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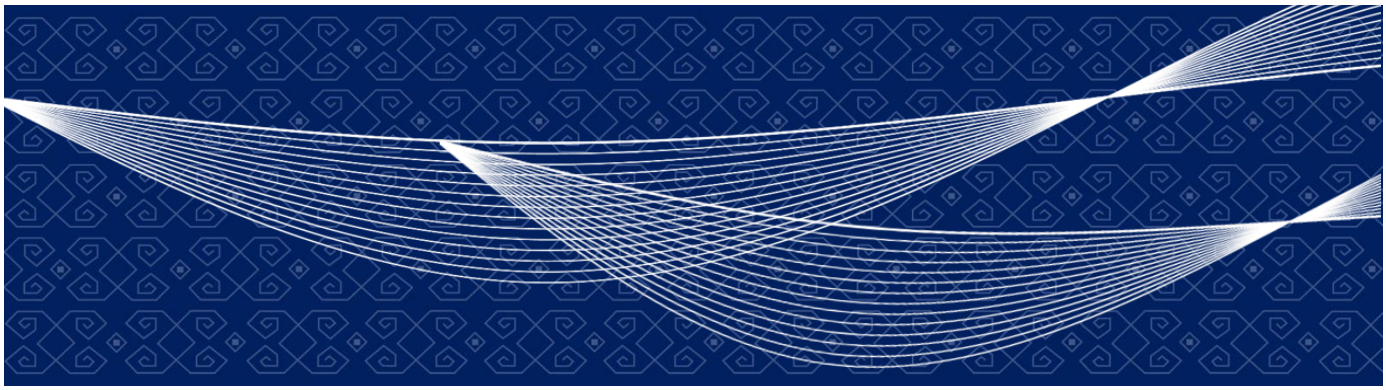

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WORKING PAPER

ON THE DEVELOPMENT OF THE ISLAMIC BENCHMARK RATE: AN INDONESIAN CASE

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ABSTRACT

Purpose — Central to the long-standing issue of Islamic finance is the lack of an established reference rate. This study proposes an alternative to the Islamic benchmark rate by linking it with the performance of underlying businesses.
Design/methodology/approach — First, we derive the very definition of how a particular rate can be considered Islamic employing a thorough literature review. Second, this study then calculates the Cash Recovery Rate (CRR) and the Return on Invested Capital (ROIC) for each country listed on the Indonesia Stock Exchange. Third, we then analyse the statistical descriptive, correlation in terms of its value and graphical plot at both the univariate and multivariate levels.
Findings — Our thorough literature review suggests that the classic CRR and the ROIC are theoretically consistent with the principles of pricing in Islamic finance. This is also empirically confirmed by employing the Indonesian data, where we observe a high correlation between CRR (ROIC) and short-term (long-term) economic macroeconomic indicators.
Originality — To the best of our knowledge, this is the first study exploring the possibility of CRR and ROIC as Islamic benchmark pricing.
Research limitations/implications — The spatial focus of this study is Indonesia. While the robustness check has incorporated the case of the US. Other countries may have different structures and institutions of the financial markets.
Practical implications — The classic measures of firm performance CRR and ROIC prove useful to be alternatives to Islamic benchmarking both theoretically and empirically. Keywords: Asset Pricing, Cash Recovery Rate, Islamic Benchmark Rate, Real Business Return, Return on Invested Capital.

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Keywords: Islamic benchmark rate, CRR, ROIC

JEL Classifications: F11, Q72

1. Introduction

A report from Islamic Financial Services Board (IFSB) in 2021 shows that assets in the Islamic finance industry have experienced a 10.6% increase from the year 2019 to 2020 globally, with a total of USD2,698.2 billion (IFSB, 2021). The highest proportion still comes from Gulf Cooperation Countries (GCC), accounting for 48.9% of the total Islamic finance asset, followed by Southeast Asia countries (24.9%), Middle East and South Asia (20.3%), and Africa and others (6%).

Notwithstanding its development, Islamic finance also faces several issues, such as the lack of use of profit-loss sharing (PLS) in the products being offered (Ibrahim, 2015), lack of product development in relation to risk and liquidity management issues (Grira & Labidi, 2021), including the benchmark rate to be employed by the Islamic financial institutions (IFIs) to determine their rate of return. Several efforts have been attempted to formulate a benchmark rate that can be used by Islamic finance, such as the use of *Tobin's Q* proposed by Mirakhor (1996) and Iqbal (1999), the general development index (Haque & Mirakhor, 1998), Islamic Interbank Benchmark Rate (IIBR) developed by several countries and Thomson Reuters in 2011 (Azad *et al*., 2018), the use of rental rate (Ali & Siddique, 2015; Yusof *et al.*, 2016), the proposed Islamic pricing benchmark model (Ahmed *et al.*, 2018), trade credit pricing (Jatmiko *et al*., 2022), and Fama and Macbeth's (1973) method (Uddin *et al*., 2022).

Several studies document that the above-proposed benchmark rates do not represent the asset centrality feature of Islamic finance. The IIBR was the only proposal that came into existence. However, the literature suggests that the IIBR is not independent of the conventional rate, such as LIBOR and other conventional benchmarks (Azad *et al.*, 2018; Nechi & Smaoui, 2019; Tlemsani, 2020). The first study examines the relationship between IIBR and LIBOR and finds that there is a long-term and short-term dynamic relationship between both rates (Azad et al., 2018). In addition, Nechi & Smaoui (2019) also find that there is a long-term relationship between IIBR and conventional interbank rates in three countries, Bahrain, Saudi Arabia, and Uni Arab Emirates (UAE), which the conventional interbank rates Granger cause IIBR. Using the same benchmark rate to examine, Tlemsani (2020) uses daily data from November 2011 to June 2015 and finds that there is a negative correlation between IIBR and LIBOR. These findings indicate that there is still co-movement between the proposed benchmark rate with the interest-based rate, raising questions on the ability of the proposed benchmark rates to reflect the performance in the real sector.

This raises an intriguing question of what is the appropriate benchmark rate that is not only theoretically appealing but also empirically robust for Islamic financial institutions? Answering this question is precisely the goal of this study.

The development of benchmarks is necessary for the Islamic financial industry to accentuate the distinctive features of Islamic financial products and institutions compared to their counterparts (Azad *et al.*, 2018). One of the criticisms that has been pointed out towards Islamic finance is its inability to set or develop its own product without mimicking its counterpart. In addition, this distinguished benchmark rate will detach Islamic finance from the interest rate issue, although it has been deemed unproblematic to refer to the rate of return on the interest-based benchmark rate as long as the product itself is *shari'ah*-compliance. Additionally, the development of this benchmark is necessary for the Islamic economy and finance to accentuate its principle of fairness and justice in which businesses should be charged a rate of return that is based on their ability to generate operating income rather than a fixed rate as in conventional finance.

Benchmark rate is also important in pricing an asset, as the value of the asset is based on the present value (discounted) of future cash flows (dividends). Additionally, various factors can influence the cash flows, such as macroeconomic variables, preferences, technology, and real factors. As such, an appropriate discount rate (benchmark rate) is needed to better reflect

the present value of cash flows. The benchmark rate also has an important role in determining the allocation of capital, as different households and corporations have their own preferences and appetite that will decide their investment allocation.

In relation to the necessity of a benchmark rate, the formulated rate should reflect the real condition of an entity that is aligned with an aspiration from Islamic finance that the financial activities should be linked with the real sector, as the spirit of Islamic finance is to serve the society and embed their activities within the society. On the other hand, there has also been another criticism for Islamic finance that it has slowly shifted towards financialisation, which might be due to the lack of a "right" discount rate to determine the price of an asset. In other words, there is an issue of understanding the true ability of the real sector to generate their return and its accompanying risk, which can be used by IFIs as a benchmark.

Following several issues that have been explained, this study aims to offer a benchmark rate that can be employed by IFIs that better reflects the real sector, namely Cash Recovery Rate (CRR) and Return on Invested Capital (ROIC). CRR is part of the accounting proxy for a company's performance that measures the ability of a company to generate various cash flows from the investment incurred by the company (Griner & Stark, 1988). As for ROIC, it is also an accounting proxy for a company's performance but can better reflect the long-term condition as it measures the return that can be generated by capital invested in the long run (Damodaran, 2017).

In addition, a study by Narayan & Phan (2019) examines the trend of research within Islamic finance and shows that research on asset pricing is still limited. The study further supports that it is necessary to develop the pricing formula for Islamic financial products, as it has distinctive features compared to the conventional counterparts. Hence, this study is expected to fulfill the gap by proposing measurement rates that can be used by Islamic Financial Institutions to price their products in such a way that reflects the real sector. In addition, this study will further examine the relationship between the proposed measurements and other macro-finance indicators to check its robustness as a measurement rate.

Our study is conducted in Indonesia with the main reason that it is a country with one of the most populous Muslims compared to other countries. Such characteristics provide a significant potential for considerable progression in Islamic finance. Considering the concerning growth in the last decade, which is known as 5% market share trapped, most recently the Ministry of State-owned Enterprises of the government of the Republic of Indonesia took corrective action, consolidating three Islamic state-owned banks to become a new bigger and expectedly a stronger entity, namely Bank Syariah Indonesia.

Indonesia undoubtfully has its own trajectory for Islamic finance. The total assets for Islamic finance accounted for IDR1,801.40 trillion in 2020, consisting of IDR1,076.22 trillion in the Islamic capital market, IDR608.9 trillion in the Islamic banks, and IDR166.28 trillion for the Islamic non-banking financial institutions (OJK, 2020). Although relatively small in total assets compared to the total financial sector within the country, Islamic finance has been growing at double the figure compared to its conventional counterparts. Report from Indonesia Financial Service Authority (OJK, 2020) shows that the total asset of Islamic banks grew by 13.11% (YoY) in 2020 compared to the asset of conventional banks that increased by 6.74% (YoY). In terms of deposits, Islamic banks experienced an increase of 11.98% (YoY), while conventional banks grew slightly lower at 10.93% (YoY). As for the credit/financing, Islamic banks posed a better trajectory as they still increased at 8.08% (YoY), while conventional banks had negative growth at -4.20% (YoY). These figures depict that Islamic finance has the potential to grow further and serve society.

Against those backdrops, 44,165 firm-quarter non-financial firms listed in the Indonesia Stock Exchange are sampled to estimate the return on their business operations. Results are analysed against the economic indicators of short-term government bond rates and spread of

two to ten years government bond rates to learn the characteristic of CRR and ROIC. It is found that CRR is strongly related to short-term rates while ROIC is otherwise. Moreover, the two proposed Islamic benchmark rates also show a considerable correlation in the lagged period indicating their capacity to forecast economic indicators understudied.

