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The effect of productivity on liquidity under financial frictions

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Abstract

Productivity is something that can affect distribution of the characteristics of the assets. In this study, we investigate whether manufacturing firms in Indonesia that have high productivity have a high level of liquidity. This study uses data from manufacturing firms listed on the Indonesia Stock Exchange in the period of 2008 to 2017. We estimate productivity level of the firm using Generalized Method of Moments (GMM) and effects of productivity to the liquidity of the firm using linear panel model. Results show that manufacturing firms in Indonesia with high productivity levels tend to have a higher level of liquidity than firms with lower levels of productivity. Even if Indonesia already adopt market based financial system, other types of financial frictions cause that firms allocate more of their resource to liquid assets than to fixed assets. Even though the effects of misallocation became weaker, misallocations of resources in manufacturing firms Indonesia are still found from a robustness test.

Abstrak

Produktivitas dapat memengaruhi distribusi karakteristik aset. Dalam penelitian ini, diteliti apakah perusahaan-perusahaan manufaktur di Indonesia yang memiliki produktivitas yang tinggi memiliki tingkat likuid aset yang tinggi atau tidak. Penelitian ini menggunakan data dari perusahaan-perusahaan manufaktur yang terdaftar di Bursa Efek Indonesia dari 2008 sampai 2017. Tingkat produktivitas perusahaan diestimasi dengan Generalized Method of Moments (GMM) dan pengaruh produktivitas terhadap tingkat likuiditas perusahaan diestimasi dengan model panel linear. Hasilnya menunjukkan bahwa perusahaan-perusahaan manufaktur di Indonesia dengan tingkat produktivitas tinggi cenderung memiliki tingkat likuiditas yang lebih tinggi daripada perusahaan dengan tingkat produktivitas yang lebih rendah. Hal ini mengartikan bahwa meski Indonesia sudah mengadopsi sistem keuangan berbasis pasar, jenis-jenis financial frictions lainnya menyebabkan perusahaan mengalokasikan lebih banyak sumber daya mereka untuk aset likuid daripada aset tetap. Dalam uji robustness kesalahan alokasi sumber daya di perusahaan-perusahaan manufaktur Indonesia masih ditemukan meski mengecil.

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1. Introduction

Effective allocation of resources of the firm has become one of the foci for practitioners and academicians. The allocation of the limited resources of the firm has direct effects on not only, growth of the firm, but also on the total productivity level of the firm. Based on economic intuition, firms that have a high level of productivity will invest more in fixed assets than firms with low productivity.

Moll (2014) and Buera, Kaboski, & Shin (2011) showed that financial frictions account for distortion of allocation resources. In developing countries, firms that have high productivity will have a higher level of liquidity than firms with low productivity (Restuccia & Rogerson, 2008, 2012; Hopenyahn, 2011; Feng, Lu, & Wang, 2017). So the situation that occurs in developing countries is contrary to economic intuition. This is due to financial frictions faced by firms in developing countries. For example, Hsieh & Klenow (2009) found that difference total factor productivity (TFP) in manufacturing sector between developed country (US) and developing countries (China and India) can be explained by different resource allocation. Feng, Lu, & Wang, (2017) using the Chinese data found that more productive firms tend to hold more liquid assets than less productive firms, even if liquid assets definitely gave a lower level of return.

Feng, Lu, & Wang (2017) mentioned that the obstacles in developing countries are caused by the existence of idiosyncratic distortions and the existence of information asymmetry between creditors and debtors. They related their findings with the substantial external financing costs because the Chinese financial market is much less developed than that of the US. One example of idiosyncratic distortion is financial repression that the government can offer special tax and contract benefits to certain firms.

Other financial frictions are related to information asymmetry that can cause external financing costs to be expensive; such distortion also causes

a high burden of financing received by firms by external parties. With the high financing burden, many firms in developing countries also save their money compared to consumption (precautionary savings); Riddick & Whited (2009) state this. Precautionary savings carried out by firms have a reason because of uncertain income and high financing costs.

Even if previous researches (Hsieh & Klenow, 2009; Buera, Kaboski, & Shin, 2011, Feng, Lu, & Wang, 2017) mentioned financial frictions as one of the sources of misallocations of investments, financial frictions that they mentioned much more related with financial repressions like direct government intervention in credit lines and subsidies.

