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## Sukūk development and income inequality

 Wahyu Jatmiko<sup>a</sup>, M. Shahid Ebrahim<sup>b,\*</sup>, Houcem Smaoui<sup>c</sup>
<sup>a</sup> Department of Management, Faculty of Economics and Business, University of Indonesia, Indonesia

<sup>b</sup> Durham University Business School, United Kingdom

<sup>c</sup> Department of Finance & Economics, Qatar University, Qatar

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### ABSTRACT

This paper investigates the link between *sukūk* development and income inequality by scrutinizing twenty-two countries' data from 1995 to 2019. We employ the two-stage Fractional Regression Model to illustrate that *sukūk* issuance is associated with increased income disparity. This result is attributed to the *sukūk* design ignoring credit market frictions. This rationalizes the *sukūk*-inequality nexus in light of the ethical objectives of Islamic law. We argue that reinforcing property rights by mitigating the ill effects of excessive risk-taking (i.e., *gharar*) and endemic agency costs of debt (i.e., *ribā*) in our ethical framework can improve *sukūk*'s role in socio-economic development.

### 1. Introduction

“There is no fundamental reason why we should believe that growth is automatically balanced. It is long since past the time when we should have put the question of inequality back at the center of economic analysis...”

(Thomas Piketty, 2017, p. 20).

The empirical literature unambiguously documents an upsurge in income disparity worldwide, particularly in Muslim countries (Alvaredo et al., 2018; Dioikitopoulos et al., 2020). The World Income Database, for example, illustrates the Top 1 % earners in oil-rich Saudi Arabia and Qatar to claim 18.86 % and 18.95 % of the respective nations' total income in 2019. These are higher than 1995's figures of 18.58 % and 18.51 %, respectively. This issue is even worse in Turkey, which experienced a significant rise in income disparity from 21.99 % in 1995 to 23.35 % in 2019. The least unequal region of Europe is not an exception (Alvaredo et al., 2018). For instance, the Netherlands' highest 1 % income increased from 5.77 % in 1995 to 6.97 % in 2019.

Whether finance contributes to the above (income) inequality has been a growing debate in the literature (Taylor, 2023). Financial development (FD) can be remarkable in ensuring a well-functioning financial system by improving financial access, depth, efficiency, and stability (Beck et al., 2007; Badunenko & Romero-Ávila, 2013). This is a crucial recipe for more inclusive growth. However, poorly managed financial development can also exacerbate inequalities when economic advancement is only experienced by the elite leaving behind the rest of the society (Čihák and Sahay, 2020). In this case, the process turns into a mere ‘financialization,’ decoupling finance from the real sector of the economy (Krippner, 2005).

\* Corresponding author: Department of Finance, Durham University Business School, University of Durham, Mill Hill Lane, Durham DH1 3LB, United Kingdom.

E-mail address: [m.s.ebrahim@durham.ac.uk](mailto:m.s.ebrahim@durham.ac.uk) (M.S. Ebrahim).

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The literature, however, is silent on the interaction between *sukūk* (loosely translated as Islamic bond) development and inequality. Most studies focus on the role of Islamic banks (IBs) in economic growth. [Gheeraert and Weill \(2015\)](#), [Abedifar et al. \(2016\)](#), and [Imam and Kpodar \(2016\)](#) unanimously report that IB development is conducive to economic growth. [Abedifar et al. \(2016\)](#) go the extra mile by documenting a negative link between IBs' development and inequality. In the context of *sukūk*, [Smaoui and Nechi \(2017\)](#), [Yildirim et al. \(2020\)](#), and [Smaoui et al. \(2021\)](#) also depict its constructive role in economic and infrastructure development, while [Echchabi et al. \(2018\)](#) suggest no relationship between the two. However, its link with inequality is left unexplored despite the growing concern about the adverse impact of public and corporate bonds on income redistribution ([Dwyer, 2018](#); [Mian et al., 2020](#)). This study aims to fill this research gap.