Various categories of sampled firms are employed to check for the robustness of our results. CRR and ROIC of firms in the Jakarta Islamic Index (JII) and Indonesia Shariah Stock Index (ISSI) are estimated for comparison with the non-financial firms in our original sample. Importantly, various sample categories do not impact our results considerably.

This study is structured as follows: Literature Review conveys the definition of Islamic finance and its fundamental axioms, alternate measurements of return, and the theoretical framework of the relationship between the proposed benchmark rate with macroeconomic variables to put forth the robustness of the proposed benchmark rate.

2. Literature review

2.1. Asset Pricing and Risk Premium Puzzle

The theory of asset pricing is dated back to the study of Markowitz's portfolio optimisation, which then further developed and found that the correlation of many assets can be replaced by one coefficient called beta, showing the relationship between the return of individual assets and market portfolio (market index). The equation is called the capital asset pricing model (CAPM) and has been used as a tool to measure the rate of return of a firm. However, there have been several criticisms of the use of CAPM, particularly when it is being tested empirically.

A study by Hsia *et al.* (2000) explains that the fundamental issue of the gap between theoretical and empirical is due to the effect of market frictions that influence the arbitrage process in the market. If the market is frictionless, the market value of a firm should be equal to its book value. Conducting the empirical study on the turn-of-the-year and Monday effects, the study finds that beta is less informative when the market frictions are ignored, and it will be useful when the market frictions are accounted for.

Claessens & Kose (2018) explain that the excess volatility of asset prices can be due to the volatility of asset prices compared to the fundamentals. It is because of the limits of the basic model to predict the real activity. The study further explains that the valuations from equity prices were relatively higher than the average. On the other hand, the value of real GDP growth was around the historical average. It shows that there is a gap between the model and the actual risk premium being observed.

Further, there has been an issue with risk premium puzzle explaining that the difference between equity and the risk-free rate of return is too large, and it remains unanswered (Mehra & Prescott, 1985). However, the risk-free rate of return has been a single reference in pricing, implying that there is still an issue in conventional finance. With the Islamic banks referring to its pricing on its conventional counterpart, it is indirectly linked themselves to the interest rate, which still has an issue. The implication is that Islamic banks can face two layers of issues, one is the use of interest rate as their benchmark rate of pricing and the evidence that interest rate is still deemed problematic within the risk premium puzzle context.

2.2. Islamic finance

Islamic finance, as an accentuation of Islamic economics, has distinctive characteristics compared to its conventional counterpart. The main objective is to promote justice and fulfil the objectives of *shari'ah*, and the basic principles are the prohibition of *riba*, *gharar*, *maysir*, and *tadzlim*, which has wider economic implications (Iqbal & Molyneux, 2016). By prohibiting *riba*, it implies that interest in the financial system is not allowed as it does not promote justice and disconnects the financial sector from the real sector. Additionally, the prohibition of *gharar* and

maysir leads to a real transaction that has clear objects and parties involved. As a consequence of these principles, Islamic finance provides several contracts that can be used according to the needs or activities being financed (Ayub, 2007). It particularly promotes the use of risk sharing in the banking operation, implying that the pricing used by Islamic banks should be different from conventional banks.

On the other hand, considering that Islamic finance is put in the same environment with its conventional counterpart with the same performance evaluation, Islamic banks in particular, have been operating commercially and mimicking the products of their conventional counterpart. It makes the Islamic banks lean towards fixed-income instruments (*murabahah* and *ijarah*) and try to have a similar rate of return with the conventional so that they can compete in the industry. As a result, Islamic finance has not been able to develop its own benchmark rate that can truly reflect the real sector, as its aspiration is to link the financial sector and the real sector.

In relation to pricing, several scholars and academics have discussed the asset pricing model from Islamic perspectives (Derbali *et al.*, 2017; Hakim *et al.*, 2016; Hammami, 2020; Hanif, 2011; Sadaf & Andleeb, 2014; Selim, 2008).

Several attempts have also been put in place by several scholars and academics in developing the benchmark rate. It includes the use of *Tobin's Q* proposed by Mirakhor (1996) and Iqbal (1999) as it has several superior features: (i) the numerator is firm's market value that already reflects the expected future profit of the firm, (ii) it can provide information that represents firm's performance. Another development is the general index (Haque & Mirakhor, 1998), consisting of the world index, market performance index, weighted return of government financial assets, and the rate of return from government investment that is the underlying asset of the financial instruments issued by the firm. In 2011, the Islamic Interbank Benchmark Rate (IIBR) was developed by several countries and Thomson Reuters (Azad *et al*., 2018) by submitting the rate from all the participants and taking the mid-point. However, this rate was discontinued in 2018. Another proposal was the use of a rental rate (Ali & Siddique, 2015; Yusof *et al.*, 2016), that is based on *ijarah* and *musharakah mutanaqisah* contracts. The most recent development was the proposed Islamic pricing benchmark model (Ahmed *et al.*, 2018).

To ensure the compatibility of the benchmark rate with other benchmark rates, several empirical studies have attempted to examine the relationship (*see:* Azad *et al.*, 2018; Smaoui & Nechi, 2019; Tlemsani, 2019). Those studies employed IIBR, LIBOR, and other conventional interbank rates used in different countries. The results show that there is a short-term and long-term dynamic relationship between IIBR and conventional benchmark rates. It indicates that the benchmark rate proposed has a co-movement with the conventional benchmark rates, implying its inability to detach/decouple from its conventional counterpart or interest rate.

Considering the distinctive features of Islamic finance compared to its conventional counterpart, it should be necessary for Islamic finance to have its own benchmark rate. As Islamic finance has been competing with its conventional counterparts, having its own benchmark rate would make these two assets become two distinct asset classes (Azad *et al.*, 2018). In addition, having its own benchmark might make Islamic finance provide a higher share of profit-loss sharing instruments as they have been criticised for mimicking conventional counterparts rather than promoting their distinctive features. However, there is also an argument that having their own benchmark rate will create inconvenience for Islamic financial institutions (IFIs) (Ahmed *et al*., 2018).

2.3. Measurement of return:

In measuring the rate of return for a firm, Metzler (1951) explains that in an all-equity economy, the rate of return should be ex-post not ex-ante. This is due to the rate of return should refer to a performance that can be calculated when the performance is known. On the other hand,

the interest rate is an ex-ante rate of return, implying that it cannot be used as a reference for the rate of return.

Ijiri (1978) explains that the main objective of a business is to generate cash flow higher than the cash flow incurred from purchasing those various types of assets. Hence, it is more appropriate to use cash flow instead of profit in determining investment feasibility, both real and financial assets). In addition, Ijiri (1978) also states that the performance evaluation of a company should not only be based on the values of assets and liabilities in the balance sheet. The measurement of return should reflect the company's productivity, resulting in a debate between accounting-based and cash flow-based rates of return.

Accounting-based rate of return, further named as accounting rate of return (ARR), relies on accounting information shown in the financial statements, with the most common measurement of ROE, ROA, and profit margin. Salamon (1982) summarises various literature, concluding that company's ranking based on ARR can be dangerous, as it has different results compared to ranking based on discounted cash flow. In the accounting information, several items need to be adjusted in order to avoid biased information, such as depreciation expense that has non-cash characteristics. Additionally, ARR has not accommodated the balance between return and risk.

To account for the drawbacks in the ARR measurement, Ijiri (1978) explains that the most appropriate measure for the rate of return is based on cash flow. The cash flow-based rate of return uses a discounted cash flow approach (DCF), which already accounts for the information on cash flow and risk factors in its measurement. The widely used measurement is the Internal Rate of Return (IRR). However, IRR has several drawbacks in which Ijiri (1978) then introduces a measurement called Cash Recovery Rate (CRR). Further, Salamon (1982), Griner & Stark (1988), and Baber & Kang (1996) develop and test the theoretical concept of CRR proposed by Ijiri (1978) as it still has the issue of project continuity in the firm (pension effect). In further developing the empirical CRR formula, Taylor (1999) includes components of accumulation for R&D and advertisement expenses in the denominator to handle the pension effect.

Additionally, Hall (2018) identified that there is a strong relationship between performance in the real sector (aggregate value of ROIC) with macro-finance indicators. For measuring the performance of a firm, it can employ accounting measurements and also cash flow-based measures. Additionally, the ROIC in this study measures the return generated by the company from its investment in physical capital.

2.3.1. Accounting-based Rate of Return

In measuring the rate of return for a company, several measures can be used including the accounting-based rate of return. There are two most common measurements, namely Return on Assets (ROA) and Return on Equity (ROE). The formula for Return on Assets (ROA) can be shown in equation (1) as follows:

$$ROA = \frac{net\ income}{total\ assets} \qquad (1)$$

ROA is more on measuring the efficiency of a company in using their assets to generate return but does not reflect the company's stream of cash flows. It mixes return for shareholders' equity (net income) with assets funded by debtholders and shareholders.

The second measure of firm's performance is Return on Equity (ROE), using the formula showed in equation (2) as follow:

$$ROE = \frac{net\ income}{total\ equity} \qquad (2)$$

As for ROE, it only accounts for a company's equity, implying that higher leverage within the company will create higher ROE (relative to its ROA). A study by De Wet *et al.* (2007) explains that ROE is a popular measure but has flaws in measuring corporate financial performance. The statistical tests performed in the study found Spreads (a standardised EVA) to be slightly superior to ROE in explaining changes in shareholders' returns.

2.3.2. IRR

Considering the issues with accounting performance, it is argued that it is better to use cash flow as the measurement, such as the Internal Rate of Return (IRR). IRR measures the rate of return when the stream of expected cash flows for a project is equal to zero.

$$I = \sum_{n=0}^{N} \frac{CF_n}{(1+r)^n} \qquad (3)$$

Where *I* is the total investment for a particular asset, *N* is the age of the asset, *CFn* is the periodic cash flow during the *N* period, and *r* is the IRR. Equation (3) shows that IRR measures the ability of an investment (*I*) to generate net cash flow (*CFn*) during the *N* period. If the business performance is superior, the IRR will be higher than other measurements, vice versa.

Although IRR is superior in concept, it lacks practical implementation. First, IRR is commonly used to value the feasibility of a project instead of the company's performance as a whole. An individual project has a particular economic period, while a company is an entity that has a going concern characteristic implying an unknown economic period. Second, IRR employs information on projected cash flow instead of actual cash flows. Meanwhile, the industry requires an actual rate of return.

2.3.3. Cash Recovery Rate

Following the development of IRR, its drawback is that it measures the feasibility of a project or investment rather than a company as a whole. In order to address this issue, Ijiri (1978) proposed Cash Recovery Rate (CRR), which calculates the net cash flow generated by a company from an investment conducted in the previous period. In principle, a company is a set of projects in which each project has its own economic value, investment, and IRR. Hence, it is possible to estimate IRR at the company's level by employing the information on cash flow at the company level.

