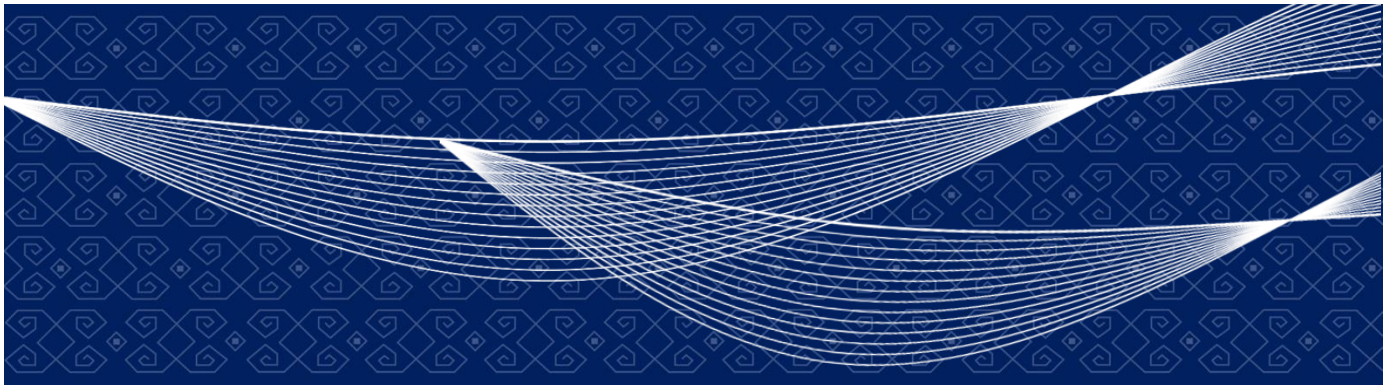
BANK INDONESIA
BANK SENTRAL REPUBLIK INDONESIA



WP/14/2021

WORKING PAPER

IMPACTS OF GLOBAL FINANCIAL CONDITIONS ON NON-FINANCIAL CORPORATE LEVERAGE IN INDONESIA

Sahminan Sahminan

2021

IMPACTS OF GLOBAL FINANCIAL CONDITIONS ON NON-FINANCIAL CORPORATE LEVERAGE IN INDONESIA

Sahminan Sahminan

Abstract

This paper examines the effects of global financial conditions on non-financial corporate leverage in Indonesia. We estimate panel data models using individual data of Indonesian publicly listed non-financial firms with quarterly frequency covering the period from 2004 to 2021. The estimation results show that looser global financial conditions, measured by lower US shadow rates, positively affect the leverage growth of the publicly listed non-financial firms in Indonesia. Nonetheless, the effect is less than that of other emerging market economies in general. Moreover, we also find that firms classified as high debt and state-owned enterprises are more sensitive to global financial conditions. On the other hand, firms classified as having a high-interest coverage ratio are less sensitive to global financial conditions. Meanwhile, the effects of global financial conditions on non-financial corporate leverage are not significantly different across economic sectors. The findings in this paper suggest that non-financial firm leverage in Indonesia is not immune to the fluctuations in global financial conditions, and the effects could vary across classifications of firms.

Keywords: Global financial conditions, non-financial corporates, leverage, Indonesia.

JEL Classifications: F21, F32, G32

Acknowledgment: I thank Reza Anglingkusumo and Zaafri A. Husodo for helpful discussions, comments, and suggestions. I am also grateful to Minda Putri Dwinanda for an excellent research assistance. Any views in this paper should not be taken to represent those of Bank Indonesia. The views expressed are those of the authors and do not necessarily reflect the views of Bank Indonesia. Corresponding author: Director, Department of Economic and Monetary Policy, Bank Indonesia, Jakarta. E-mail: sahminan@bi.go.id

1. Introduction

Global financial conditions may affect not only the corporate sector in advanced economies but also the corporate sector in emerging market (EM) economies. A number of studies have documented the increased non-financial corporate debts in emerging market economies on the back of easing monetary policy in advanced economies. For example, Sahay et al. (2014) reported that emerging markets received nearly half of the global capital flows from 2009 to 2012. They also show that in the flows to emerging markets, the role of portfolio flows—particularly debt—has also become more important. The increasing role of debt flows to emerging markets includes the increase in non-financial corporate debts. According to the IMF (2015), over the period of 2004-2014, non-financial corporate debts across major emerging market economies increased four times. And global factors—particularly global financial conditions—play a more significant role in the leverage growth in the post-crisis period.

During the period of the loose global financial conditions, non-financial corporate debts in Indonesia also increased significantly, although the level was lower than the average level in other EMs. Non-financial corporate debts in Indonesia during 2008-2019 increased from 15.6 percent of GDP in 2008 to 22.7 percent of GDP in 2019. During the loose global financial conditions, Indonesia also received strong capital inflows. From 2009 through 2019, on average, Indonesia received USD 16 billion in portfolio inflows annually, increasing from an average of USD 5.7 billion annually from 2004 to 2008. To what extent global financial conditions translated into non-financial corporate leverage in Indonesia is still a question that needs to explore.

Global financial conditions can be transmitted into non-financial corporate debts in EMs through various channels, such as capital inflows and more loose borrowing constraints (Alter & Elekdag, 2020). Lower interest rates in EMs due to strong capital inflows on the back of looser global financial conditions would be followed by increasing economic activities. And this leads non-financial corporates to expand their business through debt. On the other hand, lower domestic interest rates due to lower interest rates in advanced economies could improve the financial position of non-financial corporates and loosen their borrowing constraints.[1] Furthermore, there is

[1] This condition for EMs is discussed, for example, in Azis & Shin (2015).

also evidence on the role of bank lending channel in transmitting global liquidity into credits in emerging markets.[2]

He and McCauley (2013) argue that there are five channels through which global liquidity affects corporate leverage in EMs.[3] First, to prevent further appreciation due to low interest in major economies, central banks in emerging economies set policy rates lower than they would otherwise. Second, large bond purchases in advanced economies reduce bond yields in emerging economies through the portfolio-balance effect, as yields in the bond markets in advanced economies go down due to the large bond purchases. Third, higher interest rates in emerging markets than in advanced economies lead to exchange rate appreciations in emerging markets. Fourth, low yields in key currencies shift liabilities in emerging economies into foreign currency, mainly in countries with domestic currency expected to appreciate. Fifth, as global liquidity is abundant and low yields environment in advanced economies, capital flows into local currency and equity markets in emerging economies.

This paper aims to investigate the impacts of global financial conditions on the leverage of non-financial firms in Indonesia. Furthermore, we also examine whether firms with different characteristics and economic sectors respond differently to global financial conditions. Specifically, there are three questions that this paper tries to answer. First, to what extent do global financial conditions affect non-financial corporate leverage in Indonesia? Second, do the effects of global financial conditions differ across firm categories? Third, do firms in different economic sectors have significantly different responses to global financial conditions? To answer the questions, we use a panel data approach, in which the leverage growth of firms is regressed against a measure of global financial conditions. Here, we use individual data of Indonesian publicly listed non-financial firms with quarterly frequency covering the period from 2004 to 2021.