However, as one of the main emerging market, Indonesia, after the financial crisis of 1997, Indonesia already adopted the market based financial system. It means a substantial decrease of possibilities to happen various types of financial repression in Indonesia. Then the data we use can show the more direct impact of productivity to the asset allocation of the individual firms under financial frictions that have relatively low financial repression.

This study aims to examine, how the level of difference in corporate productivity affect firms in allocating their resources by investing in fixed assets or liquid assets due to the high costs of financing (costly financing). We will reinvestigate the relationship between firm productivity and liquidity management of manufacturing firms in developing markets (developing countries), especially Indonesia.

2. Hypotheses Development

Resource allocation and financial repression in emerging markets

Total factor productivity (TFP) aggregate is considered low because it is the performance of firms in developing countries that are less efficient than developed countries. The difference in productivity among developed countries and developing

countries are well reflected in GDP per capita. Total factor productivity is related to efficiency as well as the asset allocation of the firm. Moll (2014) mentioned errors in this allocation can also be referred to as “misallocation” of the resource owned. Misallocation of these resources can be seen in the low value of total factor productivity.

Firms that have high productivity will add their fixed assets to be able to produce more units. So that if the firm becomes more productive, investment in their fixed assets will also increase. Firms that have high productivity will need large funds because the firm needs fixed assets. Therefore, firms need funding from external parties to help them buy fixed assets.

Midrigan & Xu (2010) stated that financial frictions could hurt the productivity of the firm in developing countries. They mention two possible channels that financial frictions that can reduce the productivity of the firm because of asset misallocations. First, financial frictions may distort the decisions of new technology adoption and market entry. Second, financial frictions that directly related to financial repression like control of credit lines may generate different returns among individual firms (Midrigan & Xu, 2010).

These financial frictions make the firms to anticipate the future shocks or external uncertainty of the firm increasing precautionary liquid portion of the assets. Firms that have high productivity may be more likely to allocate their resources to liquid assets than allocating them to fixed assets in developing countries. This is due to uncompetitive competition to external funding, and if low productivity firms have chapter access to external financing, to sustain external shocking, more productive firms may intentionally hold more liquid assets than needed. Then, because of financial frictions, firms that are highly productive and efficient cannot increase the scale of their firm’s production due to problems with limited accesses to external financing opportunities.

Financial market frictions more related to financial repression that limit the efficient allocation of the resources may be more frequently happen in the economy that the government has strong intervention instruments in the economy like current China. Restuccia & Rogerson (2008), distortion in policies in developing countries has a direct impact on the heterogeneity in the costs faced by each firm. This distortion is also called idiosyncratic distortions. Idiosyncratic distortions, in this case, are distortions of government policies in developing countries. An example of this distortion is that the government can offer special taxes and contracts that are profitable for certain firms. Another example of idiosyncratic distortions is that open firms that have low productivity will receive substantial subsidies from the government for their ongoing operation.

Misallocation in developing countries can be proven by Hsieh & Klenow (2009) who conducted research on China and India and compared with the United States. Feng, Lu, & Wang (2017) also showed that using China data that holding more liquid assets in firms that have high productivity compared to firms that have low productivity because firms that have high productivity should invest in fixed assets rather than investing in liquid assets. They found that if there were strong financial frictions of the financial repressions, it caused high funding costs in developing countries (for example, China). Then it caused firms with high productivity to allocate more resource to liquid assets than firms with low productivity.

Asset allocation and other financial frictions in emerging markets

Precautionary motive to increase cash holdings happen not only in developing countries but also in developed countries. Almeida, Campello, & Weisbach (2004) found that firms that have financial problems they will invest in cash from their cash flow. Riddick & Whited (2009) also found a posi-

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tive correlation between firm risk and the level of cash held. Bates, Kahle & Stulz (2009) also showed that precautionary motives increased the cash holdings level. This precautionary motive, however, may not cause severe misallocation in developed countries to compare to developing the market.

Firms in developing an economy with market-based financial systems may have limited misallocation of resources because of financial repression. Even if there are negative effects of financial liberalization, financial liberalization may also reduce the financial repression of the government. Even if the market based financial system, the financial market in developing countries is still less efficient and effective than that of developed countries. Then the financial frictions that we need to more concerns are new entry and technology adoptions (Midrigan & Xu, 2010) that cause misallocation of the assets in emerging countries.