Ijiri (1979) explains how to estimate IRR using CRR that has discrete characteristics. As an example, if a company has an investment of $1 that generates a net cash flow of $0.60 and $0.72 in the 1st and 2nd year consecutively, then the cash recovery in the 2nd year will be $1.08. If the cash recovery in the 1st year is being reinvested, then the total investment at the end of the 2nd year will be $1.60 ($1 + $0.60). As a result, the value of CRR at the end of the 2nd year will be $0.675 ($1.80/$1.60). In terms of components for calculating cash flow (or cash recovery), IRR and CRR are derived from the same formula.

In order for CRR to be used as a proxy of IRR, there are two components needed, namely the company's age and growth. Information about growth is needed as a company is a set of various investments that have been conducted from the beginning of the business towards an unknown end of the period. Ijiri (1979) builds the relationship between CRR and IRR by assuming that the investment growth of a company is in a steady state, implying that the relationship can be presented in equation (4):

$$R = \frac{r}{[1-(1+r)^{-n}]} \qquad (4)$$

Where *R* is CRR, *r* is IRR, and *n* is the company's age. If CRR can be estimated, then the value of IRR can be calculated by solving equation (4). Ijiri (1979) then conducts simulation

arbitrarily by deciding the value of *n* to be 15 and 20 years. From equation (4), it can be said that it is highly possible that the value of the actual IRR can be estimated through CRR.

Salomon (1982) then develops the relationship between CRR and IRR, explaining that the relationship in equation (4) can only be applied if the growth rate of a company's investment is equal to IRR ($g=r$) and there is no inflation in the economy. When both assumptions are not fulfilled, equation (4) has to be modified to obtain a more reliable relationship between CRR and IRR. Further, Salamon (1982) defines the relationship between CRR and IRR with a more relaxed assumption presented in equation (5) as follows:

$$R = \left[\frac{(1-pg)p^n g^n}{1-p^n g^n}\right]\left[\frac{g^n-b^n}{g^n-(g-b)}\right]\left[\frac{r^n(r-b)}{r^n-b^n}\right] \qquad (5)$$

Where p is the inflation rate, b is the trend of a company's cash flow, and g is the gross growth rate. *B* explains that there is an assumption that cash flow has different characteristics. If $b=1$, the trend of a company's cash flow is relatively constant, while $b>1$ implies that the trend is increasing from year to year, and $b<1$ means that there is a decreasing trend. Another assumption is that g and p are constant, assuming that the company has settled, further implying that it has not been tested for small and new companies (Salamon, 1982).

According to Griner and Stark (1988), the relation between the continuously based internal rate of return and CRR can be depicted as follows:

$$CRR = \frac{GN(G)}{(1-e-GT)} \qquad (6)$$

and $N(i) = 1$.

In addition, a stable CRR shows that a firm or a division within a firm can be regarded as one investment without considering the cash flow profiles and periods of the individual projects (Andrews et al. 2010). The study also explains that stable CRR can indicate that increases in investment are accompanied by an increase in CRR to maintain the value of CRR. Moreover, large firms also tend to have stable CRR over time. A study by Said *et al.* (2008) explains that CRR-derived EIRR is more informative compared to ROA.

In relation to its suitability to be used as an Islamic rate of return, CRR can be said to be suitable as it measures the actual cash flow from the operational activities of a company that already included several adjustments for components in the calculation. It is aligned with the principles in Islamic finance that profit can only be recognised from activities in the real sector in which the operational activities of companies are directly involved in the real sector.

2.3.4. Return on Invested Capital

Aside from using CRR to account for drawbacks in IRR, Return on Invested Capital (ROIC) can be employed to measure the rate of return as it can solve the interpretation problem of IRR (Jackson, 1997). It is under the explanation that IRR can only lead to a good project selection if there is a capital budget for a set of mutually exclusive projects and there are no overrecovered balances of investment at that rate.

Return on Investment (ROI) is a measure of financial performance calculated as a ratio of after-tax operating profit/loss divided by invested capital (productive asset). It implies that ROI measures the return from each investment on a productive asset. The general formula of ROI is as follows:

$$ROI = \frac{operating\ income\ after\ tax}{invested\ capital\ on\ productive\ assets} = \frac{EBIT-tax\ payment}{FA+CA-CL-Cash\&Cash\ Equivalents} \qquad (7)$$

The equation shows that there are several points to note, which are the use of operating income rather than net income, tax adjustment, and the use of book values (Damodaran, 2007).

The operating income is used as the return on capital, includeing the return for equity holders and debtholders. It also affects the tax adjustment to avoid the double counting for the tax benefit from debt. The last one, related to book values, is due to the problem that the market value of equity has already included the expected value of growth assets, making it biased for obtaining the ratio of operating income to company's value. Additionally, the equation also takes out cash & cash equivalents because cash is usually invested in low-risk (low-return) investments. It is not aligned with the objective of the nature of invested capital that the return should be generated in the long term (higher risk and return investments).

Empirically, Sampson (1969) has tested the use of the ROIC measure of return on BMEI and Romanian companies, respectively. The study found that the DCF rate of return on capital is considered to be the most important measurement of financial performance as the inflows of long-term capital to the firm are influenced by the profits generated by the firm. It has been explained that the ROIC formula has taken the cash out of the calculation, as the income from cash is not part of operational income. Cash is commonly invested in short-term assets with low return. The exclusion of cash is aligned with the investment principle in Islamic finance as the ratio of liquidity (cash) is being capped for companies to be classified as *shari'ah*-compliance companies. In addition, principles in Islamic finance encourage long-term investment rather than a short-term investment. Hence, the use of invested capital without cash is deemed to be in accordance with Islamic finance.

Following on the discussion of measuring the real rate of return for a company that is Shariah-compliance, the development of asset pricing models conducted by previous studies is more focusing on replacing or finding alternatives for the risk-free rate of return, as it is deemed to be un-Islamic to use the conventional risk-free rate of return. However, it has not discussed the cost of equity itself, which then affects the risk premium. Addressing the issues, this study proposes the use of CRR as a benchmark for short-term investment and ROIC for long-term investment. The former is appropriate for short-term benchmarks, as it includes the net working capital, representing the day-to-day operational activities. The latter is appropriate for long-term benchmark, as it is based on the capital invested without cash, implying a longer term of return generated.

2.3.5. Rate of Return and Macro-finance Indicators

In the theory of asset pricing, typical assets being studied range from various types, such as equities, bonds, real estate, plant and equipment, even patents and so on (Claessens & Kose, 2018). The use of asset prices is that it can become a tool for households and corporations to make an investment decision that will also influence their decision on saving and consumption.

The theory of asset pricing works by taking the present value of the stream for future cash flows or services. There will be two considerations in determining asset pricing: the discounted factor and factors influencing the stream of cash flows. For the former, it can be influenced by technology and the latter can be affected by macroeconomic variables, such as output, household consumption, corporate investment and productivity, as well as uncertainty relating to these variables and correlations among them.

As mentioned before, asset prices can help household and corporations to allocate their resources for investment, savings, and consumption. It can be calculated using *Tobin's q* theory, explaining that the market value of a firm's existing fixed capital stock can be determined by asset prices. The value can be added until the *q* converges to its equilibrium level of one. Thus, the *q* theory establishes a natural link between asset prices and corporate investment.

For example, when corporate earnings have the potential to increase, equity prices are also expected to be higher. This adjustment will be performed by the companies by changing the investment in order for the asset prices to reflect its fundamentals. This can also lead to adjustment by the households in terms of their consumption and saving behaviour.

Another strand of empirical studies is to examine the relationship between the yield spread and GDP growth (Ang *et al.*, 2006; Hamilton & Kim, 2002; Engstrom & Sharpe, 2018). The study by Ang *et al.* (2006) finds that short-term rate has better predictive power for estimating GDP growth, similar to the study by Hamilton & Kim (2002) who found similar results that changes in the short rates and term premium can predict the GDP growth.

For further examination, a study by Tang & Yan (2006) about credit spread explains that it is mostly negatively correlated with the interest rate, its yield curves are upward sloping for low-grade bonds, and it is affected by firm characteristics that vary based on the economic conditions. In relation to capital to output ratio, credit spreads can be predicted by the ratio along with interest rate changes and bond returns (Cooper & Priestley, 2013).

3. Data and Methodology

This study employs quarterly financial data for Indonesian public companies, ranging from January 2010 to March 2021, that is generated from Thomson Reuters Eikon and/or Bloomberg, with the total observation of 44,165 firm-quarter data. As for the macroeconomic indicators, such as government bonds (short- and long-term period) and yield for government benchmark series are also generated from Bloomberg and/or Thomson Reuters Eikon. The 1-year benchmark employs the Government Bond 1-year benchmark series, while the spread is calculated from the difference between the yield of 2-year and 10-year Government Bonds. This study also generates information regarding constituents of the Jakarta Islamic Index (JII), Indonesia Shariah Stock Index (ISSI), and also sectoral indices. The information on constituents of JII and ISSI is generated to further compare the value of CRR and ROIC for companies classified in different categories.

This study also employs the US dataset for further examining the robustness of the proposed return calculation. The quarterly financial data of non-financial companies listed in the S&P 500, which includes large, medium, and small size companies, is also generated from Thomson Reuters Eikon for the period of 2003-2021.

After generating all the data for the variables, the analysis of data consists of statistical descriptive, correlation in terms of its value and graphical plot, both at the univariate and multivariate level. As for the descriptive of time series pattern for all the variables, it is examined at the numerator and denominator levels. Following the descriptive analysis of the series, the calculation for CRR and ROIC is conducted at the individual level, which then is aggregated for further analysis, particularly in relation to its transmission in the financial sector.

3.1. Calculating CRR

In calculating the individual CRR, at a firm level, this study employs the CRR formula used by Taylor (1999) since this formula is claimed to have accommodated various CRR formulas that have been used before and the complexity of company's activities reflected in the financial report. The formula is presented in equation (8) as follows:

$$CRR_{it} = \frac{INCBD_{it}+RD_{it}+INTEXP_{it}+DELWC_{it}-T(INCBD_{it}-DEPR_{it})}{TASS_{it}-CL_{it}+ACCDPR_{it}+\sum_{r=1}^{R} RD_{it-r}+\sum_{s=1}^{S} ADV_{it-s}} \quad (8)$$

where $INCBD_{it}$ is operating income (before tax) that reflects the operational aspect of the company, while RD_{it} is research and development expenses being counted back as it has long-term implications. $INTEXP_{it}$ is interest expenses being added back because it is part of the financial cash flow, while $DELWC_{it}$ is the change (liquidation) of net working capital reflecting the adjustment conducted by the company in the short-term by liquidating the current assets and increasing short-term liabilities. In addition, $T(INCBD_{it} - DEPR_{it})$ is the marginal tax that has to be paid by a company, $TASS_{it}$ is the total asset, CL_{it} is the current liabilities that need to be paid for long-term liabilities that are due in one year, $ACCDPR_{it}$ is the accumulation of depreciation expenses being added back to estimate the total investment incurred by the

company. The last component is the $\sum_{r=1}^{R} RD_{it-r} + \sum_{s=1}^{S} ADV_{it-s}$ explaining the accumulation of R&D and advertising expenses for 25 years as it is accounted for investment with long-term consequences. *i* denotes the company and *t* shows the time period.

