to compensate with their interest-bearing. Lastly, Government bond yield harms banking firms' investment decisions. The main reason that supports a negative relationship is Government bond yield refers to the market cost of borrowing. Thus, the higher market cost of borrowing decreases firms' investment in a new project which also reduces firms' probability to make an investment decision as well. In the local QE model, the result differences from the spillover model result in both sign direction and significant level on each variable. This difference might come from 2 reasons. First, the data in the local QE model is far from the law of large numbers. The bank data in this model contain only 11 firms with a total of 383 observations. Second, the local QE proxy also contains a problem to identify the local unconventional policy correctly as mentioned earlier. Thus, this result might not be reliable enough to prove the effect of local QE on a bank firm's investment decision.

C. Robustness check for Distance to Capital

Table 11: Distance to Capital in Bank's Risk-taking Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model
L.DEDFDC	-0.273***	-0.273***
	(0.00267)	(0.0314)
L.LocalMPS	-0.0410	-0.0383
	(0.0338)	(0.0384)
L.MPSUS		-0.118
		(0.0917)
L.MPSEU		-0.00746
		(0.234)
L.MPSUK		-0.109
		(0.304)
L3.QEEU		0.000847***
		(0.000272)
L3.QEUK		-0.000719*
		(0.000437)
Lever	-3.85e-07*	-8.88e-07
	(2.08e-07)	(2.22e-06)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As mentioned earlier in the literature review, the difference of firm characteristics also makes the monetary policy impact on each firm's types differently. The various types of the firm also have different regulation control on them. One of the regulations treat on banking firm is the capital adequacy ratio which limited baking firm to hold capital to cover their deposit position. Thus, this regulation also affects the sensitivity of banking firms concerning monetary policy action due to the capital buffer from capital adequacy policy. In this part, I also adjust the standard model of Distance to Default to Distance to Capital which was introduced by Sy and Chan-Lau (2006) to cover the capital adequacy policy on banking firms. Tables 11 provides the banking firms' results of the risk-taking model with the Distance to Capital extension. Table 11 shows the effect of monetary policy on banking firms' risk-taking position which is modified with capital adequacy ratio. The result is different relative to Table 9 which using Distance to Default as a risk-taking measurement. Most of the variables in this result are insignificant excepting for the EDF variables which can reflect the impact of the capital adequacy ratio in banking firms. Thus, the insignificant monetary policy variables can be explained by the capital adequacy policy which creates a monetary buffer on banking firms and reduces their risk sensitivity. The EDF variables still have strong negative significance can be explained by the dynamics risk optimization behavior of banking firms.

Conclusion

The recent financial crisis motivates the research on the linkage between the effect of monetary policy and firms' s risk-taking behavior and their investment behavior. Moreover, the financial crisis also pushes the limit of monetary policy authority to adopt new techniques to stimulate severe economic situations. While these new monetary policy techniques are adopted, the effect being discussed by many researchers. Furthermore. the globalization of world economics creates huge linkages between countries around the world in many directions. These linkages also create a monetary spillover effect from major countries to developing counties. The contractionary monetary policy might shift firms' behavior to higher their risk-taking and lower their investment decision.

In this paper I aiming to observe the effect of monetary policy from both local monetary policy authority and the spillover effect from the foreign monetary policy on a firm’s risk-taking and investment decision behavior. The observations come from firms in Southeast Asia including Thailand, Malaysia, Vietnam, the Philippines, and Indonesia from 2010 to 2019 in quarterly frequency. I find that the spillover of foreign monetary policy affects Southeast Asia firm’s behavior in their risk-taking behavior and investment decision. The result also provides evidence on the different effects of monetary policy on non-bank and bank firms that have their unique characteristic of money.

The result of this research is focused on both effect of local and foreign monetary policy on the overall market, non-bank firms, and bank firms. First, the results suggest that the local monetary policy authority might need specific tools rather than the conventional monetary policy to supervise over firm’s risk behavior. Second, the monetary policy authority should take attention to the spillover effect of both conventional and unconventional foreign monetary policy that mainly shifts a firm’s behavior. Third, the monetary policy authority should be aware on the characteristic of firms which absorb the monetary policy action differently. Fourth, the unconventional monetary policy has a contradiction effect on both firm’s risk-taking and investment decision behavior