Imperfect credit market conditions also cause misallocation in developing countries. That condition is caused by it is rare for developing countries to have a well-managed financial system. According to this, imperfect credit, the market is caused by a state of information asymmetry. Winker (1999) mentioned the imperfect credit market could cause selection effect and incentive effects. The limited accessibility of small firm to credit markets can also distort asset allocations. Winker (1999) mentioned information asymmetry between the borrowing party and the lender is a significant factor causing financial frictions on the market. The lack of information from both parties can cause external funding costs to be expensive.

Firms that have financial frictions, it will be difficult for them to take advantage of profitable investment opportunities. This can happen because the firm has limited access to the capital market. Fazzari, Hubbard, & Petersen (1998) mentioned that firms that experience financial constraints tend to be more sensitive to internal funding (liquidity) in making investments.

Even if Indonesia already adopt a market-based financial system after the financial crisis 1997-8, the size of Indonesia's financial sector is still substantially smaller than that of comparable countries (Rosengard & Prasetyantoko, 2011). The coupon rate of Rupiah dominated Indonesia government bond is still relatively high. Relatively short-term maturities are dominant in government and the corporate bond market (Nasution, 2015). Nugroho & Suk (2019) showed that using emerging market data, including Indonesia, showed substantial dominance of short-term debts than the long term. Nasution (2015) mentioned that the yield curve also relatively steep because of the relatively high inflation rate as well as weak Indonesia banking system. One of the reflection weakness of the banking system is shown by the high net interest income ratio in Indonesia (Nasution, 2015).

Developing countries like Indonesia actually may not have financial frictions that directly related to financial repression. However, she still has a less efficient and effective financial system compared to the developed market. These differences of financial frictions may still cause misallocations of the assets of the firms. They hold a relatively high portion of the liquid assets for precautionary purpose than makes them reduce the portion of profitable long-term investments. Then, we state the hypothesis as follows:

H_1 : more productive firms in Indonesia hold more liquid assets than less productive firms.

3. Method, Data, and Analysis

In this study, the data used are all Indonesian manufacturing firms that have been listed on the Indonesia Stock Exchange and published their financial statements from 2008 to 2017. Manufacturing firms in Indonesia consist of three industrial sectors, namely basic industrial and chemical sectors, various industrial sectors, and consumer goods industry sectors. In Indonesia, the total manufac-

turing firms are 147 firms that have been listed on the Indonesia Stock Exchange. This data can be retrieved via the data stream. After firm with incomplete financial information, we use 140 firms for 10 years, 1400 firm-year observations. The following is a breakdown of the amount of firm data used as the sample of this study as written in Table 1.

The regression model that will be used in this study to see the relationship between firm productivity and firm liquidity are as follows:

$$y_{it} = \alpha + \beta_1 Productivity_{it} + \beta_2 LogTA_{it} + \beta_3 Sales_{it} + \beta_4 Invest_{it} + \beta_5 MNC_i + \beta_6 Cashflow_{it} + \beta_7 R\&D_{it} + \varepsilon_{it} \quad (1)$$

Where:

<i>i</i>	: Firm
<i>t</i>	: Year
<i>y_{it}</i>	: Firm's liquidity in year t (net liquid assets or cash holdings)
<i>Productivity_{it}</i>	: Firm's total factor productivity (TFP) or value-added per capital
<i>LogTA_{it}</i>	: Log of total asset
<i>Sales_{it}</i>	: Sales growth
<i>Invest_{it}</i>	: Capital investment
<i>MNC_i</i>	: Dummy variable (firms with international sales above 20% are denoted by 1, others 0)
<i>R&D_{it}</i>	: Operating cash flow of the firm
<i>Cashflow_{it}</i>	: Dummy variable (firms that have research & development are represented by 1, others 0)
<i>R&D_{it}</i>	: Error term
<i>ε_{it}</i>	

Liquidity measurements

In this study, there will be four regression models that can see the relationship between firm productivity and firm liquidity. Liquidity of the firm is defined by two approaches, namely net liquid assets to total assets and cash holdings to total assets of the firm (Opler et al., 1999; Feng, Lu, & Wang, 2017). The firm's net liquid assets are obtained from the sum of cash holdings, inventory, and account receivables, which are reduced by the short-term debts and then is divided by total assets. Whereas the cash holdings are obtained from cash added to account receivables deducted by the account payables and then is divided by total assets.