3.2. Calculating ROIC

Aside from CRR, this study also employs ROIC to measure the long-term rate of return, which can also reflect the business risk premium of a company. The ROIC formula employed in this study is based on Damodaran (2007) presented in equation (9) as follows:

$$ROIC_{it} = \frac{EBIT_{it}(1-tax_{it})}{BV\ of\ invested\ capital_{it}} \qquad (9)$$

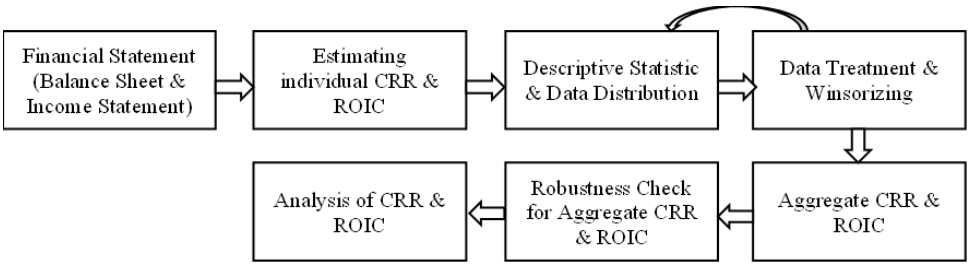
Where $ROIC_{it}$ is the return on invested capital of company *I* at time *t*, $EBIT_{it}$ is the earning before interest and tax or company's operating income, tax_{it} denotes the marginal tax rate of the company, and $BV\ of\ invested\ capital_{it}$ is the book value of a company's long term investment. As for the $BV\ of\ invested\ capital_{it}$, it is estimated by using information in company's balance sheet presented in equation (10) as follows:

$$Invested\ Capital_{it} = FA_{it} + CA_{it} - CL_{it} - Cash_{it} \qquad (10)$$

where $FA_{it}$is the value of the fixed asset of the company *i* at time *t*, $CA_{it}$is the value of current assets, $CL_{it}$is the value of current liabilities, and $Cash_{it}$ is the amount of cash.

3.3. Methodology Process

Figure 1 summarises the steps of the methodology process conducted in this study, starting with generating the dataset from firm's financial statement, estimating the individual value of CRR and ROIC, analysing the descriptive statistic and data distribution, data treatment using winsorizing, calculating the aggregate value of CRR and ROIC, checking the robustness of aggregate CRR and ROIC, and the final analysis of CRR and ROIC.



Source : Author

Figure 1. Methodology

For analysing the return measures being constructed, this study employs several measurements, which are: (i) grouping the companies based on particular category, (ii) correlations with macro-finance indicators, and (iii) correlation with SMB and HML coefficient.

Categorising the companies

This study employs all non-financial companies listed on Indonesia Stock Exchange from 2003 until 2021. As a country that is developing its Islamic finance sector, the regulator also provides an Islamic stock index, namely Jakarta Islamic Index (JII) and Indonesia Sharia Stock Index (ISSI) which are based on the *shari'ah* screening criteria stipulated by the regulator.

In Indonesia itself, the *shari'ah* screening is based on the types of businesses the companies are in and the financial ratios of the companies. The first criteria are that the company should not be involved in activities related to gambling, fictitious trade, interest-based financial institutions, and non-halal products. The second criterion is related to the financial ratios, such as the debt-to-equity ratio should not exceed the 45% threshold and the ratio of income from

interest and non-halal activities to total income should be less than 10%. As for the difference between JII and ISSI, the latter consists of all stocks fulfilling the *shari'ah* requirements, while the former consists of the 30 most liquid stocks.

Correlation with Macrofinance Indicators

The measurements constructed in this study are to examine the real return generated by companies from the operational activities, which can have a correlation with macro-finance indicators. There are two indicators employed in this study, namely the 1-year benchmark for the government bond and the spread between 10-year and 2-year government bonds (Engstrom & Sharpe, 2018). The study explains that this long-term spread has been employed in the model prediction of the recession of GDP growth. As for the short-term government bond yield, it is explained that it has a procyclical characteristic that is to stimulate economic activity, indicating that it can have a relationship with the company's performance (Ang *et al.*, 2004).

Correlation with SMB and HML Coefficients

The third robustness check will employ SMB and HML coefficients, following a study by Morana (2014) explaining that the coefficients of SMB and HML can indicate the business cycle and have a relationship with macro-finance indicators. The SMB and HML are based on the study of the Fama French three-factor model, an extension to the Capital Asset Pricing Model (CAPM), aiming to capture the premium generated between small and big market capitalisation (SMB) and the premium from the high minus low book-to-market value. The portfolio will be constructed into five groups based on the market capitalisation and book-to-market value of the stocks listed on the Indonesia stock exchange. Obtaining the return from the portfolio, the CAPM is then estimated to generate the coefficients of SMB and HML.

In estimating the coefficients, the rolling regression is conducted by using 250 days (one year) rolling window.

$$Rp_t - Rf_t = a + b(Rm_t - Rf_t) + sSMB_t + hHML_t + e_t \quad (11)$$

Where Rp_t is the return of portfolio at time *t*, Rf_t is the return for the risk-free asset at time *t*, Rm_t is the market return at time *t*, SMB_t is the return for a small minus big capitalization portfolio at time *t*, and HML_t is the return for high book-to-market minus low high book-to-market at time *t*.

3.4. Robustness check

In examining the robustness check of the proposed measurement, CRR and ROIC, this study calculates the CRR and ROIC from the US public companies. The firms are non-financial companies listed in the S&P 500, S&P 400 mid-cap, and S&P 600 small-cap indices, generated from Refinitiv Eikon. The pattern of CRR and ROIC is then examined to see the comparison with the Indonesian results. In addition, the CRR and ROIC are also compared with the short-term (3-month, 6-month, and 1-year) benchmark rate and the yield spread, which the data is generated from St Louis Fed website. Furthermore, coefficients of SMB and HML are also estimated to examine the correlation with CRR and ROIC, also to compare with the Indonesian results. The data for SMB and HML are generated from Kenneth French's data library. The formula for calculating CRR, ROIC, and coefficients of SMB and HML follows equations 8, 9, and 11, respectively.

4. Discussion and Analysis

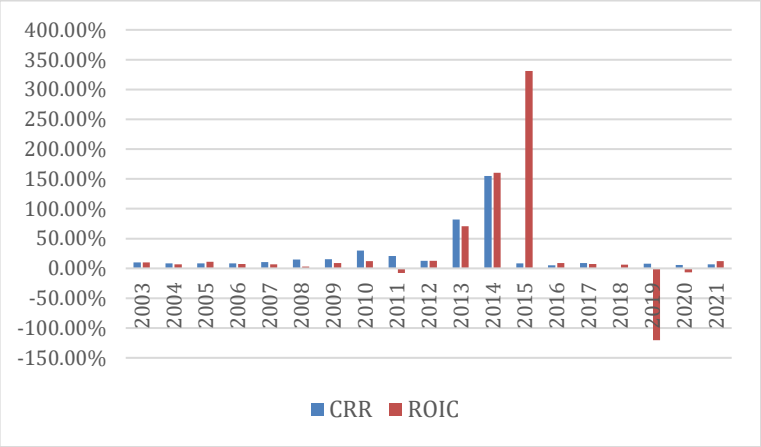
This section will explain the descriptive statistics for the value of CRR and ROIC in the firm and aggregate levels, followed by the comparison of CRR and ROIC with values of one-year benchmark and spread that present the short-term and long-term indicators, respectively.

4.1. Descriptive Statistics

This section explains the values of CRR and ROIC at the firm level, which is presented in Figure 2, showing that there is an extreme value of outlier. It is shown that the range of value is quite high, from around 0% to 300%. Comparing the mean values and standard deviation of CRR and ROIC, Figures 2 and 3 depict that the values of standard deviation for CRR is always higher than its average values. At certain periods, the value of standard deviation also shows extreme outlier values.

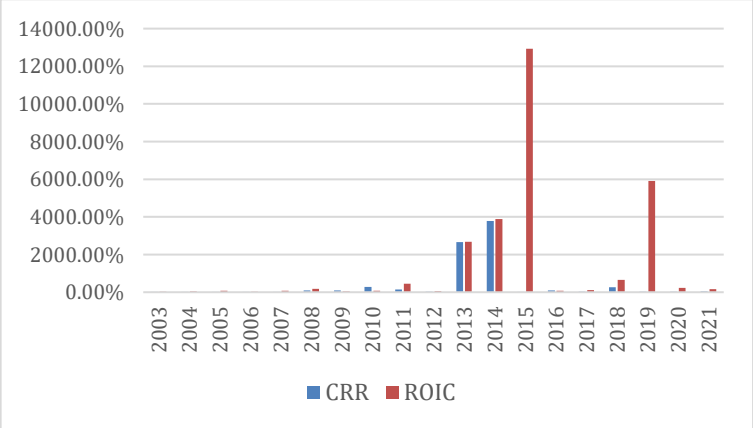
This finding indicates that it is necessary to conduct further treatment for the firm-level CRR and ROIC values. This treatment can be conducted by examining the distribution, such as minimum, maximum, and percentile values to see the extreme values of CRR and ROIC in each period. If the number of outliers is relatively fewer compared to the total observation, the data cleansing process of employing winsorising techniques is appropriate.

Data cleansing can be conducted if there is a big difference between the value of minimum-maximum and the value within the percentile high-low. For the percentile, it can be determined arbitrarily, although a percentile higher than 5% (lower than 95%) should be avoided since it shows the data intervention is too large. In the preliminary data, there are several periods that the value of minimum and maximum CRR is very extreme. Looking at the percentiles 2% and 98%, the value of CRR on those percentiles is quite large compared to the minimum-maximum values. The winsorising can be conducted for 4% of the data per period by cutting all the values below the percentile 2% and higher than percentile 98% from the preliminary dataset.