To the best of our knowledge, this paper is the first to examine the nexus between *sukūk* development and income inequality. We integrate two strands in the literature to do so. Our first set of studies is market frictions in financial development, while the second is asymmetric information in conjunction with bond vigilante.

The first stream of research demonstrates that financial development, in some instances, can exacerbate income inequality ([Jau-motte et al., 2013](#); [Piketty, 2017](#)). Frictions in the financial instruments and institutions are the most crucial channels in explaining the nexus between financial development and income disparity ([Altunbaş and Thornton, 2020](#)). It is plausible to hypothesize the link between bonds (along with *sukūk*)<sup>1</sup> and income inequality. [Foellmi and Oechslin \(2010\)](#) document the positive association between bond issuance and income inequality within the spatial context of less-developed economies. They argue that economic liberalization makes access to credit difficult for least-affluent agents, leading to larger income inequality. [Azzimonti et al. \(2014\)](#) also observe that the increase in income disparity in industrialized economies has been associated with higher issuance of public debt. They attribute this nexus to the market imperfection on consumption smoothing driven by financial liberalization. Here, bonds are used as a consumption smoothing instrument by entrepreneurs (or the wealthy) for their uninsurable income risks. The increase in debt requires a higher interest rate, thereby extricating the wealth of the less fortunate (workers). A recent [Mian et al. \(2020\)](#) study also supports previous findings.

The second set of studies focuses on the ramification of asymmetric information in the form of credit market frictions (i.e., agency costs of debt) in the securitization (or financial development) process. This would lead investors to demand higher yields to compensate for any incremental risk. It would reduce bond prices due to the negative relationship between bond yields and prices ([Akerlof, 1970](#); [Habbard, 2012](#); [Minhat and Dzolkarnaini, 2017](#); [Nagano, 2017](#); [Rose and Spiegel, 2018](#)). This decrease in bond prices (or an increase in the *sukūk* coupon at the underwriting stage) would extract wealth from issuers and thus aggravate income inequality. In the extreme case, this could also lead to a market failure, as observed in the Global Financial Crisis of 2008 ([Ebrahim et al., 2016](#)).

The relatively nascent development of the *sukūk* market, implying higher market frictions, serves as a natural experiment to study income inequality ([Minhat and Dzolkarnaini, 2017](#); [Nagano, 2017](#)). *Sukūk*, unlike bonds, are financial certificates theoretically representing undivided claim in ownership of religiously permissible assets, usufructs, or services ([Abdul Halim et al., 2019](#); [Shafron, 2019](#); [Aziz et al., 2021](#)). Their contrasting structure as asset-backed security versus asset-based security conveys varying credit risk (as elaborated below in [Section 2.1](#)). This is because the first type, backed by tangible collateral, mitigates agency costs of debt (with varying degrees contingent on the meticulousness of collateralization) better than the second type ([Ebrahim et al., 2016](#)). Thus, with changes in business cycles, asset-based *sukūk* would decline more than asset-backed ones. This stems from the implications of information asymmetry in addition to bond vigilante. In a sample (or portfolio) where asset-based ones exceed asset-backed ones, wealth would be extracted (from the users of funds by the suppliers of the same), leading to income inequality. The quality of debt securitization depends on the financial development of a particular nation. This result links our study to the literature on financial development. The above result also conveys the economic intuition between financial development and income inequality.

The ethical axioms of Islamic Finance (IF) necessitate *sukūk* to strengthen property rights and be linked to the real sector of the economy, thereby promoting an equitable socio-economic order ([Sidani and Al Ariss, 2015](#)). However, the Muslim-majority countries that host *sukūk* have suffered more from income inequality, as explained at the onset of this study, raising an intriguing question: Does *sukūk* development truly contribute to inequality reduction?<sup>2</sup>

We first develop the ethical framework of *sukūk* in the context of socio-economic justice, then discuss the potential economic channels of the *sukūk*-inequality nexus. We then empirically evaluate the connection between the yearly *sukūk* issuance and the income share of the Top 1 % earners in twenty-two *sukūk*-issuing countries.<sup>3</sup> To do so, we perform the Fractional Regression Model (FRM, hereafter) with the Logit link function, as our dependent variable (i.e., Top 1 % income group) is bounded between 0 and 1. We employ

<sup>1</sup> A large number of studies document the similarities between bonds and *sukūk*. See [Azmat et al. \(2017\)](#), [Kuran \(2018\)](#), [Ahmed and Elsayed \(2019\)](#), [Samitas et al. \(2021\)](#).