Our findings show that a loosening global financial condition positively affects the leverage growth of publicly listed non-financial corporates in Indonesia. A one percentage point lower in the US *shadow rates* results in around 0.02 higher in the growth of corporate leverage. Compared to empirical evidence from other emerging markets, this paper's findings show that Indonesia's non-financial corporates in general are less sensitive to global financial conditions.[4]

[2] See, for example, Xu & La (2017).
[3] He and McCauley (2013) follow Caruana (2012).
[4] See, for example, Alter & Elekdag (2020).

We also find that firms classified as high debt and state-owned enterprises (BUMN) are more sensitive to global financial conditions. On the other hand, firms classified as having high-interest coverage ratio (ICR) are less sensitive to global financial conditions. Meanwhile, the effects of global financial conditions are not significantly different across economic sectors. These results are quite robust to different specifications of the regression model.

This paper is related the strands of literature on how global financial conditions affect firms in emerging market economies. A number of studies have empirically examined the relationship between global financial conditions and non-financial corporate debts in EMs. In its GFSR in October 2015, the IMF reveals some findings on corporate leverage in emerging economies (IMF, 2015). First, the role of global factors—including global financial conditions—in explaining leverage growth in emerging markets has increased, while firm- and country-specific roles have become less important. Second, corporate leverage has increased larger in more cyclical sectors.[5] Third, emerging market corporates have managed to issue bonds with lower yields and longer maturities.

Herwadkar (2015) looked at the determinants of corporate leverage in EMs in the post-global financial crisis. In line with the IMF's (2015) findings, Herwadker found that the role of global factors, including global financial conditions, has increased since the global financial crisis. Meanwhile, domestic factors and firm-specific factors have become less important. Nonetheless, when looking at individual economies, Herwadkar's (2015) model doesn't fit well with Indonesia. In a more recent study, Alter & Elekdag (2020) find that the rise in corporate leverage in EMs following the GFC can be attributed to the accommodative monetary policy condition in the US and looser global financial conditions. Their study uses annual data of around 400,000 individual companies from 24 EMs. Although Alter & Elekdag (2020) also covers Indonesia, the number of Indonesian firms in their sample is very small, only 296 out of 760,038 firms.

This paper contributes to the literature on the impacts of global financial conditions on non-financial firm leverage in emerging market economies. Instead of using cross-country data with yearly frequency like in Alter & Elekdag (2020), this paper uses quarterly data of individual non-financial firms in Indonesia. This allows capturing more dynamics of the firm leverage. Moreover, this paper also contributes to the literature on corporate finance by providing empirical evidence

[5] Cyclical sectors include basic materials, consumer discretionary, and financial services (IMF, 2015).

on the determinants of non-financial firms' leverage in Indonesia. Different from two studies on the spillover of global financial conditions in Indonesia that use aggregate data (Harahap et al., 2019, 2020; Prabheesh et al., 2020; and Satria et al. 2021), this paper exploits individual data of publicly listed non-financial corporates in Indonesia. By using individual data, the models in this paper capture variation across firms. Overall, a better understanding of global liquidity's impacts on corporates in Indonesia helps design policy responses to mitigate risks emanating from the fluctuations in global liquidity conditions.

The remainder of the paper proceeds as follows. Section 2 explains the methodology used to examine the effects of global financial conditions on the non-financial corporate leverage in Indonesia. Section 3 describes the data used in the paper. Section 4 presents estimation results. And Section 5 provides some conclusions.

2. Model Specifications and Hypotheses

To measure the impacts of global financial conditions on corporate leverage, we use a panel data model, following the approach used, among others, by Alter & Elekdag (2020). In the baseline equation, corporate leverage is modeled as a function of global financial condition and control variables for the corporates and macroeconomic variables. Thus, the baseline equation can be written as follows:

$$L_{it} = \alpha_0 + \alpha_1 L_{i,(t-1)} + \beta_0 G_t + \gamma F_{i,(t-1)} + \delta M_{(t-1)} + \varepsilon_{i,t} \qquad 1)$$

where L_{it} is the leverage growth of corporate i, G_t is a measure of global financial condition, F_{it} represents firm-specific control variables, and M_t represents macroeconomic variables. The lag of corporate leverage is used to measure the persistency of the leverage that may arise due to adjustment costs facing the corporates in optimizing their leverage. Coefficient β_0 measures the magnitude of the impact of global financial condition on corporate leverage. Thus, if the looser global financial conditions is transmitted into larger corporate leverage, then β_0 is expected to be significantly larger than zero.

To capture the effects of certain classifications of the firms on the transmission of the global financial cycle on firms' leverage, we also include the interaction between the global financial

cycle variable and a dummy variable for certain classifications of the firms. Let C_{it} be the variable for a category of firms, then the equation for the firm's leverage is:

$$L_{it} = \alpha_0 + \alpha_1 L_{i,(t-1)} + \beta_0 G_t + \beta_1 G_t * C_{i,t} + \gamma F_{i,(t-1)} + \delta M_{(t-1)} + \varepsilon_{i,t} \quad (2)$$

If firms in C_{it} are more sensitive to the global financial cycle, we expect β_1 is significantly larger than zero. On the other hand, if firms in C_{it} are less sensitive to the global financial cycle, we expect β_1 is significantly negative.

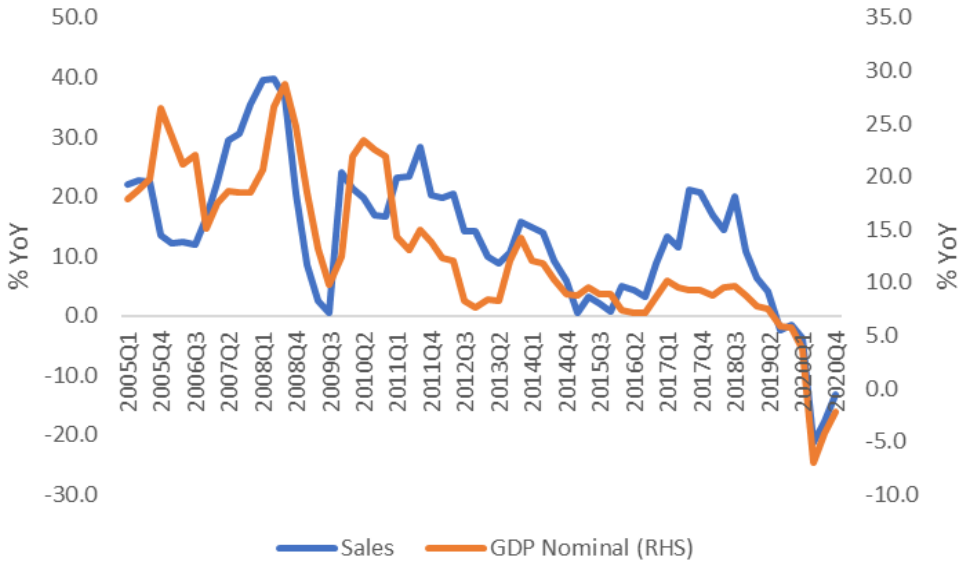
We use the non-equity liability to asset ratio as a measure of corporate leverage. We measure global financial conditions by the US *shadow rates* developed by Wu and Xia (2016), which has been widely used in the literature.[6] For robustness check, we also estimate the models using Fed Fund Rate (FFR) as a proxy for global financial conditions and using different measures of domestic policy rates. We control for firm-specific factors such as sales growth, profitability, asset tangibility, liquidity, and firm size.[7] The profitability is measured by return on asset (ROA). Unlike return on equity (ROE), ROA is not affected by the leverage (Alter & Elekdag, 2020). We include firm size as a control variable as it may relate to the leverage of the firms. Alfaro et al. (2019) show that firm size plays a critical role in the relationship between leverage and corporate vulnerability. To control for macroeconomic conditions, we include GDP growth, changes in Bank Indonesia's policy rates, and the rupiah exchange rate against the US dollar. In addition, as natural resources play a significant role in the Indonesian economy, we also include commodity prices as a control variable.[8]