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Appendix

Part A: Control Variables Formula

$$Market\ to\ Book\ Ratio = \frac{Market\ Capitalization}{Total\ Book\ Value}$$

$$Cost\ to\ Total\ Income\ Ratio = \frac{Operating\ Cost}{Operating\ Income}$$

$$Leverage\ Ratio = \frac{Total\ Debt}{Total\ Equity}$$

$$Capital\ to\ Asset\ Ratio = \frac{Current\ Assets - Current\ Liabilities}{Total\ Assets}$$

Part B: Results Table (Full version)

Table A: Pooled Data Risk-taking Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	-0.296***	-0.296***	-0.296***
	(0.0549)	(0.0547)	(0.0111)
L.LocalMPS	0.00663	0.00506	0.0249
	(0.0249)	(0.0308)	(0.0964)
L2.LocalMPS	0.0442	0.0692	0.0673
	(0.0390)	(0.0510)	(0.115)
L3.LocalMPS	-0.0302	-0.0597	-0.0963
	(0.0575)	(0.0613)	(0.0952)
L.MPSUS		0.367*	0.537**
		(0.214)	(0.232)
L2.MPSUS		0.268	0.349*
		(0.232)	(0.206)
L3.MPSUS		0.178	0.307
		(0.163)	(0.201)
L.MPSEU		-0.376	-0.722
		(0.469)	(0.584)
L2.MPSEU		0.288	0.364
		(0.509)	(0.657)
L3.MPSEU		0.150	0.291
		(0.293)	(0.555)
L.MPSUK		-0.591	-0.774
		(0.400)	(0.738)
L2.MPSUK		-1.207**	-1.876***
		(0.601)	(0.652)
L3.MPSUK		0.0280	-0.0457
		(0.354)	(0.570)
L.QEUS		2.53e-05	0.000349
		(0.00107)	(0.00201)
L2.QEUS		0.00210	0.00240
		(0.00255)	(0.00359)
L3.QEUS		-0.00301	-0.00416*
		(0.00223)	(0.00247)
L.QEEU		0.000737	0.00144
		(0.00102)	(0.00100)
L2.QEEU		-0.000634	-0.000971

		(0.000684)	(0.000833)
L3.QEEU		-3.18e-05	-0.000296
		(0.000722)	(0.000684)
L.QEUK		0.000412	-3.60e-07
		(0.000770)	(0.00118)
L2.QEUK		-0.000373	0.000133
		(0.00102)	(0.00147)
L3.QEUK		-7.97e-05	-5.41e-05
		(0.000813)	(0.00111)
L.QEJP		-4.77e-05	-0.000103
		(0.000339)	(0.000660)
L2.QEJP		-0.000635	-0.00108
		(0.000614)	(0.000974)
L3.QEJP		0.000691	0.00115
		(0.000485)	(0.000709)
L.LocalQE			0.000605
			(0.00968)
L2.LocalQE			0.00584
			(0.0110)
L3.LocalQE			-0.00656
			(0.00989)
MTB	-4.22e-06	-4.18e-06	-4.82e-06**
	(6.46e-06)	(6.43e-06)	(1.90e-06)
CTTI	1.91e-07	1.48e-07	4.74e-07
	(2.06e-07)	(2.83e-07)	(4.77e-06)
Lever	6.61e-06***	6.65e-06***	6.67e-06***
	(1.83e-06)	(1.82e-06)	(5.81e-07)
TA	-0	-0	-0
	(0)	(0)	(0)
GovYield	0.00343	0.00127	0.0496
	(0.00404)	(0.00354)	(0.114)
SP	-0.0149**	-0.0121**	-0.0203**
	(0.00631)	(0.00583)	(0.00954)
Constant	-0.000831**	0.0206	0.0335*
	(0.000415)	(0.0157)	(0.0188)
Observations	9,702	9,702	7,337
Number of Stock	345	345	239