Source : Author

Figure 2. Mean Values of CRR and ROIC



Source : Author

Figure 3. Standard Deviation of CRR and ROIC

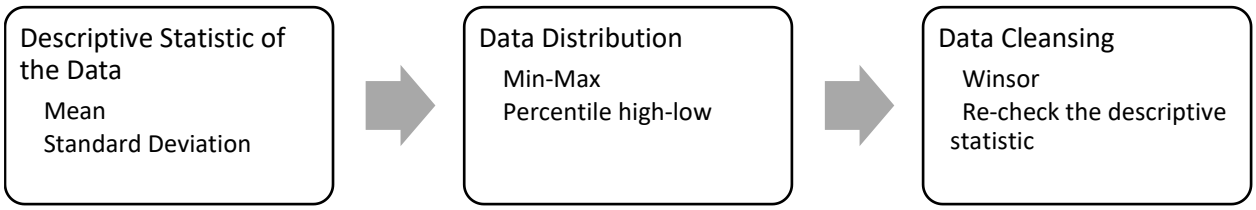


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Figure 4. Steps for the Data Treatment

Table 1. Preliminary Data Distribution

Period	Min	Max	Percentile	
			2%	98%
2010 Q1	-29.53%	5489.87%	-6.08%	70.32%
2010 Q2	-28.23%	167.09%	-9.59%	45.63%
2010 Q3	-39.42%	5862.43%	-8.29%	63.86%
2010 Q4	-43.38%	3206.29%	-5.21%	72.01%
2011 Q1	-47.99%	3061.03%	-6.79%	50.76%
2011 Q2	-815.06%	2928.88%	-22.36%	54.84%
2011 Q3	-832.31%	1010.97%	-7.28%	64.88%
2011 Q4	-220.53%	298.96%	-4.26%	62.99%
2012 Q1	-64.43%	280.18%	-6.40%	52.42%
2012 Q2	-150.85%	209.93%	-7.20%	65.35%
2012 Q3	-200.90%	159.79%	-6.63%	50.44%
2012 Q4	-36.16%	245.24%	-6.08%	48.46%
2013 Q1	-27.20%	59.15%	-7.36%	40.56%
2013 Q2	-36.71%	145.72%	-8.40%	40.42%
2013 Q3	-66.08%	73.69%	-3.40%	36.94%
2013 Q4	-9.23%	99875.49%	-2.42%	45.91%
2014 Q1	-96.64%	102164.32 %	-5.80%	34.41%
2014 Q2	-94.66%	104366.38 %	-5.69%	38.81%
2014 Q3	-90.46%	9669.69%	-5.92%	34.09%
2014 Q4	-34.76%	68.46%	-7.35%	44.12%
2015 Q1	-60.61%	78.61%	-8.49%	34.23%
2015 Q2	-60.95%	82.46%	-10.68%	42.18%
2015 Q3	-59.06%	128.53%	-11.62%	37.65%
2015 Q4	-112.16%	290.98%	-9.15%	42.29%

Period	Min	Max	Percentile	
			2%	98%
2016 Q1	-1284.71%	2807.72%	-17.19%	38.14%
2016 Q2	-1299.20%	64.23%	-13.25%	32.56%
2016 Q3	-1334.39%	71.42%	-21.84%	39.45%
2016 Q4	-258.79%	96.76%	-10.47%	49.34%
2017 Q1	-287.42%	468.11%	-13.86%	36.30%
2017 Q2	-91.03%	310.35%	-11.32%	39.75%
2017 Q3	-130.19%	395.43%	-11.13%	45.74%
2017 Q4	-29.02%	83.57%	-8.74%	45.01%
2018 Q1	-77.41%	91.88%	-9.96%	40.95%
2018 Q2	-5516.85%	79.92%	-12.25%	43.26%
2018 Q3	-9981.58%	90.65%	-10.49%	39.96%
2018 Q4	-1256.81%	103.91%	-7.81%	40.37%
2019 Q1	-144.40%	326.32%	-10.85%	37.87%
2019 Q2	-147.94%	228.05%	-9.75%	37.09%
2019 Q3	-158.30%	121.66%	-11.74%	36.77%
2019 Q4	-318.39%	311.51%	-7.82%	40.89%
2020 Q1	-430.75%	110.73%	-11.33%	35.69%
2020 Q2	-577.41%	80.42%	-18.26%	30.59%
2020 Q3	-578.73%	184.41%	-20.34%	34.96%
2020 Q4	-63.39%	906.35%	-11.55%	48.28%

Table 2 presents the descriptive statistics after the winsorising technique is conducted, showing that the data distribution is relatively better compared to the preliminary dataset. On the other hand, Table 2 also shows that in several periods, at the firm level, the standard deviation of CRR and ROIC is still higher than its average value. Further, it can also be seen that the data distribution is relatively not normal (skewed), which implies that the mean and

median values have the potential to be biased. Hence, the firm-level CRR and ROIC should be used carefully for policy formulation.

Table 2. Descriptive Statistics Firm Level – Winsorized

Panel a: Descriptive Statistic Firm Level			
Period	Descriptive	CRR	ROIC
2003	Mean	9.96%	8.91%
	St. Dev	11.20%	15.66%
2004	Mean	8.16%	7.11%
	St. Dev	9.82%	14.36%
2005	Mean	8.65%	8.14%
	St. Dev	9.54%	13.07%
2006	Mean	8.49%	7.41%
	St. Dev	9.06%	12.66%
2007	Mean	9.96%	8.57%
	St. Dev	10.20%	17.11%
2008	Mean	11.77%	11.06%
	St. Dev	11.85%	18.92%
2009	Mean	10.61%	10.34%
	St. Dev	11.80%	18.48%
2010	Mean	11.45%	10.14%
	St. Dev	13.24%	16.99%
2011	Mean	12.53%	11.63%
	St. Dev	13.38%	20.61%
2012	Mean	12.05%	12.86%
	St. Dev	12.26%	21.25%

Panel a: Descriptive Statistic Firm Level			
Period	Descriptive	CRR	ROIC
2013	Mean	10.59%	10.96%
	St. Dev	9.89%	14.20%
2014	Mean	9.70%	9.45%
	St. Dev	9.57%	12.51%
2015	Mean	8.36%	6.98%
	St. Dev	9.88%	12.44%
2016	Mean	7.46%	6.50%
	St. Dev	10.66%	14.75%
2017	Mean	8.19%	7.94%
	St. Dev	10.19%	15.91%
2018	Mean	8.62%	7.51%
	St. Dev	10.10%	14.28%
2019	Mean	7.87%	6.03%
	St. Dev	9.35%	12.08%
2020	Mean	6.29%	2.93%
	St. Dev	9.64%	15.50%
2021	Mean	4.61%	3.48%
	St. Dev	8.97%	15.39%

4.2. Aggregate Level for CRR and ROIC Value

After examining the firm-level values of CRR and ROIC, the values are aggregated in order to minimise bias due to data distribution. To aggregate the data, it can be structured using a value-weighted method by allocating the highest weight to the company with a big size. The robustness check is employed by using the values of mean and median and excluding minimum-maximum or quantile I and III in the data distribution to avoid any outlier. There are four measurements in the aggregate level: (i) mean of CRR, (ii) mean of ROIC, (iii) standard deviation of CRR, and (iv) standard deviation of ROIC. Those four measurements show a uniform trend for the data movement in which only the average value of CRR has a high increase in several periods (*see:* Figure 6). Additionally, Table 4 depicts that there is a high correlation among the CRR values with different methods of aggregating CRR. However, in terms of value, value-weighted CRR has the highest value compared to other methods.

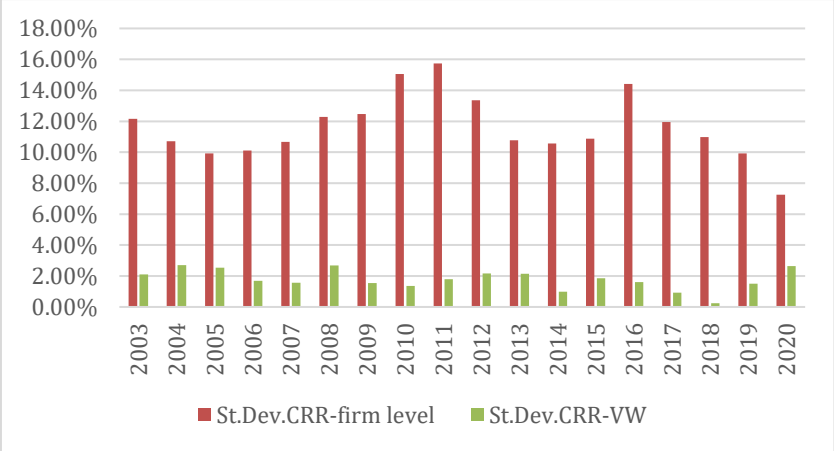
Table 3. Descriptive Statistics – Aggregate Level (Clean)

Panel b: Descriptive Statistic Aggregate Level			
Period	Descriptive	CRR	ROIC

Panel b: Descriptive Statistic Aggregate Level			
Period	Descriptive	CRR	ROIC

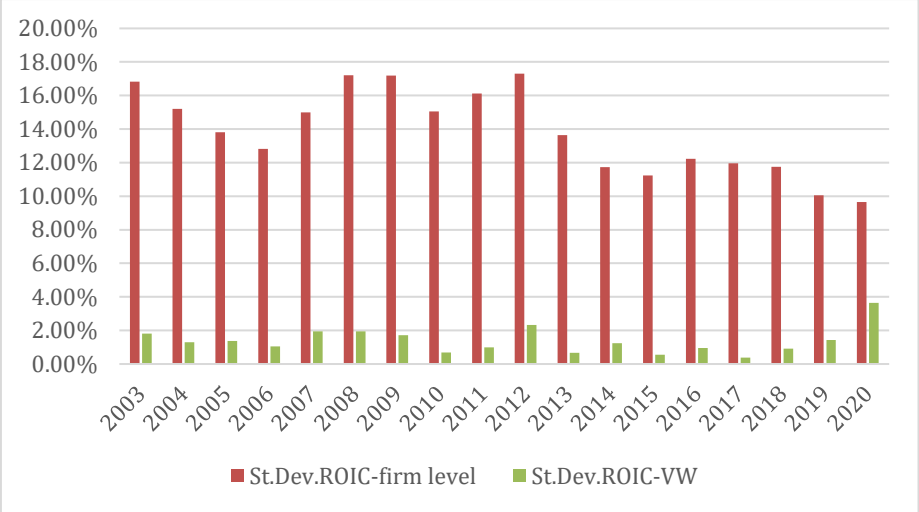
2003	Mean	19.06%	22.88%
	St. Dev	1.79%	3.78%
2004	Mean	15.06%	20.40%
	St. Dev	2.04%	0.94%
2005	Mean	15.64%	21.34%
	St. Dev	1.72%	1.76%
2006	Mean	14.56%	21.46%
	St. Dev	1.67%	1.49%
2007	Mean	17.28%	25.96%
	St. Dev	0.85%	2.05%
2008	Mean	18.47%	27.09%
	St. Dev	2.23%	2.78%
2009	Mean	16.94%	25.39%
	St. Dev	1.52%	1.79%
2010	Mean	19.28%	25.88%
	St. Dev	1.35%	1.85%
2011	Mean	20.47%	27.48%
	St. Dev	1.59%	2.25%
2012	Mean	20.83%	31.48%
	St. Dev	1.84%	5.85%