[6] See, for example, Alter & Elekdag (2020).
[7] Following other empirical studies on firm leverage, including Rajan & Zingales (1995), Goyal & Parker (2012), Alter & Elekdag (2020), Narayan et al. (2021), and Demirci et al. (2022).
[8] The important role of commodity prices in capital inflows to Indonesia is shown by, for example, Satria et al. (2021).

3. Data

3.1 Stylized Facts on the Indonesia's Non-Financial Corporate Sector

Corporate data used in this paper are individual data of publicly listed non-financial corporates in Indonesia.[9] The sample consists of 523 firms out of the 713 publicly listed companies in the Indonesian stock market as of December 2020. At the end of 2020, the capitalization of the publicly listed companies reached Rp 6,969 trillion, or around 45 percent of Indonesia's GDP in 2020.[10] On average, in 2017-2019, the ratio of publicly listed non-financial corporates' sales to GDP in Indonesia stood at around 20 percent. The high co-movement between nominal GDP growth and the sample of publicly listed non-financial corporates' sales growth indicates that those companies play an important role in the Indonesian GDP (**Figure 1**). The strong co-movement between nominal GDP growth and publicly listed companies' sales growth in Indonesia is also shown by their high coefficient correlation at 0.79.



Source: Authors' calculation

Figure 1 Indonesia's Nominal GDP Growth and Sales Growth of the Publicly Listed Companies

[9] We cover only publicly listed firms, given the data availability for analysis, beside their important roles in Indonesian economy.
[10] Capital Market Monthly Statistics, December 2020, OJK.

Source: Authors' calculations.

In terms of the economic sector of the firms used in this study, the manufacturing sector has the largest number of firms, followed by the trade sector and the construction sector, each accounting for 32.1 percent, 18.4 percent, and 15.5 percent, respectively (**Table 1**). The manufacturing sector also has the largest share in terms of assets, liabilities, and sales. In 2020, total assets, liabilities, and sales of the manufacturing industry, respectively, accounted for 35 percent, 32 percent, and 46 percent of the total assets, liabilities, and sales of the publicly listed companies in the Indonesia Stock Exchange.

Table 1: Distribution of Firms by Economic Sector

Economic Sectors	Number of Firms	Assets (%)	Liabilities (%)	Sales (%)
Agriculture	22	4.0	3.8	4.6
Mining	40	11.6	11.3	10.7
Manufacturing	168	35.3	32.1	46.0
Electricity, Gas, and Water	10	2.6	2.8	1.8
Construction	81	19.6	20.3	7.1
Trade	96	7.3	7.0	15.7
Transportation	50	14.3	18.6	8.8
Business Services	37	1.5	1.3	2.3
Public Services	19	3.7	2.7	3.0
Others	1	0.0	0.0	0.0
All Sectors	523	100	100	100

Source: Bloomberg, authors' calculations.

3.2 Descriptive Statistics

The data periods used to estimate the models range from Q1:2004 to Q2:2021. We chose the starting point from the first quarter of 2004 based on data availability for our analysis. Summary statistics in **Table 2** give some ideas on the data used in this study. Overall, the average debt-to-asset ratio of the firm sample stood at 0.276, with a standard deviation of 0.221. The size of the firms in terms of assets varies from Rp0 to Rp366,740 billion, with an average of Rp6,738 billion. Asset tangibility, measured as a ratio of fixed assets to total assets ranges from 0 to 4.452. The sample also covers firms with various levels of sales growth, profitability, and liquidity. Sales

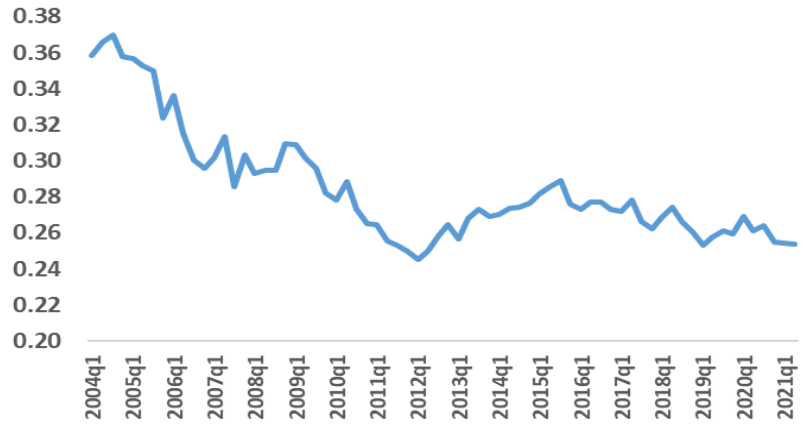
growth of the firms in the sample averaged 3.4 percent annually. Meanwhile, the average profitability, asset tangibility, and liquidity stood at 0.029, 0.403, and 0.013, respectively.

Table 2: Summary Statistics of the Variables

Variable	Number of Observation	Mean	Standard Deviation	Minimum	Maximum
Firm-Level Data					
Leverage	21431	0.276	0.221	0.000	1.987
Size	25279	6738	18482	0	366740
Sales Growth	24284	0.034	1.112	-13.531	13.960
Profitability	25262	0.029	0.187	-4.836	4.698
Tangibility	23567	0.403	0.265	0.000	4.452
Liquidity	21690	0013	0.078	-6.205	0.994
Macro-Level Data					
GDP Growth	70	4.97	2.14	-5.32	7.20
BI Policy Rate	70	5.971	1.688	3.500	11.500
Exchange Rate	70	11,242	2203	8460	14893
US Shadow Rate	70	0.12	2.82	-5.30	5.18
FFR	70	1.31	1.67	0.04	5.34
Commodity Prices	70	182	31	119	262

Source: Authors' calculations.
Note: A detailed description of the variables is provided in Table A.1. in Appendix.

Figure 2 shows the dynamics of the leverage of the sample of the firms used in this study throughout Q1:2004-Q2:2021. From 2005 to mid-2011, the average non-financial corporate leverage in Indonesia was on a declining trend. Then, the leverage trend increased until 2017 before falling again starting in 2019.