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B: Pooled Data Investment Decision Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	0.245	0.231	0.224
	(0.690)	(0.695)	(0.694)
L.LocalMPS	-5.118	-10.06**	-4.709
	(3.891)	(4.214)	(6.287)
L2.LocalMPS	5.487	4.875	-11.25
	(4.730)	(5.132)	(7.097)
L3.LocalMPS	5.911	0.544	-0.0611
	(3.645)	(4.000)	(5.824)
L.MPSUS		23.31**	3.805
		(11.65)	(13.79)
L2.MPSUS		10.66	1.493
		(10.98)	(12.42)
L3.MPSUS		-5.226	-14.43
		(10.19)	(11.81)
L.MPSEU		2.396	28.32
		(28.02)	(34.11)
L2.MPSEU		0.967	-8.874
		(33.13)	(39.38)
L3.MPSEU		-38.14	-45.04
		(27.57)	(33.53)
L.MPSUK		-19.63	-25.42
		(36.58)	(42.81)
L2.MPSUK		-48.45	-17.56
		(31.72)	(39.21)
L3.MPSUK		38.49	50.97
		(29.31)	(34.19)
L.QEUS		0.0492	-0.0984
		(0.106)	(0.118)
L2.QEUS		0.0120	0.168
		(0.187)	(0.211)
L3.QEUS		-0.122	-0.0909
		(0.126)	(0.146)
L.QEEU		0.0763	0.0397
		(0.0493)	(0.0585)
L2.QEEU		-0.0486	-0.0280
		(0.0408)	(0.0502)

L3.QEEU		-0.0305	-0.00537
		(0.0346)	(0.0403)
L.QEUK		0.0179	0.0183
		(0.0572)	(0.0683)
L2.QEUK		0.0568	0.00928
		(0.0722)	(0.0866)
L3.QEUK		-0.00573	0.0245
		(0.0553)	(0.0651)
L.QEJP		0.00671	-0.00249
		(0.0326)	(0.0392)
L2.QEJP		-0.0492	-0.0467
		(0.0498)	(0.0584)
L3.QEJP		0.0280	0.0307
		(0.0351)	(0.0413)
L.LocalQE			0.462
			(0.539)
L2.LocalQE			-0.846
			(0.647)
L3.LocalQE			0.530
			(0.593)
MTB	-0.000190	-0.000228	-0.000226
	(0.000481)	(0.000623)	(0.000653)
CTTI	0.000343	0.000338	0.000350
	(0.000371)	(0.000383)	(0.000417)
Lever	-1.12e-05	-1.00e-05	-1.11e-05
	(3.57e-05)	(3.58e-05)	(3.61e-05)
TA	-7.35e-11	5.64e-10	5.68e-10
	(6.69e-10)	(6.79e-10)	(7.32e-10)
GovYield	0.313	-0.405	10.26
	(0.633)	(0.676)	(6.800)
SP	-0.482	-0.348	-1.426**
	(0.341)	(0.428)	(0.558)
Observations	9,405	9,405	7,133
Number of Stock	324	324	226

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table C: Non-bank's Risk-taking Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	-0.296***	-0.297***	-0.298***
	(0.0547)	(0.0103)	(0.0118)
L.LocalMPS	0.00824	0.00303	0.0323
	(0.0266)	(0.0634)	(0.109)
L2.LocalMPS	0.0468	0.0757	0.0686
	(0.0423)	(0.0821)	(0.130)
L3.LocalMPS	-0.0346	-0.0649	-0.107
	(0.0625)	(0.0631)	(0.108)
L.MPSUS		0.424**	0.596**
		(0.192)	(0.262)
L2.MPSUS		0.312*	0.392*
		(0.179)	(0.233)
L3.MPSUS		0.214	0.351
		(0.169)	(0.227)
L.MPSEU		-0.382	-0.767
		(0.465)	(0.657)
L2.MPSEU		0.327	0.425
		(0.540)	(0.741)
L3.MPSEU		0.220	0.350
		(0.450)	(0.625)
L.MPSUK		-0.625	-0.795
		(0.604)	(0.831)
L2.MPSUK		-1.334**	-2.056***
		(0.519)	(0.736)
L3.MPSUK		-0.00830	-0.0737
		(0.485)	(0.644)
L.QEUS		0.000256	0.000657
		(0.00175)	(0.00227)
L2.QEUS		0.00208	0.00225
		(0.00309)	(0.00405)
L3.QEUS		-0.00326	-0.00443
		(0.00209)	(0.00279)
L.QEEU		0.000790	0.00156
		(0.000824)	(0.00113)
L2.QEEU		-0.000609	-0.000967
		(0.000669)	(0.000940)