2013	Mean	17.98%	24.33%
	St. Dev	0.73%	1.07%
2014	Mean	16.05%	21.17%
	St. Dev	1.11%	1.57%
2015	Mean	15.73%	19.04%
	St. Dev	1.25%	0.46%
2016	Mean	16.58%	20.68%
	St. Dev	1.67%	1.61%
2017	Mean	16.47%	23.58%
	St. Dev	1.00%	2.03%
2018	Mean	16.10%	22.68%
	St. Dev	0.29%	2.34%
2019	Mean	14.19%	17.29%
	St. Dev	0.69%	2.83%
2020	Mean	12.20%	13.60%
	St. Dev	0.61%	1.12%
2021	Mean	9.56%	12.79%
	St. Dev	NA	NA



Source : Author

Figure 4. Standard Deviation for CRR: Firm-level vs Value-weighted



Source : Author

Figure 5. Standard Deviation for ROIC: Firm-level vs Value-weighted

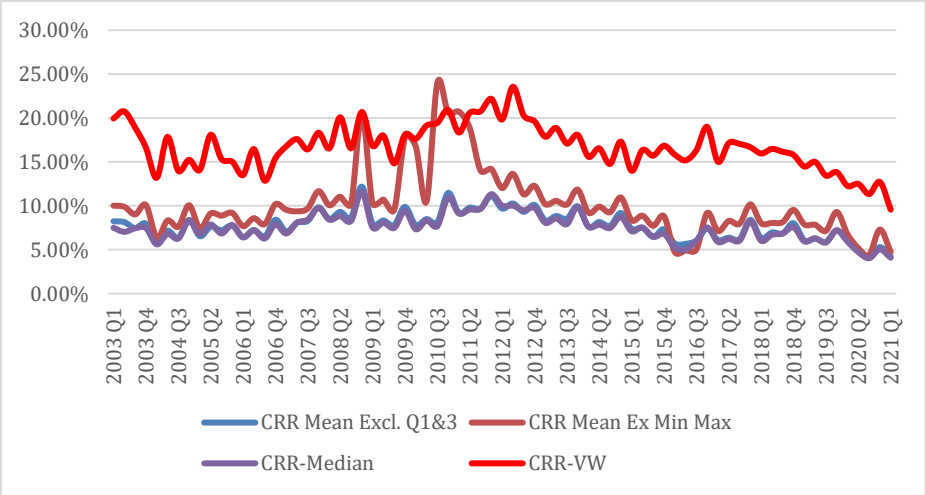


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Figure 6. Pattern of CRR with Various Methods of Aggregating CRR

Table 4. Correlation of CRR between Various Methods of Aggregating CRR

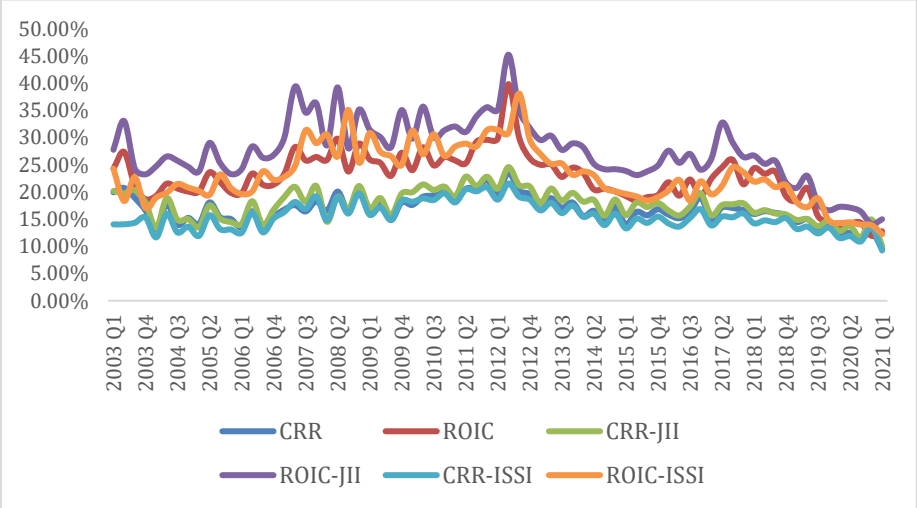
	CRR Mean Excl. Q1&3	CRR Mean Ex Min Max	Median	CRR-VW
CRR Mean Excl. Q1&3	1			
CRR Mean Ex Min Max	0.7789	1		
Median	0.9874	0.7559	1	
CRR-VW	0.8186	0.6680	0.7998	1

Aggregate Data with Particular Criteria

We also classify our sampled firms based on the Jakarta Islamic Index (JII) or Indonesia Shariah Stock Index (ISSI) to estimate the Cash Recovery Rates. The *shari'ah* screening criteria is developed as guidance for investors who are conscious about the *shari'ah*-compliancy of stocks that they want to invest. Considering that the sampled companies in this study are not differentiated between the *shari'ah*-compliance and non-*shari'ah* compliance, this section

provides the values of CRR and ROIC for stocks included in JII and ISSI to see whether there is a difference between *shari'ah*-compliance and non-*shari'ah* compliance companies.

Figure 7 shows the pattern of movement for CRR and ROIC in terms of all companies, companies constituted in JII, and companies constituted in ISSI. It shows that it has a similar movement, strengthened by the correlation presented in Table 5, showing that the correlation values are always higher than 65%. It implies that there is no difference in terms of the pattern for CRR and ROIC between companies classified as *shari'ah* stock and non-*shari'ah* stocks.



Source : Author

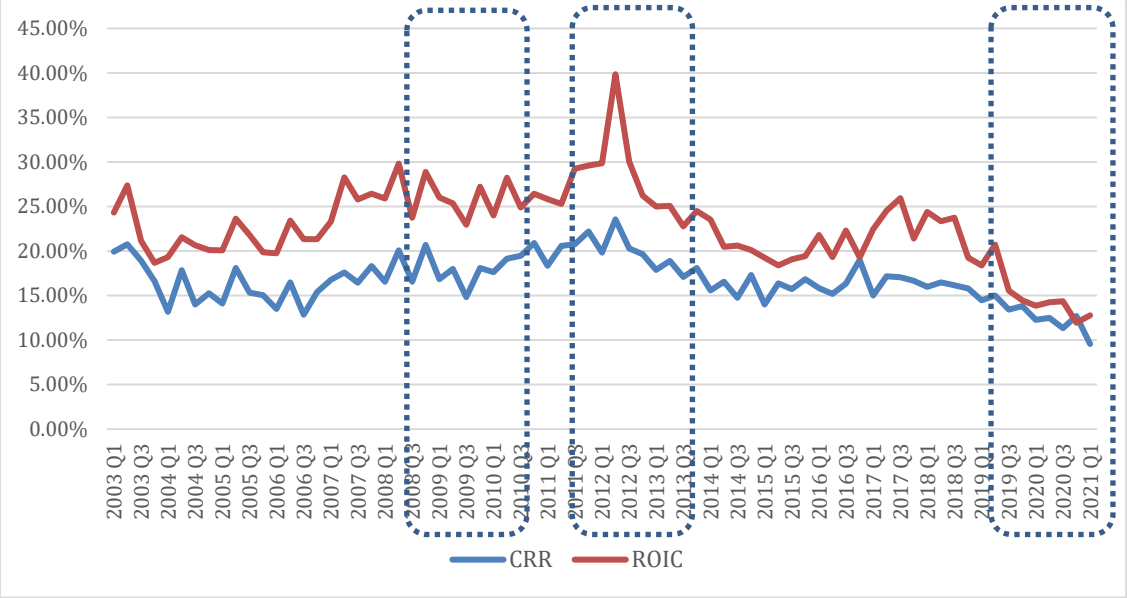
Figure 7. CRR and ROIC with Various Criteria/Group

Table 5. Correlation Between CRR and ROIC with Different Criteria/Group

	CRR	*ROIC*	*CRR-JII*	*ROIC-JII*	*CRR-ISSI*	*ROIC-ISSI*
CRR	1					
ROIC	0.8460	1				
CRR-JII	0.9436	0.7836	1			
ROIC-JII	0.8150	0.9638	0.7962	1		
CRR-ISSI	0.8937	0.8135	0.9266	0.8281	1	
ROIC-ISSI	0.6824	0.7876	0.6542	0.7664	0.752	1

Pattern for CRR and ROIC

After examining the descriptive statistics and patterns of CRR and ROIC in terms of the mean and standard deviation, also the aggregate method, this section compares the values of CRR and ROIC. Both series have similar movement patterns with a high correlation, that is 0.85. Looking further, the movement of CRR is more dynamic compared to the ROIC. It can be due to the calculation of CRR that includes changes in net working capital (*DELWC*) that represents the operational activities of companies in a short-term period. It implies that firms adjust their working capital dynamically in the short-term to respond to the current business environment. If there is pressure in the short-term that should be responded to quickly, firms will liquidate their working capital. On the other hand, the formula for calculating ROIC does not measure the short-term activities of the companies, as it directly employs after-tax operating cash flow as the numerator.



Source : Author

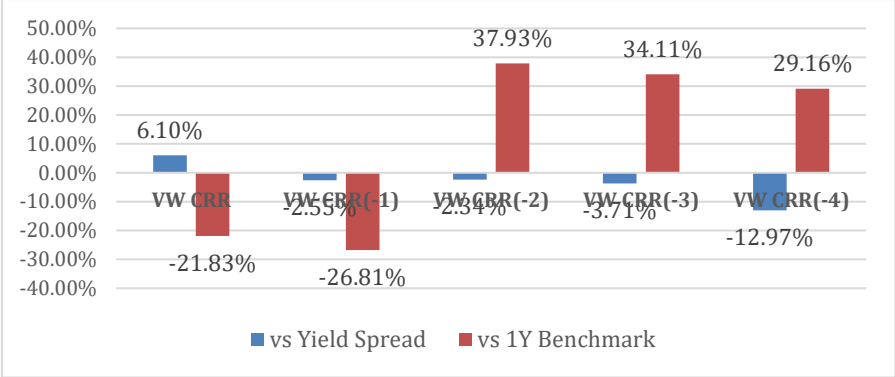
Figure 8. Patterns of CRR and ROIC

The pattern of CRR and ROIC in Figure 8 shows the business cycle of the real sector in Indonesia, presenting that there are several events that the values of CRR and ROIC represent the business cycle of the real sector in Indonesia. In the period of the global financial crisis (2007-2009), the values of CRR and ROIC were relatively stable although there was a decrease. In the period of 2011-2013, CRR and ROIC experienced a significant increase compared to the previous period showing that the fundamental condition of the real sector in Indonesia was in great condition. On the other hand, when the social restriction was put in place in 2020-2021 as a response to the Covid-19 pandemic situation, the performance of the real sector experienced a significant decrease (*see* the third box in Figure 8).