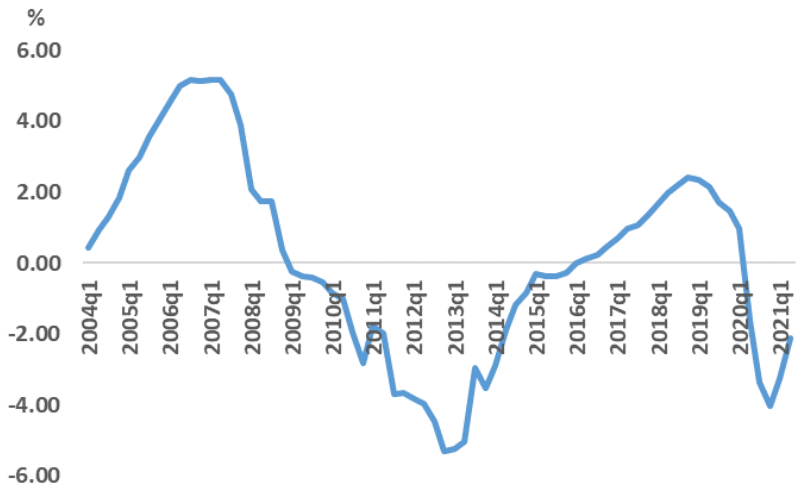


Source: Authors' calculation

Note: Leverage is measured by the ratio of debt to total assets.

Figure 2 Average Leverage of the Firms in the Sample

The dynamics of global financial conditions can be captured by the US *shadow rates*, as shown in **Figure 3**. Following the global financial crisis, the Fed cut the FFR aggressively and implemented a quantitative easing policy. The policy led to a loosening global financial condition, as reflected by the fall in the US *shadow rates* from 2009 to 2015. As the Fed started reversing its monetary policy, global financial conditions also shifted to a tightening trend until early 2019. Then, the quantitative easing policy implemented by central banks in advanced and emerging economies to support the economy amidst the Covid-19 pandemic has also resulted in a loosening of global financial conditions, as indicated by the fall in the US *shadow rates*, reaching negative since the second quarter of 2020. Although the US *shadow rates* have increased significantly in the second quarter of 2021, the level is still below zero.



Source: Federal Reserve Bank of Atlanta

Figure 3 The US Shadow Rates

4. Estimation Results

4.1 Baseline Results

In the baseline models, we use the inverted US *shadow rates* to measure of global financial conditions. Thus, a higher inverted US *shadow rate* reflects a loosening global financial condition, and a lower inverted FFR reflects tighter global financial conditions. Using the inverted US *shadow rate* as a measure of global financial conditions, the estimation results show that loosening global financial conditions positively affects the growth of the non-financial corporate leverage in Indonesia. A one percentage point lower in the US *shadow rates* results in around 0.02 higher in the growth of corporate leverage (**Table 3**). And the effects of the US *shadow rates* on corporate leverage are robust to the different model specifications. The positive effect of the looser global financial conditions on the leverage of the non-financial firms is in line with other studies on the effects of the US monetary policy on firm leverage in other countries (see, e.g., Alter & Elekdag, 2020; Cecchetti et al., 2020). This finding also corroborates the IMF (2015), showing the important role of the global factor in driving non-financial corporate leverage in emerging market economies.

Nonetheless, compared to overall emerging markets, the results here also show that, in general, Indonesia's non-financial corporates are less sensitive to global financial conditions.[11]

Firm-specific variables that significantly affect corporate leverage are lag of the growth leverage, firm size, and asset tangibility. The results show persistence in the firm's leverage, in which the coefficient of leverage lag is 0.6 and statistically significant at a 1 percent significance level. Meanwhile, the effect of asset tangibility on firm leverage is positive and significant. A 1 point higher in the firm's asset tangibility ratio results in higher corporate leverage growth by around 0.3. This finding supports the view in the literature that firms with more intangible assets borrow less (Myers, 1984; Long & Malitz, 1985; Alter & Elekdag, 2020). Firms with larger tangible assets—easier to value—would face lower distress costs.

Firm size also has positive and significant effects on leverage growth. A one percent increase in firm size results in a 0.28 increase in the growth of firm leverage. This finding is consistent with the view that larger firms take on more debt and more diversified firms tend to face lower default risk (Alter & Elekdag, 2020). Meanwhile, profitability does not significantly affect a firm's leverage. Empirical evidence on the effects of profitability on firm leverage is mixed. Narayan et al. (2021), for example, found that the effect of firm profitability on corporate leverage in the US is insignificant. On the other hand, Alter & Elekdag's (2020) found a positive and significant effect, in which more profitable firms tend to take more debts as their financial distress cost is expected to be lower. We also do not find significant effects of the firm's liquidity on leverage.

Table 3: Estimation Results of the Baseline Model Using the US *Shadow Rates*

	Model 01	**Model 02**	**Model 03**	**Model 04**
Leverage	0.589***	0.589***	0.590***	0.589***
	(0.007)	(0.007)	(0.007)	(0.007)
Sales Growth	0.008	0.008	0.008	0.008
	(0.010)	(0.010)	(0.010)	(0.010)
Profitability	0.073	0.072	0.069	0.069
	(0.050)	(0.050)	(0.050)	(0.050)
Tangibility	0.323***	0.321***	0.318***	0.322***
	(0.087)	(0.087)	(0.087)	(0.087)
Liquidity	0.167	0.165	0.165	0.164
	(0.122)	(0.122)	(0.122)	(0.122)

[11] The effect of global financial conditions on leverage found in this paper is only one-fifth of the effects for emerging markets found in Alter & Elekdag (2021).

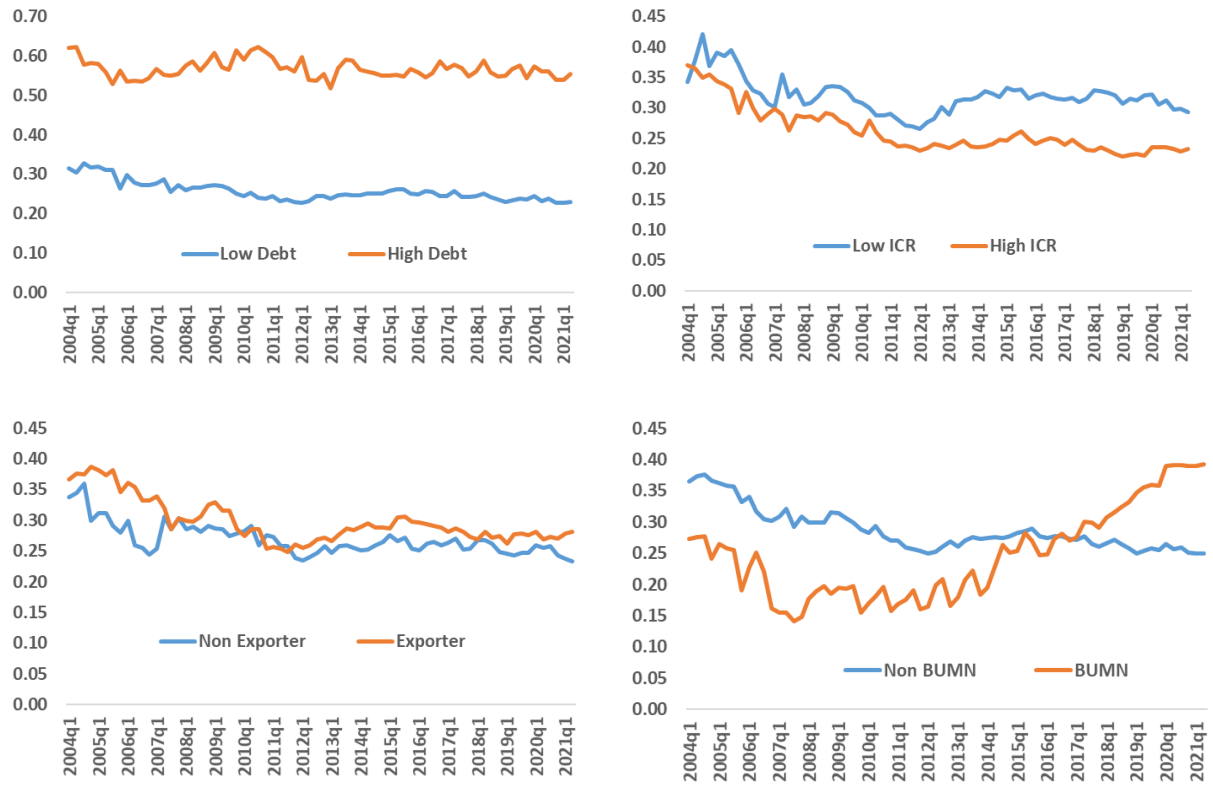
Size	0.281***	0.282***	0.286***	0.285***
	(0.035)	(0.035)	(0.035)	(0.035)
GDP Growth	0.012**	0.012**	0.011**	0.010**
	(0.005)	(0.005)	(0.005)	(0.005)
Inverted US Shadow Rate	0.017**	0.017**	0.018**	0.018**
	(0.007)	(0.007)	(0.007)	(0.007)
BI Policy Rate		-0.014	-0.014	-0.013
		(0.019)	(0.019)	(0.019)
Exchange Rate			-0.243**	-0.304**
			(0.112)	(0.112)
Commodity Prices				-0.087*
				(0.052)
Constant	-2.386***	-2.398***	-2.417***	-2.401***
	(0.283)	(0.283)	(0.283)	(0.283)
N	16644	16644	16644	16644
χ^2	7645.906	7645.337	7647.791	7654.043