L3.QEEU		-0.000127	-0.000446
		(0.000569)	(0.000771)
L.QEUK		0.000476	2.89e-05
		(0.000953)	(0.00133)
L2.QEUK		-0.000508	9.74e-05
		(0.00118)	(0.00166)
L3.QEUK		-4.29e-06	-1.43e-05
		(0.000912)	(0.00125)
L.QEJP		-2.72e-06	-4.38e-05
		(0.000541)	(0.000745)
L2.QEJP		-0.000787	-0.00130
		(0.000815)	(0.00110)
L3.QEJP		0.000806	0.00132*
		(0.000581)	(0.000799)
L.LocalQE			-0.000614
			(0.0109)
L2.LocalQE			0.00574
			(0.0124)
L3.LocalQE			-0.00529
			(0.0112)
MTB	-4.20e-06	-4.15e-06**	-4.79e-06**
	(6.44e-06)	(1.76e-06)	(2.02e-06)
CTTI	1.02e-07	4.95e-08	-8.45e-08
	(1.08e-07)	(2.29e-06)	(5.05e-06)
Lever	6.68e-06***	6.73e-06***	6.78e-06***
	(1.89e-06)	(5.34e-07)	(6.17e-07)
TA	-0*	-0	-0
	(0)	(0)	(0)
GovYield	0.00552	0.00358	0.0555
	(0.00378)	(0.0113)	(0.129)
SP	-0.0157**	-0.0129*	-0.0223**
	(0.00691)	(0.00712)	(0.0108)
Constant	-0.000811*	0.0215	0.0361*
	(0.000489)	(0.0141)	(0.0212)
Observations	8,671	8,671	6,491
Number of Stock	316	316	215

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table D: Non-bank's Investment Decision Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	0.197	0.144	0.115
	(0.691)	(0.697)	(0.695)
L.LocalMPS	-6.218	-11.58***	-5.746
	(4.086)	(4.433)	(6.771)
L2.LocalMPS	7.537	7.743	-6.606
	(4.964)	(5.388)	(7.643)
L3.LocalMPS	3.793	-2.167	-2.389
	(3.810)	(4.185)	(6.260)
L.MPSUS		31.40**	13.35
		(12.41)	(14.72)
L2.MPSUS		15.84	7.376
		(11.72)	(13.28)
L3.MPSUS		-3.477	-10.21
		(10.87)	(12.62)
L.MPSEU		14.06	43.79
		(29.69)	(36.38)
L2.MPSEU		23.47	6.570
		(35.29)	(42.04)
L3.MPSEU		-35.24	-43.70
		(29.37)	(35.77)
L.MPSUK		-50.06	-66.78
		(38.83)	(45.63)
L2.MPSUK		-55.02	-28.41
		(33.72)	(41.87)
L3.MPSUK		39.24	48.58
		(31.29)	(36.47)
L.QEUS		0.0805	-0.0727
		(0.113)	(0.126)
L2.QEUS		0.0396	0.233
		(0.200)	(0.226)
L3.QEUS		-0.173	-0.185
		(0.135)	(0.156)
L.QEEU		0.0730	0.0580
		(0.0524)	(0.0624)
L2.QEEU		-0.0543	-0.0395
		(0.0434)	(0.0536)

L3.QEEU		-0.0294	-0.0143
		(0.0369)	(0.0429)
L.QEUK		0.0200	0.0168
		(0.0606)	(0.0729)
L2.QEUK		0.0614	0.0130
		(0.0767)	(0.0925)
L3.QEUK		-0.0194	0.0276
		(0.0590)	(0.0696)
L.QEJP		0.0238	0.0119
		(0.0347)	(0.0419)
L2.QEJP		-0.0740	-0.0745
		(0.0533)	(0.0625)
L3.QEJP		0.0397	0.0456
		(0.0374)	(0.0441)
L.LocalQE			0.379
			(0.574)
L2.LocalQE			-0.541
			(0.688)
L3.LocalQE			0.203
			(0.635)
MTB	-0.000193	-0.000232	-0.000226
	(0.000488)	(0.000634)	(0.000650)
CTTI	0.000334	0.000343	0.000350
	(0.000365)	(0.000372)	(0.000399)
Lever	-1.61e-05	-1.30e-05	-1.26e-05
	(3.62e-05)	(3.63e-05)	(3.66e-05)
TA	-8.50e-10	5.94e-10	1.44e-09
	(1.82e-09)	(1.86e-09)	(3.62e-09)
GovYield	1.049	0.435	9.086
	(0.700)	(0.738)	(7.250)
SP	-0.458	-0.287	-1.553***
	(0.359)	(0.451)	(0.597)
Observations	8,407	8,407	6,320
Number of Stock	296	296	203

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table E: Bank's Risk-taking Regression Result