Productivity measurements

In this study, we used two approaches to measure the level of productivity of firms in Indonesia. First, the level of productivity can be measured using value-added per capital (Feng, Lu, & Wang, 2017). But measurement using value-added per capital has several problems. First, labor and material costs used for production. Firms that have a lot of labor will produce more products even though the firm's capital is the same. Second, capital and labor will be influenced by technology so that measurement problems can occur.

Therefore, there are ways to overcome the limitations of productivity using value-added per capital. One of them is TFP (Total Factor Productivity). TFP can be defined as the measurement ratio of the quantity of total expenditure to the measurement of the total quantity of income. This measurement is obtained through residuals from non-linear

Table 1. Sample selection

Information	Number of Firms
The Total of Manufacturing Firm	147
Firms with incomplete financial statement data	7
The total firm used as the research sample	140

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regression results between gross output with capital, labor, and intermediate inputs. Intermediate inputs are the value of goods produced in each period obtained from the cost of the material used at the time of production. The non-linear model that will be used adopts research that has been done by Levinsohn & Petrin (2003) and Feng, Lu, & Wang (2017). The TFP regression model is:

$$Y_{it} - (\hat{\beta}_l l_{it} + \hat{\beta}_{ll} l_{it}^2) = \gamma_0 + \gamma_1(\omega_{it-1}) + \gamma_2 k_{it} + \gamma_3 m_{it} + \gamma_4 k_{it}^2 + \gamma_5 m_{it}^2 + \eta_{it} \quad (2)$$

Where:

- i : Firm
- t : Year
- Y_{it} : Gross output of firm i in year t
- ω_{it-1} : The lag of $Y_{it} - (\hat{\beta}_l l_{it} + \hat{\beta}_{ll} l_{it}^2)$
- l_{it} : The amount of labor employed
- k_{it} : The book value of fixed capital after depreciation
- m_{it} : The value of intermediate inputs
- η_{it} : Error term

In the first step, to estimate total factor productivity (TFP) is removing the labor factor in equation (2). According to Levinsohn & Petrin (2013), in estimating firm productivity, there are two variables, namely independent variables (labor, intermediate inputs) and dependent variables (capital). They want to issue input variables that affect the output of each firm. From the results found by Levinsohn & Petrin (2013), the coefficients of input variables that can be used are those that are not related to the movements of intermediate inputs and capital.

In estimating TFP, the regression model used to have a problem of endogeneity. The residual results used for TFP are endogenous, this due to the results of that residue have several factors, which are productivity and another instrument that cannot be detected, such as technological developments.

Therefore, to overcome this problem, the Generalized Method of Moments (GMM) method is used.

Other independent variables in liquidity model

Firm size: Larger firms generally are regarded to have a lower level of asymmetrical information to outside financial market. They are more diversified and have more assets that can be used as collateral (Opler et al., 1999; Bates, Kahle & Stulz, 2009). Then, larger firms can reduce external funding expenses compare to the smaller one. Therefore larger firms will maintain a lower level of liquidity than smaller. We defined firm size using the log of total assets of the firm (Opler et al., 1999; Bates, Kahle & Stulz, 2009).

Investment opportunities: If a firm has many profitable investment opportunities, asymmetric information regarding new investment opportunities will increase. It requires higher external financing costs to the firm. Then firms that have more profitable projects will increase the cash holdings or liquid assets for the precautionary purpose (Opler et al., 1999; Bates, Kahle & Stulz, 2009). We defined the investment opportunities of a firm using capital investments divided by total assets (Opler et al., 1999; Bates, Kahle & Stulz, 2009).

Sales' growth: Sales can be promoted by extending credit payments periods. To support the sales' growth, it is needed to increase also inventory. Then with the increase of the revenues, generally liquid assets of the firm also grow. We defined the firm's growth by the difference of sales year of the t and t-1 divided by sales t-1 (Feng, Lu, & Wang, 2017).