Note: * p<0.10, ** p<0.05, ***<0.01.
The dependent variable is annual growth rate of debt to asset ratio, and the measure for global financial conditions is the inverted US *shadow rate*. The model is estimated using a dynamic panel data model.

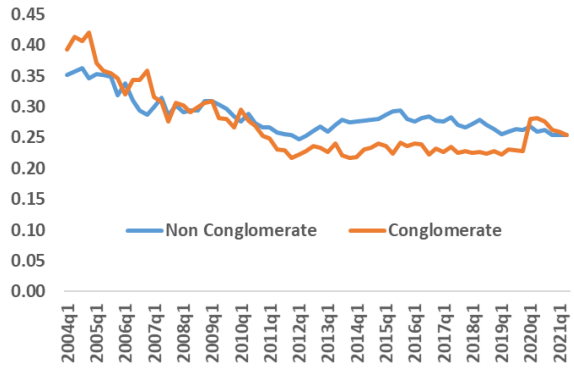
On the macroeconomic side, the rupiah exchange rate against the US dollar significantly affects firm leverage growth. A 1 percent rupiah depreciation leads to lower leverage growth by around 0.3. As argued by Kalemli-Ozcan (2021), domestic currency depreciation is associated with lower firm leverage. Non-financial firms that hold foreign currency debt and local currency assets would have lower net worth when local currency depreciates. This leads to a lower firm's ability to borrow and then lower leverage. Another macroeconomic variable that affects firm's leverage growth is domestic GDP growth, in which higher GDP growth leads to higher firm leverage growth. Meanwhile, the coefficients of the domestic policy rate are negative but are not statistically significant. The insignificant effect of the domestic policy rate on the firm leverage is consistent with Cecchetti et al. (2020), showing that the effect of the easing US monetary policy on firm leverage is larger than those of domestic monetary policy. We also include commodity prices in the model, as the Indonesian economy heavily relies on natural resources. The estimation results show that the effect of commodity prices on firm leverage is negative but only significant at a 10 percent significance level.

4.2 Do Firm Characteristics Affects the Sensitivity to Global Financial Conditions?

We examine whether firms in specific categories are more sensitive to global financial conditions. There are five classification that we examine: (1) High debt or not; (2) High ICR or not; (3) Exporter or not; (4) State-owned or not; (5) Conglomerate or not; (6) Small or not.[12] The dynamics of the leverage of each classification are presented in **Figure 4**. The charts show that the dynamics of the firm's leverage can be different across different categories of firms. While many possible factors may drive the differences, we examine whether global financial conditions are one factor. For that purpose, we add variables that capture the interaction between global financial conditions and firm categories. We created dummy variables for each of the following categories and generated interaction variables between each of the dummy and global financial conditions variable.



[12] A firm is classified as High Debt if its debt-to-equity ratio is above 2. A firm is classified as having a High ICR when its ICR is above 1.5. A firm is classified as an exporter if it has sold its products overseas within the last five years. A firm is identified as a conglomerate if it is highly connected with 16 large conglomerate groups as identified using a payment system database.



Source: Authors' calculation

Figure 4 Debt to Asset Ratio by Firms Classifications

As presented in **Table 4**, firms classified as high debt and BUMN are more sensitive to global financial conditions. This is shown by significant and positive coefficients of the interaction between the inverted US *shadow rates* with a dummy variable for high debt and a dummy variable for BUMN. On the other hand, firms classified as high ICR are less sensitive to global financial conditions, as reflected by the significant and negative coefficient of the interaction between the inverted US *shadow rates* and a dummy variable for high ICR. Meanwhile, neither the exporter status nor conglomerate categories significantly affect their sensitivity to global financial conditions.

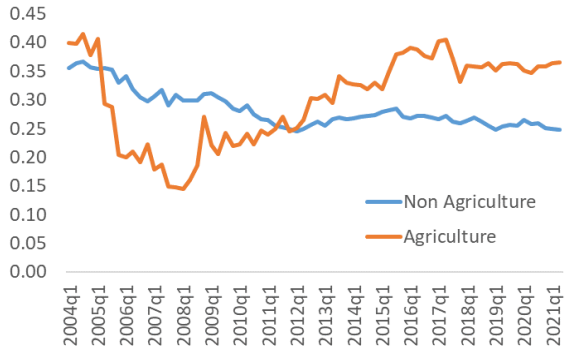
Table 4: Estimation Results with the Interaction between the US *Shadow Rates* with Firm's Characteristics

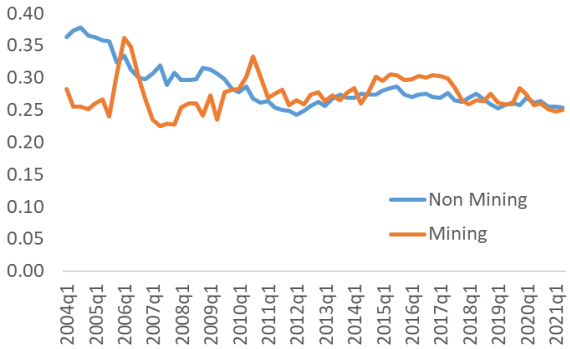
	Model 05	Model 06	Model 07	Model 08	Model 09
Leverage	0.589***	0.593***	0.589***	0.589***	0.589***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Sales Growth	0.008	0.008	0.008	0.008	0.008
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Profitability	0.068	0.064	0.069	0.068	0.068
	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
Tangibility	0.324***	0.309***	0.322***	0.319***	0.321***
	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)
Liquidity	0.166	0.216*	0.164	0.166	0.165
	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)
Size	0.280***	0.232***	0.285***	0.287***	0.286***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
GDP Growth	0.011**	0.009*	0.010**	0.010*	0.010**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)