<sup>2</sup> The above question broadly echoes with the view of [Shafron \(2019, p. 24\)](#) that states "Relying heavily on structuring to meet *Shari'ah* compliance, the forms of many Islamic finance products differ drastically the economic substance of the transactions. This disconnect between substance and form provides a unique setting for in depth exploration of interesting research and questions...".

<sup>3</sup> The Top 1% income group has been widely employed as a measure of income inequality, especially in studies focusing on the concentration of income among the wealthiest individuals ([Piketty and Saez, 2003](#); [Alvaredo et al., 2013](#); and [Saez and Zucman, 2016](#)). One of the main advantages of using the Top 1% income measure is that it captures the extreme upper tail of income distribution providing valuable insights on the concentration of income among the wealthiest individuals.

a two-step FRM estimation to address the endogeneity problem of the financial development reported in the literature (see Beck et al., 2007). We ensure the robustness of our findings by separating the sample for the Government and Corporate *sukūk* categories, controlling for sample selection bias, and using the Gini coefficient (Gini) as an alternative measure of inequality.<sup>4</sup>

Our results illustrate that *sukūk* development has a positive relationship with income inequality. Countries with higher *sukūk* issuance experience a more profound income disparity. This positive effect weakens (yet remains positive) after the 2008 Global Financial Crisis (GFC). This may be due to a shift towards more issuance of leasing-type *sukūk* after the crisis and the infamous critique of Taqi Usmani suggesting that most *sukūk* were not deemed Islamic in late 2007 (Usmani, 2007; Oakley, 2008; Azmat et al., 2021).<sup>5</sup> This shows that the industry has been heading toward improvement. However, immense efforts remain needed to stem the tide.

Our study contributes to the extensive literature on the finance-inequality nexus mentioned above. It also enhances the policy-oriented research on the effects of IF on socio-economic development.<sup>6</sup> Several studies advocate the favorable roles of IBs and *sukūk* on development (Gheeraert and Weill, 2015; Abedifar et al., 2016; Imam and Kpodar, 2016; Smaoui and Nechi, 2017; Yildirim et al., 2020; Smaoui et al., 2021). According to Smaoui and Nechi (2017), this positive link is reinforced as *sukūk* progression leads to greater access to finance for religious agents who otherwise are self-excluded from the financial market. However, the socio-economic issues are not only about economic growth. Inequality is among the oldest puzzles in the literature.

Regarding bonds, Azzimonti et al. (2014) and Mian et al. (2020) document an adverse association of public debt with income redistribution. Higher government bond issuance is associated with more concentrated savings for the wealthy and considerable household debts for laypeople. Our findings document that bond issuance is conducive to income redistribution, in harmony with Beck et al. (2007) and Zhang and Naceur (2019). This indicates the higher frictions of the nascent *sukūk* market. We highlight that the meticulous design of *sukūk* extricating the ill effects of agency costs of debt and excessive risk transfer is needed to deliver the ethical promise of *sukūk*.

The remainder of this paper is structured as follows. Section 2 discusses the overview of *sukūk* markets, the transmission channels of the *sukūk*-inequality nexus from Islamic ethics and economic perspective, and the hypothesis development. Section 3 proceeds with the methodology and data in Section 4. Section 5 examines the empirical results, followed by a thorough discussion in Section 6. Finally, section 7 concludes our study.