Over the period of the first quarter in 2021, the economic condition is getting better shown by an increase in ROIC values although the CRR is still experiencing a decrease. It indicates that firms in Indonesia have started to generate profit from their business although they still have to adjust their working capital to fulfil the short-term operational needs. To further confirm the analysis, CRR and ROIC are compared with the macro-finance indicators, namely 1-year benchmark rate and yield spread. In addition, the CRR and ROICS will also be compared with coefficients of SMB and HML that are taken as able to reflect the business cycle in the economy.

Correlation between CRR-ROIC and Macro-finance Indicators

To further examine the values of CRR and ROIC in reflecting its ability to measure the rate of return of firms, Figure 9 presents the correlation between CRR and macro-finance indicators, namely yield spread (10-year and 2-year treasury bond yield) and one-year yield benchmark. It shows that the correlation between CRR and yield of the one-year benchmark is higher compared to the correlation between CRR and yield spread. On the other hand, Figure 10 presents the correlation between ROIC and microfinance indicators, showing that ROIC has a higher correlation with yield spread compared to its correlation with the yield of the one-year benchmark. It can indicate that CRR is closely linked with the real sector in the short-term, while ROIC is closely linked with the real sector in the long-term.



Source : Author

Figure 9. Correlation between CRR and Macro-finance Indicators

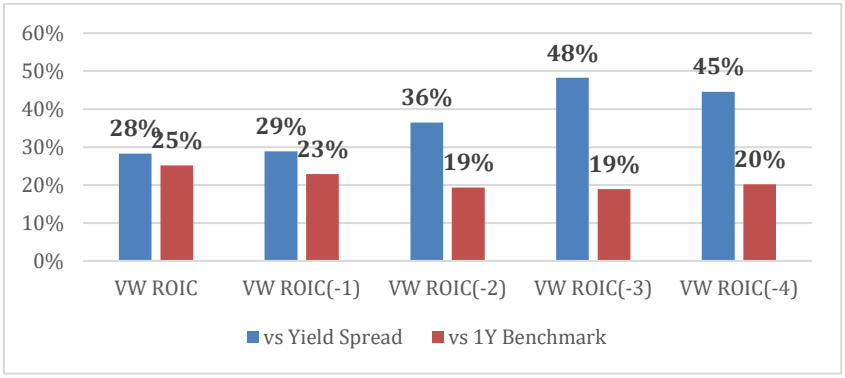


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Figure 10. Correlation between ROIC and Macro-finance Indicators

Correlation with SMB and HML Coefficients

This section explains the relationship between the values of CRR and the coefficients of SMB and HML that is according to Morana (2014) who explains that the coefficients of SMB and HML can predict the investment growth prospect of firms and the business cycle. This study calculates the coefficients of SMB and HML for Indonesian companies, shown in Figures 11 and 12. It presents the pattern of CRR, ROIC, and coefficients of SMB and HML, showing that the coefficients have negative values and contrasting values from CRR and ROIC.

In the theoretical framework, coefficients of SMB and HML are expected to have positive values implying the existence of premiums for small-cap stocks and growth stocks. On the other hand, the result for the Indonesian dataset shows the opposite. The coefficients of SMB dan HML in Indonesia have negative values in several periods and show a particular cycle. It shows that there is no risk premium for that particular period. For example, during the global financial crisis in 2007-2009, the coefficients of SMB and HML were negative, depicting the absence of risk premium from the market when there is a big shock in the market. These negative coefficients can be due to the method of rolling regressions or can be termed a short-term estimate of the coefficients. When the coefficients are estimated in the long-term or overall period, the result shows positive coefficients of SMB and HML, consistent with the results from the US although the short-term coefficients are positive for the US (*see*: Figure 13).

Further examining the correlation, Table 6 shows that CRR and ROIC have a negative correlation with coefficients of SMB and HML. It indicates that for Indonesian companies, big cap and value stocks have higher CRR and ROIC. It confirms the trend of CRR-ROIC and SMB-HML presented in Figures 11 and 12. The negative correlation between CRR-ROIC and SMB HML indicates that there is no risk premium based on size or book-to-market value for firms in

Indonesia. Firms with big capitalisation and low book-to-market have a higher rate of return (CRR and ROIC) compared to firms with small capitalisation and low book-to-market. It implies that investors in Indonesia are still leaning toward investing their funds in big and stable companies rather than small firms that have the potential for high growth. This can be due to the high uncertainty in Indonesia, causing investors to be reluctant to allocate their funds to small firms that have the potential for high growth.

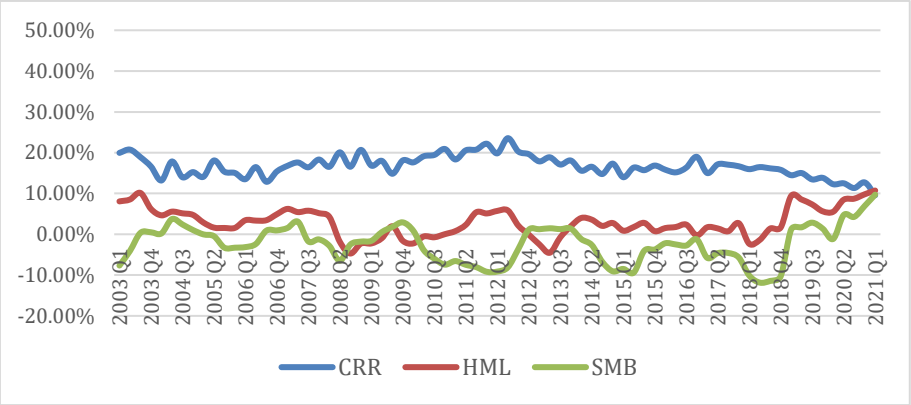

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Figure 11. Pattern CRR and Coefficients of SMB and HML

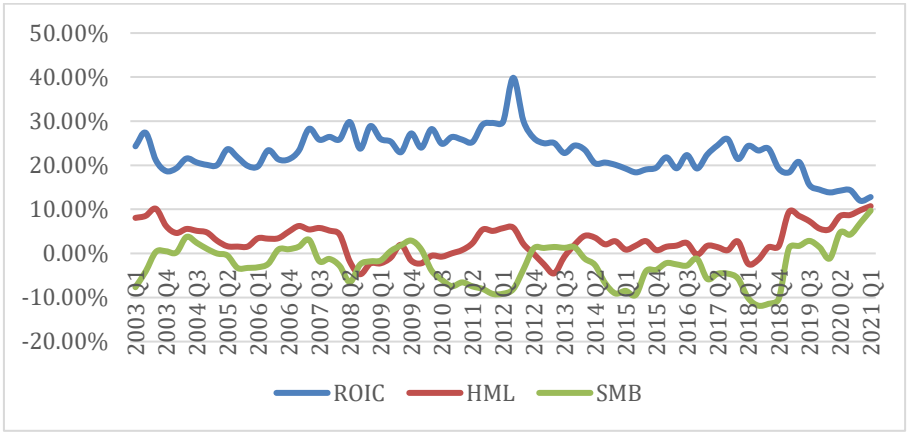

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Figure 12. Pattern ROIC and Coefficients of SMB and HML

Table 6. Correlation between CRR, ROIC, and Coefficients of SMB and HML (Indonesia from Q1-2003 to Q1-2021)

	CRR	*ROIC*	*SMB*	*HML*
CRR	1			
ROIC	0.8460	1		
SMB	-0.4585	-0.4233	1	
HML	-0.3158	-0.3628	0.3378	1

4.3. Robustness Check

CRR, ROIC, SMB, and HML: the US Dataset

This section presents the calculation for CRR, ROIC, and coefficients of SMB and HML for the US companies, aiming to examine the robustness of results from Indonesia data and the

US data. The US data employs a sample of non-financial companies listed as constituents of the S&P 500 index, S&P 400 mid-cap index, and S&P 600 small-cap index. The total sample is 51,356 firm-quarter observations, consisting of 694 firms in 74 periods. As for estimating the coefficients of SMB and HML, the 3FF generated from Kennet French website is employed.

Figure 13 shows that CRR and ROIC from public companies in the US are able to reflect the performance of the real sector in the US. The results are consistent with Hall (2018) in which the period 2007-2009 had a significant decrease, which then recovered in 2011-2012. On the other hand, compared to the result from Indonesia, the performance of the real sector in the US is more stable with standard deviations of 0.65% and 1.60% for CRR and ROIC, respectively. The deviation is much lower compared to the Indonesian data with standard deviations of 2.64% and 4.68% for CRR and ROIC, respectively.

Figures 14 & 15 show the correlation between CRR-ROIC and the US macro-finance indicators, namely short-term yield (3-month, 6-month, and 1-year benchmark) and spread (10-year and 2-year US treasury bond). The correlation shows a different result from Indonesia, which Figures 15 and 16 present that CRR and ROIC in the US are consistently having a positive correlation, both in contemporaneous and lag terms, with the benchmark yield.