	(1)	(2)	(3)
VARIABLES	Standard Model	Spillover Model	Local QE Robustness Check
L.DEDF	-0.285***	-0.285***	-0.282***
	(0.00453)	(0.0311)	(0.0341)
L.LocalMPS	-0.0369	-0.0474	0.000132
	(0.0369)	(0.0435)	(0.000538)
L2.LocalMPS	0.0313	0.0876*	-0.000139
	(0.0360)	(0.0525)	(0.000513)
L3.LocalMPS	0.00633	-0.0452	-0.000190
	(0.00562)	(0.0427)	(0.000537)
L.MPSUS		-0.144	-0.138
		(0.104)	(0.122)
L2.MPSUS		-0.0317	-0.0308
		(0.0959)	(0.112)
L3.MPSUS		-0.0712	-0.0515
		(0.0906)	(0.108)
L.MPSEU		-0.00285	-0.0133
		(0.266)	(0.327)
L2.MPSEU		-0.0704	-0.0157
		(0.293)	(0.351)
L3.MPSEU		-0.334	-0.491
		(0.245)	(0.300)
L.MPSUK		-0.103	-0.180
		(0.345)	(0.411)
L2.MPSUK		0.0381	0.0668
		(0.290)	(0.353)
L3.MPSUK		0.440*	0.511*
		(0.259)	(0.307)
L.QEUS		-0.000915	-0.00111
		(0.000938)	(0.00109)
L2.QEUS		0.00105	0.00180
		(0.00167)	(0.00195)
L3.QEUS		6.84e-05	-0.000395
		(0.00113)	(0.00133)
L.QEEU		-0.000230	-0.000317
		(0.000455)	(0.000546)
L2.QEEU		-0.000527	-0.000421
		(0.000374)	(0.000460)
L3.QEEU		0.000977***	0.00112***

		(0.000309)	(0.000370)
L.QEUK		-0.000291	-0.000507
		(0.000541)	(0.000653)
L2.QEUK		0.000523	0.000594
		(0.000667)	(0.000809)
L3.QEUK		-0.000851*	-0.000941
		(0.000496)	(0.000590)
L.QEJP		-0.000382	-0.000368
		(0.000296)	(0.000361)
L2.QEJP		0.000614	0.000662
		(0.000441)	(0.000523)
L3.QEJP		-0.000218	-0.000286
		(0.000318)	(0.000380)
L.LocalQE			-0.0538
			(0.0507)
L2.LocalQE			0.103*
			(0.0589)
L3.LocalQE			-0.0481
			(0.0501)
MTB	4.51e-06	-0.000315	-0.000433
	(6.41e-05)	(0.000358)	(0.000413)
CTTI	-3.32e-05	-5.24e-05	-4.63e-05
	(2.98e-05)	(9.84e-05)	(0.000107)
Lever	-1.57e-07	-6.21e-07	-6.49e-07
	(3.31e-07)	(2.52e-06)	(3.06e-06)
TA	-0	0	0
	(0)	(0)	(0)
GovYield	-0.000525	-0.00211	-0.0454
	(0.00136)	(0.00613)	(0.0624)
SP	-0.00378	-0.00663	-0.00837
	(0.00338)	(0.00429)	(0.00522)
CTA	2.03e-06	4.14e-05	3.65e-05
	(1.20e-05)	(9.64e-05)	(0.000114)
Constant	8.95e-05	0.000815	-0.00101
	(0.000252)	(0.00828)	(0.0103)
Observations	988	988	822
Number of Stock	29	29	24

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table F: Bank’s Investment Decision Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model	(3) Local QE Robustness Check
L.DEDF	28.46*	31.79*	-36.98
	(16.30)	(16.97)	(9,240)
L.LocalMPS	2.424	7.243	0.651
	(14.65)	(16.05)	(0.461)
L2.LocalMPS	-22.88	-36.86*	-0.102
	(16.71)	(18.99)	(0.447)
L3.LocalMPS	20.31	28.50*	0.248
	(13.39)	(15.45)	(0.449)
L.MPSUS		-31.91	283.2**
		(36.27)	(111.8)
L2.MPSUS		-20.18	308.0***
		(33.13)	(98.07)
L3.MPSUS		-15.00	166.2*
		(30.92)	(99.31)
L.MPSEU		-108.3	510.5*
		(89.85)	(271.9)
L2.MPSEU		-188.9*	-389.3
		(104.5)	(272.0)
L3.MPSEU		3.745	284.5
		(85.19)	(256.3)
L.MPSUK		245.1**	-1,178***
		(118.3)	(338.0)
L2.MPSUK		16.98	-1,152***
		(101.1)	(389.8)
L3.MPSUK		-26.36	-487.3*
		(92.67)	(257.1)
L.QEUS		-0.282	-0.278
		(0.326)	(0.984)
L2.QEUS		-0.129	3.442*
		(0.572)	(1.874)
L3.QEUS		0.323	-3.860***
		(0.391)	(1.246)
L.QEEU		0.0317	1.025**
		(0.153)	(0.496)
L2.QEEU		0.0817	-0.290
		(0.131)	(0.411)