International sales: Firms exports their products to international markets are well-positioned in their industry and get more stable cash flows because outcomes of the domestic and international markets are imperfectly correlated. Their cash flows have lower volatile than those of the firm which

just rely on a domestic market. Like diversified firms, they will reserve less cash for the precautionary purpose (Duchin, 2010) that the firms do not join international trading. We defined the portion of international sales by the dummy variable. We defined 1 if the fraction of foreign sales bigger than 20%, others 0.

Cash flow: If firms have positive cash flow, they can utilize it for various purposes of the firm. Even if the effect of cash flow to cash holdings need to consider with the leverage, in general increase of cash inflow directly increase the cash holdings and their portion of liquid assets. We defined cash flow by operating cash flows divided by total assets (Opler et al., 1999; Bates, Kahle & Stulz, 2009).

R&D expenditure: R&D expenses are less flexible and need higher adjustment costs than typical capital investments. R&D intensive firms have a higher probability of financial distress (Zhang, 2015). Then we used R&D expenditure of a firm as a proxy of the potential financial costs (Opler et al., 1999) Therefore to reduce potential financial distress firms that higher R&D expenses tend to increase liquid assets. We defined R&D expenditure as a dummy variable. We defined 1 if a firm has a record of R&D expenditure, others 0.

4. Results

Descriptive statistics

Based on Table 2, it is seen that manufacturing firms in Indonesia are still dominated by firms

that have low productivity levels. This can be seen from the average value of the two low productivity variables far compared to the maximum value of each variable. If productivity is measured by value-added per capital, then the average level of firm productivity is 27.76 percent of their total assets and a high maximum value of 119.24 percent of total assets. Similarly, if measured through TFP, the average firm in Indonesia has a productivity level of 2.62 percent, which is fair compared to its maximum value.

Based on Table 3, it can also be seen the liquid value of assets owned by manufacturing firms in Indonesia. If firm liquidity is measured through net liquid assets, then the average manufacturing firm in Indonesia has liquid assets of 17% of total assets. Negative value at the minimum value of the net liquid asset ratio can be interpreted that the firm has more short-term debt than their current assets. Meanwhile, if measured through the net cash holdings, manufacturing firms in Indonesia have average liquid assets of 12 percent of their total assets.

Effect of productivity on firm liquidity

This study used a regression model of research that has been done by Feng, Lu, & Wang (2017). There are two approaches to estimating productivity, namely total factor productivity and value-added per capital. This study also uses two approaches to liquidity, namely net liquid assets and net cash holdings. Then, there are four regression models in this study to see the relationship between

Table 2. Descriptive statistics

Variable Name	Obs.	Mean	Std. Dev.	Min.	Max.
Value-added per Capital	1400	0.2776	0.2310	-0.0414	1.1924
TFP	1260	0.0262	0.3178	-0.6129	1.6675
Net Liquid Assets	1400	0.1697	0.2392	-0.9417	0.6714
Net Cash Holdings	1400	0.1177	0.1345	-0.2251	0.4754
Log Total Asset	1400	21.1650	1.5511	18.0251	25.1580
Capital investment	1400	0.0515	0.0535	4.05e-06	0.2810
Operating Cash Flow	1400	0.0645	0.1101	-0.2099	0.4454
Revenue Growth	1400	0.1134	0.2538	-0.5430	1.2535

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liquidity and productivity of manufacturing firms in Indonesia.

To get the results in Table 3, we choose the proper model using Hausman and redundant fixed effect tests, and the Breusch-Pagan Lagrange test. Based on that results, we applied fixed effects for Model (1) and (2), and random effect models for Model (3) and (4). We also found violations of autocorrelation, cross dependency, and heteroscedasticity. Then we corrected each model using generalized least squares that reduce the effects of assumption violation in panel regression.

In Table 3, it can be seen in the first regression model which shows that manufacturing firms in Indonesia that have higher productivity will have higher net liquid assets of 29.79 percent compared to firms that have lower productivity. This first regression model uses productivity with TFP. When

compared to firm productivity with value-added per capital, the results in Table 3 show that firms that have higher productivity will have net liquid assets of 31.26 percent more than firms with lower productivity.

From Table 3, it can be seen in the first regression model which shows that manufacturing firms in Indonesia that have higher productivity will have higher net liquid assets of 29.79 percent compared to firms that have lower productivity. This first regression model uses productivity with TFP. When compared to firm productivity with value-added per capital, the results in Table 3 show that firms that have higher productivity will have net liquid assets of 31.26 percent more than firms with lower productivity.