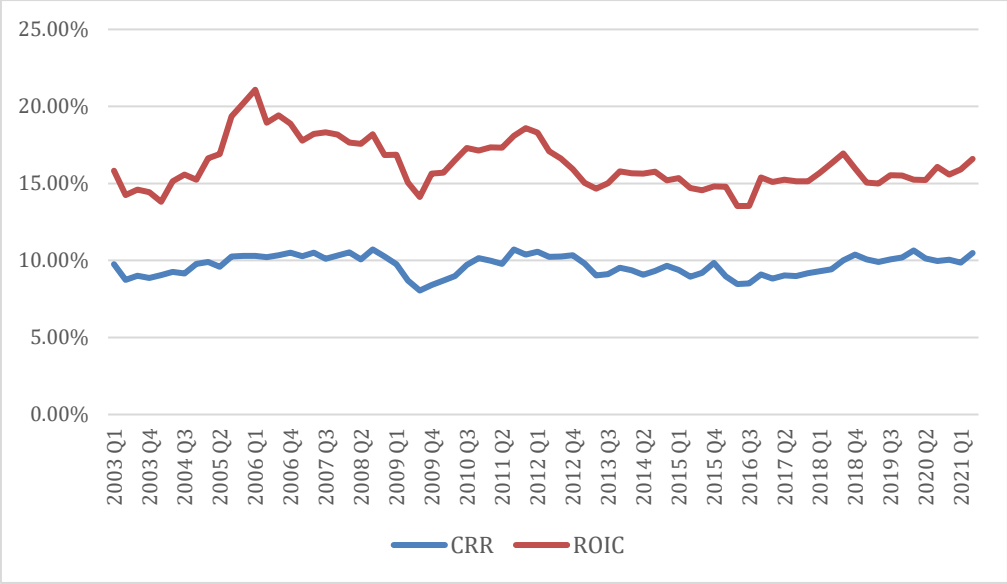

Figure 13. CRR & ROIC USA

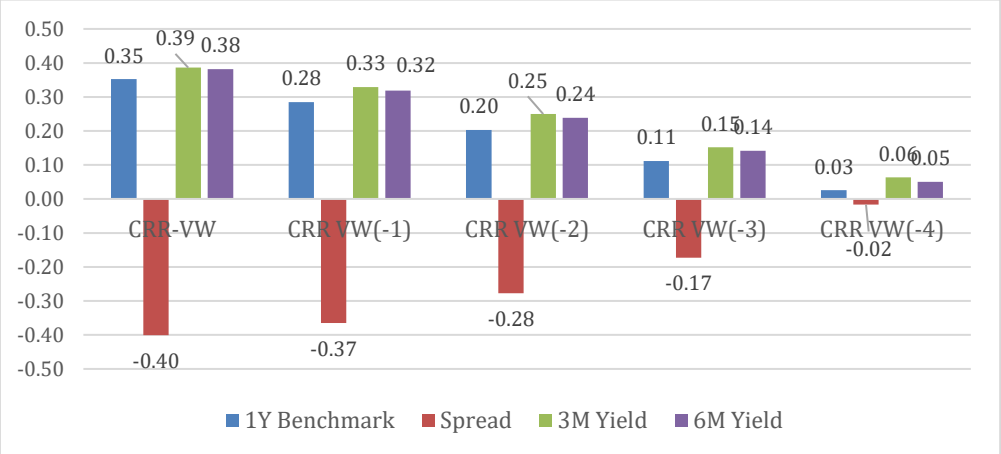

Figure 14. CRR and Macrofinance Indicator of USA

On the other hand, CRR and ROIC in the US have a negative correlation with yield spread. It is due to the nature of the economy in the US that is supported by the financial sector, making the information that occurs in the real sector directly accommodated in the financial market indicators. In other words, indicators in the financial sector already represent the performance of the real sector. It is in contrast with Indonesia whose financial sector is still developing (Beck *et al.*, 2009; Cihak *et al.*, 2012). It is indicated by the results for CRR and ROIC in Indonesia, showing that there is not yet perfect integration between financial and real sectors. Hence, using indicators of the financial sector to measure the performance of the real sector can mislead, which supports the previous study by Azad et al. (2018) that Islamic finance should have its own benchmark rate.

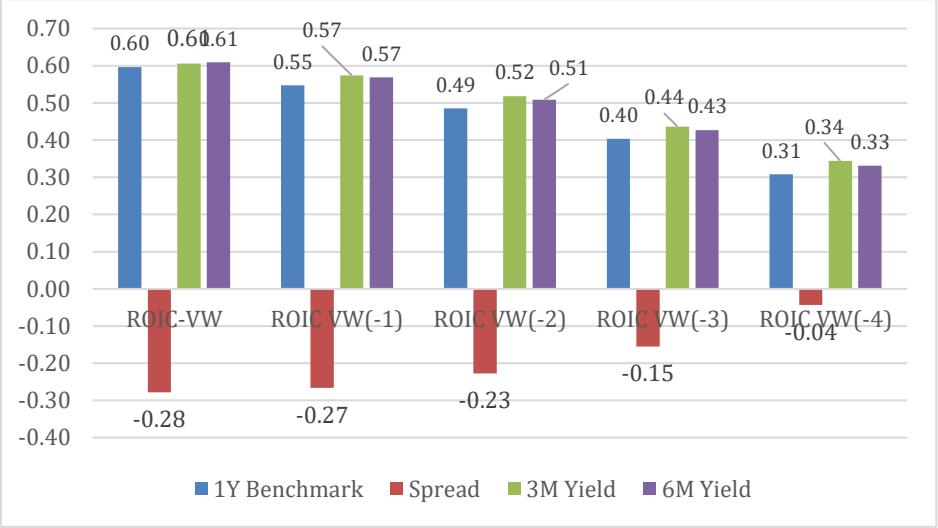

Figure 15. ROIC and Macrofinance Indicator of USA

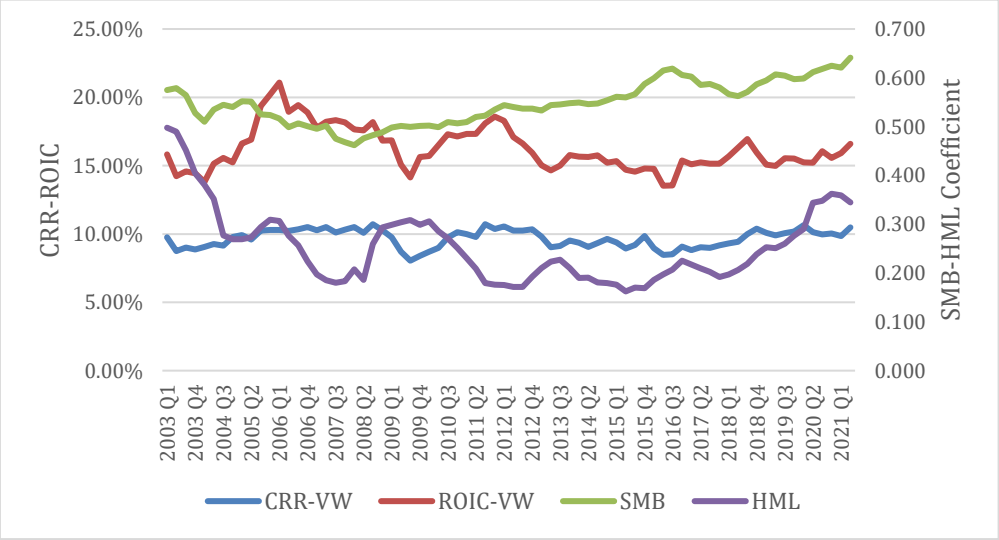

Figure 16. CRR-ROIC and SMB-HML coefficient

Table 7. Correlation between CRR, ROIC, and Coefficients of SMB and HML

	CRR-VW	*ROIC-VW*	*SMB*	*HML*
CRR-VW	1			
ROIC-VW	0.705	1		
SMB	-0.175	-0.536	1	

HML	-0.141	-0.142	0.131	1

Figure 16 shows the pattern of CRR-ROIC and coefficients of SMB-HML in the US, which is different from Indonesia (*see*: Figures 12 and 13). The coefficients in the US are always positive, indicating that risk premiums, both size and value, exist in the US financial market, which is consistent in literature identifying the size effect and value effect in the financial market. On the other hand, Table 7 presents a consistent result with Indonesia's when examining the correlation between CRR-ROIC and SMB-HML in the US, which both have a negative correlation.

5. Conclusion

This study aims to propose a *shari'ah* reference rate, a distinctive reference rate that can be employed by Islamic financial institutions in delivering their products. Islamic finance has been criticised for not being fully *shari'ah*-compliance, as it still refers to the conventional benchmark rate in delivering its financial products. In a response to that, several measurements have been developed in an attempt to provide a distinguished reference rate. However, previous empirical studies consistently (*see*: Azad *et al.*, 2018; Smaoui & Nechi, 2019; Tlemsani, 2020) showed that the reference rates had a long-run relationship with conventional benchmark rates and also had a close movement with interest rates. Although it is deemed not to violate the *shari'ah* principles, nevertheless the absence of a reference rate can be one of the causes of Islamic finance unable to deliver authentic products.

In response to that, this study attempts to argue the use of Cash Recovery Rate (CRR) and Return on Invested Capital (ROIC) as the proposed *shari'ah* reference rate, which can minimise the potential effect of interest income or expense and other non-operating income or expenses. This study employs quarterly data from non-financial companies listed in the Indonesia Stock Exchange from 2003 up to Q1-2021. The CRR and ROIC are calculated at the firm-level, which is then aggregated to obtain one value per period. After obtaining the aggregate-level of CRR and ROIC values, the pattern showing that CRR and ROIC are aligned with several events, such the global financial crisis and Covid-19 pandemic. It shows that during those periods, the CRR and ROIC experienced a decrease in their value.

For further examination, the CRR and ROIC are then compared to the Indonesian Government Bond 1-year benchmark and Government Bond yield spread. The results show that CRR has a relatively higher correlation with 1-year benchmark rate in which the degree of correlation reaches the highest point at the second lag of CRR and then slightly declines for lags 3 and 4. In addition, ROIC has a relatively higher correlation with the yield spread, indicating that ROIC can predict the expected condition of the economy in the future.

Categorising the sample into *shari'ah*-compliance and non-*shari'ah* compliance stocks provides consistent results regarding the value of CRR and ROIC, as they have similar movement. Additionally, the CRR and ROIC are also compared with coefficients of SMB and HML, as these coefficients can reflect the business cycle in the economy. The result shows that the coefficients have negative values for several periods, for example during the global financial crisis in 2007-2008. Further, the coefficients have a negative relationship with CRR and ROIC, indicating that investors in Indonesia are leaning toward big and stable firms to invest.

For the robustness check, values of CRR and ROIC are calculated for the US firms, which shows that the CRR and ROIC can reflect the performance of the real sector. It is shown by the decreasing values during the global financial crisis in 2007-2009, in which it recovered in 2011-2012. However, the CRR and ROIC have a different correlation with the short-term benchmark rate and the yield spread compared to the results from Indonesia. It might be due to the US currently experiencing a liquidity issue due to the global pandemic situation, implying a closer correlation with the short-term benchmark rate. Comparing the CRR and ROIC with coefficients

of SMB and HML, the correlation also shows a negative correlation although the magnitude is lower than the results in Indonesia.

The negative relationship between ROIC and yield spread implies that yield spread will increase when the ROIC decreases, suggesting a better expectation for the future. It indicates that the information in the real sector has been reflected in the financial sector, which can occur as the financial sector has been more developed in comparison with the Indonesian financial sector, which is still in at the developing stage. It is supported by the empirical evidence that stock returns in the US market can predict the real sector, measured by the industrial production index (Choi *et al.*, 1999). It also further strengthens the argument by Azad *et al.* (2018) that Islamic finance needs its own benchmark rate as the financial sector has not been able to reflect the real sector.

The overall results show that there is a contrasting result for the correlation between capital market-based measures and macro-finance indicators. The correlation of capital market-based measures, CRR and ROIC, with SMB and HML coefficients both in Indonesia and in the US are consistent in that they show a negative correlation. The correlation indicates the risk-return trade-off as higher CRR and ROIC implies higher risk in the market, and the coefficients of SMB and HML are negative, showing a shifting of portfolio toward big cap and low B/M stocks. On the other hand, the correlation with the macro indicator presents a different sign and magnitude between the CRR-ROIC and the 1-year benchmark and yield spread.

Notwithstanding the process and results of this study, this study has several limitations. It has not discussed and determined how the reference rate can be used as a pricing mechanism for Islamic financial products.

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