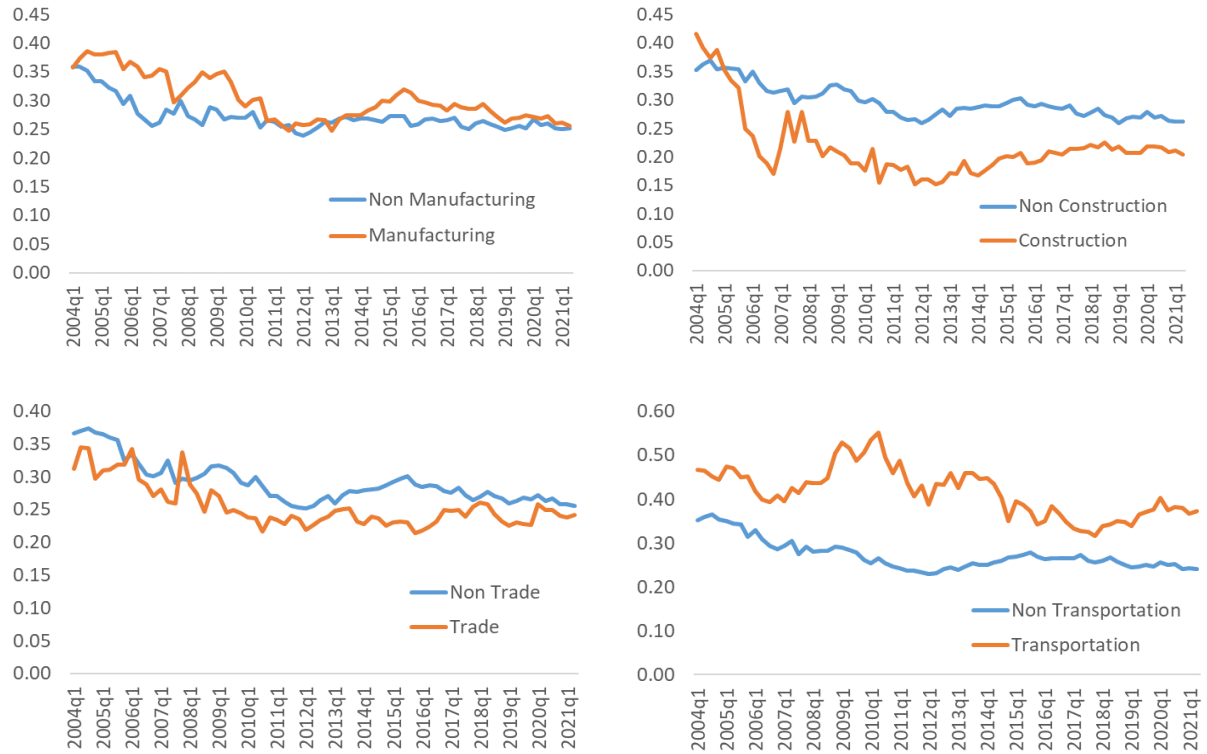
BI Policy Rate	-0.013 (0.019)	-0.011 (0.019)	-0.013 (0.019)	-0.013 (0.019)	-0.013 (0.019)
Exchange Rate	-0.306** (0.120)	-0.287** (0.119)	-0.306** (0.120)	-0.304** (0.120)	-0.305** (0.120)
Commodity Prices	-0.088* (0.052)	-0.077 (0.052)	-0.087* (0.052)	-0.086* (0.052)	-0.086* (0.052)
Inverted US Shadow Rate	0.014** (0.007)	0.032** (0.007)	0.022** (0.007)	0.014** (0.007)	0.016** (0.007)
ISR x High Debt	0.071** (0.017)				
ISR x High ICR		-0.22** (0.012)			
ISR x High Export			-0.008 (0.012)		
ISR x BUMN				0.050** (0.025)	
Commodity Prices					0.024 (0.020)
Constant	-2.387*** (0.283)	-1.980*** (0.285)	-2.400*** (0.283)	-2.418*** (0.284)	-2.411*** (0.284)
N	16644	16644	16644	16644	16644
χ^2	7672.127	7716.400	7655.635	7659.635	7655.006

Note: * p<0.10, ** p<0.05, ***<0.01.

The dependent variable is the annual growth rate of debt to asset ratio, and the measure for global financial conditions is the inverted US *shadow rate*. This model includes the interaction between global financial conditions and several firms' characteristics. The model is estimated using a dynamic panel data model.







Source: Authors' calculation

Figure 5 Debt to Asset Ratio by Firms Classifications

We also examine whether the sensitivity of firms in key economic sectors to global financial conditions differs from those of firms in other sectors. As shown in **Figure 5**, there is an indication that different economic sectors have different leverage dynamics. Following the global financial crisis in 2008, the leverage of the agricultural sector has been on an increasing trend and, since 2012, surpassing the leverage ratio of other sectors. Meanwhile, the leverage of the construction sector and the trade sector is, in general, has been lower than the leverage of other sectors. On the other hand, the leverage of the transportation sector has consistently been above those of other sectors. Meanwhile, the mining and manufacturing sector's leverage tends to be close to the other sectors' leverage, at least since 2010.

Table 5: Estimation Results with the Interaction between the US *Shadow Rates* with the Firm's Sector

	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Leverage	0.589***	0.589****	0.589***	0.589***	0.589***	0.589***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Sales Growth	0.007	0.008	0.008	0.008	0.008	0.008

	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Profitability	0.068	0.069	0.069	0.069	0.069	0.069
	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
Tangibility	0.319***	0.322***	0.321***	0.322***	0.320***	0.322***
	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)
Liquidity	0.165	0.165	0.164	0.164	0.163	0.164
	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)
Size	0.284***	0.284***	0.286***	0.285***	0.285***	0.285***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
GDP Growth	0.010**	0.010**	0.010**	0.010**	0.010**	0.010**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
BI Policy Rate	-0.013	-0.013	-0.013	-0.013	-0.013	-0.013
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Exchange Rate	-0.303**	-0.304**	-0.304**	-0.303**	-0.304**	-0.304**
	(0.120)	(0.120)	(0.120)	(0.120)	(0.120)	(0.120)
Commodity Prices	-0.086*	-0.087*	-0.087*	-0.086*	-0.087*	-0.087*
	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)
Inverted US Shadow Rate	0.016**	0.017**	0.023***	0.016**	0.017**	0.018**
	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)
ISR x Agriculture	0.032					
	(0.028)					
ISR x Mining		0.009				
		(0.020)				
ISR x Industry			-0.013			
			(0.011)			
ISR x Construction				0.013		
				(0.016)		
ISR x Trade					0.004	
					(0.016)	
ISR x Transportation						-0.000
						(0.021)
Constant	-2.396***	-2.399***	-2.411***	-2.399***	-2.399***	-2.401***
	(0.283)	(0.284)	(0.284)	(0.283)	(0.284)	(0.284)
N	16644	16644	16644	16644	16644	16644
χ^2	7657.149	7654.087	7655.245	7653.805	7653.014	7653.772