L3.QEEU		-0.0661	-0.602*
		(0.108)	(0.347)
L.QEUK		0.0335	-0.793
		(0.181)	(0.517)
L2.QEUK		-0.0224	0.0553
		(0.228)	(0.668)
L3.QEUK		0.108	1.286***
		(0.169)	(0.474)
L.QEJP		-0.138	-0.439
		(0.101)	(0.331)
L2.QEJP		0.151	0.395
		(0.152)	(0.519)
L3.QEJP		-0.0544	-0.0637
		(0.107)	(0.371)
L.LocalQE			61.21
			(47.38)
L2.LocalQE			18.86
			(53.79)
L3.LocalQE			-0.735
			(45.94)
MTB	0.151	0.0336	0.934
	(0.205)	(0.251)	(1.071)
CTTI	0.0738**	0.0641*	0.201
	(0.0373)	(0.0369)	(0.376)
Lever	0.00660***	0.00768***	0.0187*
	(0.00200)	(0.00219)	(0.0112)
TA	-1.47e-10	-3.90e-10	8.62e-09**
	(8.31e-10)	(8.98e-10)	(3.48e-09)
GovYield	-4.437*	-6.002**	56.97
	(2.285)	(2.451)	(86.89)
SP	-1.174	-0.951	-2.284
	(1.177)	(1.441)	(4.205)
CTA	0.00243	0.0134	-0.207
	(0.0356)	(0.0369)	(0.231)
Observations	955	955	383
Number of Stock	28	28	11

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table G: Distance to Capital in Bank's Risk-taking Regression Result

VARIABLES	(1) Standard Model	(2) Spillover Model
L.DEDFDC	-0.273***	-0.273***
	(0.00267)	(0.0314)
L.LocalMPS	-0.0410	-0.0383
	(0.0338)	(0.0384)
L2.LocalMPS	0.0360	0.0730
	(0.0337)	(0.0462)
L3.LocalMPS	0.00555	-0.0394
	(0.00501)	(0.0377)
L.MPSUS		-0.118
		(0.0917)
L2.MPSUS		-0.0205
		(0.0845)
L3.MPSUS		-0.0500
		(0.0798)
L.MPSEU		-0.00746
		(0.234)
L2.MPSEU		-0.0637
		(0.258)
L3.MPSEU		-0.274
		(0.216)
L.MPSUK		-0.109
		(0.304)
L2.MPSUK		0.0189
		(0.256)
L3.MPSUK		0.337
		(0.229)
L.QEUS		-0.000847
		(0.000825)
L2.QEUS		0.00108
		(0.00147)
L3.QEUS		-4.18e-05
		(0.000998)
L.QEEU		-0.000198
		(0.000401)
L2.QEEU		-0.000436
		(0.000329)
L3.QEEU		0.000847***

		(0.000272)
L.QEUK		-0.000291
		(0.000476)
L2.QEUK		0.000456
		(0.000587)
L3.QEUK		-0.000719*
		(0.000437)
L.QEJP		-0.000379
		(0.000261)
L2.QEJP		0.000595
		(0.000389)
L3.QEJP		-0.000208
		(0.000280)
MTB	3.33e-06	-0.000263
	(5.49e-05)	(0.000315)
CTTI	-2.17e-05	-4.21e-05
	(2.41e-05)	(8.79e-05)
Lever	-3.85e-07*	-8.88e-07
	(2.08e-07)	(2.22e-06)
TA	-0	0
	(0)	(0)
GovYield	-0.000283	-0.00194
	(0.00108)	(0.00544)
SP	-0.00451	-0.00548
	(0.00374)	(0.00378)
CTA	6.92e-06	4.05e-05
	(1.15e-05)	(8.51e-05)
Constant	4.37e-05	0.000680
	(0.000212)	(0.00730)
Observations	988	988
Number of Stock	29	29

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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