In the results of the third regression model in Table 3, it means that the relationship between net

Table 3. Effect of productivity on liquidity

	Model 1	Model 2	Model 3	Model 4
TFP	0.2979*** (0.0496)		0.0396*** (0.0079)	
Value-added per Capital		0.3126*** (0.0438)		0.0949*** (0.0126)
Log Total Assets	-0.0160** (0.0064)	0.0153 (0.0082)	-0.0220*** (0.0017)	-0.0139*** (0.0018)
Revenue Growth	0.0309** (0.0136)	0.0299*** (0.0109)	0.00254 (0.00503)	0.00207 (0.0049)
Capital Investment	-0.1116*** (0.0364)	-0.1676*** (0.4419)	-0.0740*** (0.0241)	-0.1039*** (0.0234)
Dummy Variable International Sales	0.0122 (0.00712)	0.0130** (0.0049)	-0.01052** (0.00494)	-0.0128** (0.00501)
Cash Flow	0.0848** (0.0383)	0.0410 (0.0381)	-0.0271 (0.0158)	-0.0540*** (0.0148)
Dummy Variable R&D	-0.0076 (0.0188)	-0.0069 (0.0181)	0.0066 (0.0058)	-0.00282 (0.00603)
Intercept	0.4998*** (0.1407)	0.2393 (0.1789)	0.5906*** (0.03656)	0.3955*** (0.04134)
F (7, 138)	265.30	71.34		
Wald Chi ² (7)			196.98	176.93
R ²	0.0784	0.0653		
Prob > F	0.0000**	0.0000**	0.0000**	0.0000**

Information: * shows statistical significance at the level of 10%, ** shows statistical significance at the level of 5%, *** shows statistical significance at the level of 1%. Model 1 = Net Liquid Assets & Total Production Factors. Model 2 = Net Liquid Assets & Value-added per Capital. Model 3 = Net Cash Holdings & Total Production Factors. Model 4 = Net Cash Holdings & Value-added per Capital.

cash holdings and TFP has a significant and positive correlation. So that it can be interpreted that more productive manufacturing firms in Indonesia will have more net cash holdings of 3.96 percent. If firm productivity is measured by value-added per capital, firms that have higher productivity will have more net cash holdings of 9.49 percent compared to firms with lower productivity. This situation can be seen in the fourth regression models in Table 3. Therefore, the four regression models are consistent, which are the relationship between liquidity and productivity of manufacturing firms in Indonesia has a positive and significant correlation.

5. Discussion

The results of this study contrast with economic intuition, where manufacturing firms that have high productivity should have fewer liquid

assets than firms with low productivity. The results of this study are supported by previous studies conducted by Feng, Lu, & Wang (2017) who have researched in China. The research conducted by Feng, Lu, & Wang (2017) found that firms with higher productivity levels will hold more liquid assets than firms with low productivity. Even if Indonesia characteristics of financial frictions may be different with China, financial frictions in Indonesia still cause misallocations of the resources.

This can occur because of the misallocation of resources carried out by firms in developing countries. This situation, according to Restuccia & Rogerson (2008), occurs because of the distortion of policies in developing countries, especially the existence of information asymmetry. As Winker (1999) mentioned, information asymmetry between creditors and debtors also causes expensive financing from external parties. This shows that the condition of