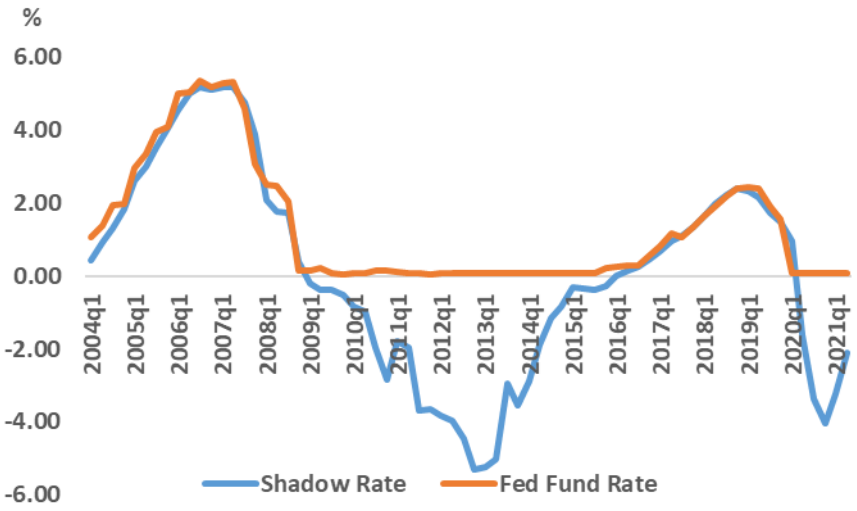
Note: * p<0.10, ** p<0.05, ***<0.01.

The dependent variable is annual growth rate of debt to asset ratio, and the measure for global financial conditions is the inverted US *shadow rate*. This model includes the interaction between global financial conditions and the economic sector where a firm belongs to. The model is estimated using a dynamic panel data model.

To test whether firms across different economic sectors have different sensitivity to global financial conditions, we create a dummy variable for each economic sector. Then, we include a variable that captures the interaction between global financial conditions and the dummy for each economic sector. The estimation results show that none is significant, at least at a 10 percent significance level (**Table 5**). Thus, it appears that the effects of global financial conditions on the leverage of those three key sectors are not statistically different from those in other sectors.

4.3 Robustness to a Different Measure of Global Financial Conditions

As an alternative for the US *shadow rates* to measure the global financial conditions, we use the FFR, reflecting policy rates with zero lower bound. As shown in **Figure 6**, except during the FFR around zero lower bound, the FFR moves closely with the US *shadow rate*s. However, during the quantitative easing period, where the US *shadow rates* are below zero, the FFR stays around the zero lower bound. Negative US *shadow rates* occurred following the global financial crisis from 2009 to 2015 and the Covid-19 pandemic since the second quarter of 2020. In response to the global financial crisis, monetary authorities in advanced economies implemented a quantitative easing policy. Furthermore, to help economic recovery during the Covid-19 pandemic, advanced economies and developing economies implemented quantitative easing.



Source: BIS, and Federal Reserve Bank of Atlanta

Figure 6 FFR and the US Shadow Rates

Using similar model specifications in which the US *shadow rates* measure global financial conditions, we estimate the effect of global financial conditions using the FFR. The estimation results show that the effect of lower FFR on the growth of firm leverage is positive (**Table 6**). Meanwhile, the estimation results for other variables are also generally consistent with the results of the models using the US *shadow rates*. Firm size, asset tangibility, and lag of firm leverage remain positive and significant, at least at a 10 percent significance level. Similarly, the effect of

exchange rate depreciation remains negative and significant, while the effect of the domestic policy rate is insignificant.

Table 6: Estimation Results of the Baseline Model Using FFR

	Model 21	Model 22	Model 23	Model 24
Leverage	0.590***	0.590***	0.590***	0.590***
	(0.007)	(0.007)	(0.007)	(0.007)
Sales Growth	0.008	0.008	0.008	0.008
	(0.010)	(0.010)	(0.010)	(0.010)
Profitability	0.074	0.073	0.071	0.071
	(0.050)	(0.050)	(0.050)	(0.050)
Tangibility	0.319***	0.318***	0.314***	0.318***
	(0.087)	(0.087)	(0.087)	(0.087)
Liquidity	0.170	0.169	0.170	0.169
	(0.122)	(0.122)	(0.122)	(0.122)
Size	0.271***	0.272***	0.275***	0.274***
	(0.035)	(0.035)	(0.035)	(0.035)
GDP Growth	0.006	0.007	0.005	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
Inverted FFR	0.032**	0.032**	0.030**	0.028**
	(0.013)	(0.013)	(0.013)	(0.013)
BI Policy Rate		-0.011	-0.012	-0.011
		(0.019)	(0.019)	(0.019)
Exchange Rate			-0.203*	-0.266**
			(0.111)	(0.120)
Commodity Prices				-0.084
				(0.052)
Constant	-2.253***	-2.260***	-2.269***	-2.255***
	(0.276)	(0.276)	(0.276)	(0.276)
N	16644	16644	16644	16644
χ^2	7644.586	7644.091	7644.295	7649.830

Note: * p<0.10, ** p<0.05, ***<0.01.
The dependent variable is the annual growth rate of the debt to asset ratio, and the measure for global financial conditions is the Fed Fund Rate (FFR). The model is estimated using a dynamic panel data model.

5. Conclusions

Global financial conditions may affect not only non-financial corporates in advanced economies but also in emerging market economies. Many studies have shown that since the global financial crisis non-financial corporate debts in emerging market economies has increased. One main factor behind the increase is more favorable global financial conditions on the back of a loose monetary

policy in advanced economies. This paper examines the effects of global financial conditions on leverage of the non-financial corporates in Indonesia. We use individual data of publicly listed non-financial firms with quarterly frequency covering the period from the first quarter of 2004 to the second quarter of 2021. Using firm-level data, we estimate dynamic panel data models in which the dependent variable is the growth rate of firm leverage. Independent variables consist of a measure of global financial conditions, control variables for firms' characteristics, and macroeconomic variables.

Overall, the estimation results show that a loosening global financial condition positively affects the leverage growth of publicly listed non-financial corporates in Indonesia. Nonetheless, compared to emerging markets in general, non-financial corporates in Indonesia are less sensitive to global financial conditions. The estimation results also show that firms classified as high debt and state-owned enterprises are more sensitive to global financial conditions. On the other hand, firms classified as having a high-interest coverage ratio are less sensitive to global financial conditions. Meanwhile, the effects of global financial conditions on non-financial corporate leverage are not significantly different across economic sectors. Other variables that significantly affect the leverage of the non-financial corporates in Indonesia include firm characteristics such as firm size and asset tangibility and macroeconomic factors such as GDP growth and exchange rate.

The results in this paper show the important role of global financial conditions, particularly reflected in the US monetary policy, on the non-financial corporates' leverage in Indonesia. It means that when the US tightens its monetary policy, which leads to tighter global financial conditions, we expect that the leverage growth of the non-financial corporates in Indonesia will be lower. This condition may weaken investments and carry the risk to financial stability. The tightening in global financial conditions may affect corporate leverage not only directly but also through the impacts on the rupiah exchange rates, as rupiah depreciation significantly lowers the growth of the non-financial firm's leverage. These findings imply that monetary policy and macroprudential measures could reduce risks associated with fluctuations in the global financial conditions to the domestic economic and financial stability.

References

Alfaro, Laura, Gonzalo Asis, Anusha Chari, and Ugo Panizza, 2019. "Corporate debt, firm size and financial fragility in emerging markets," *Journal of International Economics*, Elsevier, vol. 118(C), pages 1-19.

Alter, Adrian and Selim Elekdag, 2020. "Emerging market corporate leverage and global financial conditions," *Journal of Corporate Finance*, No. 62.

Azis, I. J., & Shin, H. S., 2015. *Managing Elevated Risk: Global Liquidity, Capital Flows, and Macroprudential Policy-An Asian Perspective* (1st ed.). Singapore: Springer Singapore. https://doi.org/10.1007/978-981-287-284-5.

Cecchetti, Stephen G., Tommaso Mancini-Griffoli, Machiko Narita and Ratna Sahay, 2020. "US or Domestic Monetary Policy: Which Matters More for Financial Stability?" *IMF Economic Review*, vol. 68(1), pages 35-65, March.

Demirci, Irem, Jennifer Huang, and Clemens Sialm, 2019. "Government debt and corporate leverage: International evidence," *Journal of Financial Economics*, vol. 113, pages 337-356.

Goyal, Vidhan and Frank Packer, 2017. "Corporate leverage in emerging Asia," BIS Papers chapters, in: Bank for International Settlements (ed.), *Financial systems and the real economy*, volume 91, pages 65-94.

Harahap, B. A., Bary, P., & Kusuma, A. C. M., 2020. "The Determinants of Indonesia's Business Cycle." *Journal of Central Banking Theory and Practice*, 9 (August 2019), 215–235. https://doi.org/10.2478/jcbtp-2020-0029

Harahap, B. A., Bary, P., Panjaitan, L. N., & Satyanugroho, R., 2019. "Spillovers of United States and People's Republic of China Shocks on Small Open Economies," *ADBI Working Paper Series No 616*. https://doi.org/10.1093/oso/9780198838104.003.0010

He, D and R. N. McCauley, 2013: "Transmitting Global Liquidity to East Asia: Policy Rates, Bond Yields, Currencies and Dollar Credit," *BIS Working Papers* 431.

Herwadkar, Snehal S., 2017. "Corporate leverage in EMEs: Did the global financial crisis change determinants?" *BIS Working Papers* No. 681.

IMF, 2015. Corporate leverage in emerging markets—A concern? Vulnerabilities, Legacies, and Policy Challenges Risks Rotating to Emerging Markets, *Global Financial Stability Report*, October. Washington D.C.

Kalemli-Ozcan, Sebnem, Xiaoxi Liu, and Ilhyock Shim, 2021. "Exchange Rate Fluctuations and Firm Leverage," *NBER Working Paper* No.28608.

Krippner, Leo, 2019. A Note of Caution and Shadow Rate Estimates. Journal of Money, Credit and Banking, Pages 951-962

Long, Michael S., and Ileen. B. Malitz, 1985. "Investment Patterns and Financial Leverage," in Friedman, Benjamin's (ed), *Corporate Capital Structure in the United States*. University of Chicago Press.

Myers, Stewart C., 1984. "The capital structure puzzle," *Journal of Finance* 39: 575-592.

Narayan, Seema, Minh Ngoc Thi Bui, Yishuai Ren, and Chaoqun Ma, 2021. "Macroeconomic Determinants of US Corporate Leverage," *Economic Modelling*, No. 104.

Prabheesh, K.P., Reza Anglingkusumo, and Solikin M. Juhro, 2020. "The dynamics of global financial cycle and domestic economic cycles: evidence from India and Indonesia," *Economic Modelling* No. 94, pp. 831-842.

Rajan, R, and L Zingales, 1995. "What Do We Know about Capital Structure? Some Evidence from International Data", *Journal of Finance*, 50(5):1421-1460.

Sahay, Ratna, Vivek Arora, Thanos Arvanitis, Hamid Faruqee, Papa N'Diaye, Tommaso Mancini-Griffoli, and an IMF Team, 2014. "Emerging Market Volatility: Lessons from the Taper Tantrum," *IMF Staff Discussion Note*, SDN/14/09.

Satria, Doni, Nachrowi D. Nachrowi, Telisa A. Falianty, and Iskandar Simorangkir, 2021. "Dynamic Relationship between Capital Inflows and Bank Lending: the Role of Commodity Price and Global Financial Market Shocks," *Bulletin of Monetary Economics and Banking*, Vo. 24 No.4, 2021, pp.589-630.

Wu, Jing Cynthia and Fan Dora Xia, 2016. "Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound," *Journal of Money, Credit and Banking*, vol. 48(2-3), pages 253-291.

Xu, Ying and Hai Anh La, 2017. "Spillovers of the United States' Unconventional Monetary Policy to Emerging Asia: the Bank Lending Channel," *Emerging Markets Finance and Trade*, Vol.53 (12).

Appendix

Table A.1: Definition of the Variables and Data Sources

Variable	Definition	Sources
Dependent Variables		
Leverage	Annual growth of Total Debt to Total Assets ratio	Bloomberg
Global Financial Conditions		
US *Shadow Rate*	Quarterly average of monthly US *Shadow Rate* based on Wu and Xia (2016)	Federal Reserve Bank of Atlanta
Fed Fund Rate	Quarterly Fed Fund Rate (end of period)	BIS, Federal Reserve Bank of Atlanta
Firm-Specific Variables		
Profitability	Quarterly Net Income to Total Assets ratio	Bloomberg
Tangibility	Quarterly Property, plant and Equipment to Total Assets ratio	Bloomberg
Liquidity	Quarterly Cash Flow of Operation to Total Assets ratio	Bloomberg
Size	Log of Total Assets	Bloomberg
Sales Growth	Annual growth of sales	Bloomberg
Macroeconomic Variables		
GDP Growth	Annual growth of Indonesia's real GDP	BPS
Exchange Rate	Annual growth of Indonesia exchange rate (rupiah)	Bank Indonesia
BI Policy Rate	Since Apr 2016: BI7DRR Before Apr 2016: adjusted benchmark rates before using BI7DRR.	Bank Indonesia
Commodity Prices	Annual growth of commodity prices	Bank Indonesia
Firm Classification		
High Debt	Firms with Debt to Equity ratio above 2	Bloomberg
High Repayment Capacity	Firms with ratio of earning before interest and taxes (EBIT) to interest expense above 1.5	Bloomberg
Exporter	Firms with export activities in the past 5 years	Bank Indonesia
BUMN	State-Owned Enterprises	Bursa Efek Indonesia
Conglomerate	42 identified firms that are highly connected with 16 large conglomerate groups based on the payment system data	Bank Indonesia
Economic Sector	Economic sector based on Statistics Indonesia (BPS) classification	Statistics Indonesia