Table 4. Robustness test based on firm size

	Big (1)	Small (2)	Big (3)	Small (4)	Big (5)	Small (6)	Big (7)	Small (8)
TFP	0.180*** (0.003)	0.255*** (0.000)			0.00949 (0.394)	0.0530 (0.259)		
Value-added per Capital			8.79e-12*** (0.001)	1.97e-10** (0.030)			4.82e-13 (0.542)	1.29e-11 (0.684)
Log of Total Assets	0.0215 (0.386)	0.0410* (0.052)	-0.0146** (0.022)	0.0161 (0.551)	-0.00575 (0.354)	0.0471** (0.016)	-0.00604 (0.404)	0.0455** (0.040)
Revalue Growth	0.000618 (0.725)	0.0135*** (0.005)	0.00165** (0.016)	0.0181*** (0.002)	-0.00081* (0.062)	-0.00375 (0.283)	-0.00079* (0.084)	-0.00262 (0.314)
Capital Investment	0.0607 (0.830)	-0.437*** (0.000)	-0.172* (0.051)	-0.442*** (0.000)	-0.199*** (0.000)	-0.238*** (0.000)	-0.199*** (0.000)	-0.242*** (0.000)
Dummy International Sales	0.0678** (0.045)	0.00564 (0.794)	0.0652 (0.329)	0.00453 (0.834)	-0.00189 (0.873)	-0.00176 (0.733)	-0.00164 (0.894)	-0.00175 (0.737)
Cash Flow	0.568* (0.012)	0.171*** (0.001)	-0.00822 (0.971)	0.233*** (0.000)	0.00613 (0.890)	0.0316 (0.255)	0.00926 (0.815)	0.0475** (0.015)
Dummy R&D	-0.0139 (0.110)	-0.0139 (0.669)	0.156*** (0.000)	-0.0157 (0.600)	0.0251*** (0.001)	-0.0649** (0.014)	0.0255*** (0.001)	-0.0652** (0.011)
Intercept	-0.503 (0.253)	-0.438 (0.258)	0.414** (0.013)	0.00553 (0.992)	0.2990* (0.064)	-0.7040 (0.052)	0.3040* (0.089)	-0.6770* (0.100)
F (7, 9)	195.32	125.57	579.48	186.97	264.99	163.75	176.52	16.91
Pro > F	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***

P-values in parentheses, * p<0.10, ** p<0.05, *** p<0.01. Model (1) and (2) = Net Liquid Assets & Total Production Factors. Model (3) and (4) = Net Liquid Assets & Total Production Factors. Model (5) and (6) = Net Liquid Assets & Value-added per Capital. Model (7) and (8) = Net Cash Holdings & Total Production Factors. Model 4 = Net Cash Holdings & Value-added per Capital. Size of the firm was divided based on median of total assets.

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the credit market in Indonesia may still have the possibility of improvements.

Therefore, with such a credit market situation and more generally financial system, it will result in manufacturing firms in Indonesia, making mistakes in allocating their resources because the firm has a view of conducting precautionary savings. According to Bates, Kahle & Stulz (2009), the motive of precautionary savings is carried out by firms because of their attitude of alertness to uncertain credit market conditions. This motive causes firms to view it better than they invest in liquid assets more than buying capital. Because firms want to anticipate if, at any time, they cannot enter the credit market or be subject to external funding costs that become expensive. So the motive for precautionary savings is what causes manufacturing firms with high productivity levels to have higher liquid assets than less productive firms in Indonesia.

Robustness tests

We run the regression with the same model based on the median of the firm size, which is defined by total assets. In emerging countries, relatively small firms may face more substantial financial frictions than big firms (Winker, 1999). Then as Opler et al. (1999) and Bates, Kahle & Stulz (2009) smaller firms tend to hold a higher portion of liquid assets for precautionary purposes than the bigger one.

In the model (2) and (4) in Table 4 coefficient of productivity (TFP and Value-added per Capital) bigger than that of (1) and (3). When the firms are smaller, the effects of the productivity higher impacts on the level of liquid assets in Indonesia. From the model (6) and (8) in Table 4 coefficients of variable productivities (TFP and Value-added per Capital) also much bigger than that of (5) and (7) for bigger firms. Though the signs and significant level of control variables vary, the sign and magnitude

of the productivity factors still consistently have positive effects on the liquidity asset level from the model (1) to (4) in Table 4. In model (5) to (8) in Table 4, however, the coefficient productivities variable became insignificant may not undermine the main results. Feng, Lu, & Wang (2017) use the same model; productivity factors have negative and significant effects on cash holdings in US markets.

6. Conclusion, Limitations, and Suggestions

Conclusion

In the results of research conducted on 140 manufacturing firms in Indonesia from 2007 to 2017, after regression with two ways of liquidity approach and two ways of corporate productivity approach it can be concluded that manufacturing firms in Indonesia that have higher productivity levels will have a higher level of liquidity too. This is due to the financial frictions that occurred in Indonesia. Several distortions that cause financial frictions still occurs in Indonesia like other developing countries. The financial frictions that cause distortions in Indonesia may be related to information asymmetry between creditor and debtor, which cause the high cost of external financing. Then, when they need funds to invest, but because of the cost of funding from external parties that is too expensive, the firms allocate their resources to liquid assets than take investment in capital.

Limitations and suggestions

We use a relatively short period of data, including turbulent period 2008 and 2009. The results can be improved with revised models that can control that extreme effects of that period. We also limit the effects of productivity to asset liquidity, but it can investigate effects to market liquidity with related markets and also diverse dimensions of market frictions that related to liquidity holdings.

References

- Almeida, H., Campello, M., & Weisbach, M. S. (2004). The cash flow sensitivity of cash. *The Journal of Finance*, 59(4), 1777-1804. <https://doi.org/10.1111/j.1540-6261.2004.00679.x>
- Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why do US firms hold so much more cash than they used to? *The Journal of Finance*, 64(5), 1985-2021. <https://doi.org/10.1111/j.1540-6261.2009.01492.x>
- Buera, F. J., Kaboski, J. P., & Shin, Y. (2011). Finance and development: A tale of two sectors. *American Economic Review*, 101(5), 1964-2002. <https://doi.org/10.1257/aer.101.5.1964>
- Duchin, R. (2010). Cash holdings and corporate diversification. *The Journal of Finance*, 65(3), 955-992. <https://doi.org/10.1111/j.1540-6261.2010.01558.x>
- Fazzari, S., Hubbard, R. G., & Petersen, B. (1988). Investment, financing decisions, and tax policy. *The American Economic Review*, 78(2), 200-205. Retrieved from <http://www.jstor.org/stable/1818123>
- Feng, F. Z., Lu, J., & Wang, J. (2017). Productivity and liquidity management under costly financing. *Journal of Corporate Finance*. <https://doi.org/10.1016/j.jcorpfin.2017.09.009>
- Hsieh, C. T., & Klenow, P. J. (2009). Misallocation and manufacturing TFP in China and India. *The Quarterly Journal of Economics*, 124(4), 1403-1448. <https://doi.org/10.1162/qjec.2009.124.4.1403>
- Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *The Review of Economic Studies*, 70(2), 317-341. <https://doi.org/10.1111/1467-937X.00246>
- Midrigan, V., & Xu, D. Y. (2014). Finance and misallocation: Evidence from Plant-Level Data. *American Economic Review*, 104(2), 422-58. <https://doi.org/10.1257/aer.104.2.422>
- Moll, B. (2014). Productivity losses from financial frictions: Can self-financing undo capital misallocation? *American Economic Review*, 104(10), 3186-3221. <https://doi.org/10.1257/aer.104.10.3186>
- Nasution, A. (Ed.). (2015). *Macroeconomic Policies in Indonesia: Indonesia Economy since the Asian Financial Crisis of 1997*. Routledge.
- Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of financial economics*, 52(1), 3-46. [https://doi.org/10.1016/S0304-405X\(99\)00003-3](https://doi.org/10.1016/S0304-405X(99)00003-3)
- Restuccia, D., & Rogerson, R. (2008). Policy distortions and aggregate productivity with heterogeneous establishments. *Review of Economic Dynamics*, 11(4), 707-720. <https://doi.org/10.1016/j.red.2008.05.002>
- Restuccia, D., & Rogerson, R. (2012). Misallocation and productivity. *Review of Economic dynamics*, 16(1), 1-10. <https://doi.org/10.1016/j.red.2012.11.003>
- Rosengard, J. K., & Prasetyantoko, A. (2011). If the banks are doing so well, why can't I get a loan? Regulatory constraints to financial inclusion in Indonesia. *Asian Economic Policy Review*, 6(2), 273-296. <https://doi.org/10.1111/j.1748-3131.2011.01205.x>
- Riddick, L. A., & Whited, T. M. (2009). The corporate propensity to save. *The Journal of Finance*, 64(4), 1729-1766. <https://doi.org/10.1111/j.1540-6261.2009.01478.x>
- Nugroho, V. C., & Suk, K. S. (2019). The relationship between leverage, maturity, and investment decision: Evidence from emerging markets. *Organizations and Markets in Emerging Economies*, 10(1).
- Winker, P. (1999). Causes and effects of financing constraints at the firm level. *Small Business Economics*, 12(2), 169-181. <https://doi.org/10.1023/A:1008035826914>
- Zhang, W. (2015). *R&D investment and distress risk*. <http://dx.doi.org/10.2139/ssrn.2327688>
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