## 2. Literature review and hypothesis development

### 2.1. Overview of *sukūk* markets

*Sukūk* are securities entitling their investors' ownership in the underlying asset as well as any profits derived from that ownership. However, unlike bonds, which pay a fixed interest payment, *sukūk* holders receive periodic payments in the form of profit from a joint venture, lease payment, or gain from the sale of assets, depending on the structure of the *sukūk*.

In recent years, the global *sukūk* market has become the fastest-growing segment of the Islamic finance industry, surpassing the Islamic banking sector on a growth basis. In 2021, the global *sukūk* market reached USD 767 billion, representing a year-on-year (y-o-y) growth of 12.5%. The worldwide *sukūk* issuance is forecasted to reach USD 1,987 billion by 2027, with a cumulative average growth rate (CAGR) of 17% from 2022 to 2027 (IFSB, 2022). Rapid urbanization in Middle-Eastern countries is one of the key factors driving market growth. Furthermore, the diversification of investment patterns in emerging countries and increased cross-border transactions boost market growth. In addition, various Islamic banking institutions seek strategic partnerships with foreign institutions to participate in international trade. This, along with increased investments by Muslim-majority governments in infrastructure development and financial service digitization, is expected to drive the market even further.

Regionally, the Gulf Cooperation Council (GCC) countries accounted for approximately 48% of total *sukūk* issuance in 2021, aided by increased issuances from Saudi Arabia, surpassing South-East Asia as the largest regional issuer. In 2021, there were several new entrants to the market and the return of issuers from non-core Islamic finance markets. For instance, the Maldives' government issued its first international sovereign *sukūk*, worth USD 200 million and maturing in five years. The United Kingdom issued its second sovereign *sukūk* in 2021, with a five-year maturity and a face value of USD 653.9 million, while Nigeria returned to the sovereign market with a USD 600 million issuance as well. In addition, Bangladesh continued sovereign issuances in 2021 after issuing its first sovereign *sukūk* in 2020.

### 2.2. Transmission channels of *sukūk*-inequality nexus from an Islamic ethics perspective

The Islamic moral system is highlighted in the *Qur'ān* (i.e., Muslim holy book) and the authentic traditions of Prophet Muhammad (i.e., *aḥādīth*). It aims to prevent harm and promote social justice (Rice, 1999). This entails safeguarding property rights in the realm of

<sup>4</sup> The Gini coefficient is indeed a widely used measure of income inequality and provides a comprehensive overview of the overall income distribution. However, the decision to use the Top 1% income group as the main variable in our study is to specifically examine the concentration of income among the wealthiest individuals and assess the impact of *sukūk* development on this particular segment of the population.

<sup>5</sup> Taqi Usmani is a religious scholar and former judge of Pakistan's supreme court. Please see Section 2.4 for more details on this issue.

<sup>6</sup> We are grateful to an anonymous referee who emphasized the utilization of funds raised by the *sukūk* for socio-economic projects. We refer the readers of this paper to Table 1 of Liu and Lai (2021, p.1904) for information on Sustainable and Responsible Investment (SRI) *sukūk* and Green Bond Principles.

the economic system. In the context of *sukūk*, this implies the alleviation of mainly *ribā* (agency costs of debt) and *gharar* (asymmetric information or excessive risk transfer), leading to the asset centrality of *sukūk* structure. Prohibiting *ribā* and *gharar* allows *sukūk* to promote a more equitable resource distribution. However, this cannot be accomplished without deeply understanding the objectives of Islamic law (*Maqāsid al-Sharī'ah*).<sup>7</sup> In so doing, our framework in Fig. 1 extends Jatmiko et al.'s (2023a) economic equivalence of *ribā* and *gharar*.

### 2.2.1. *Ribā and inequality*

Jatmiko et al. (2023a) argue that the deeper meaning of *ribā* goes beyond the terminology of interest.<sup>8</sup> They instead decipher this concept to the agency cost of debt attributed to the unethical behavior of financial decoupling-led risk-shifting and price gouging-led underinvestment. In risk-shifting, the borrower strategically defaults when the equity goes 'underwater', violating the contractual agreement, as illustrated in Fig. 2. In underinvestment, the onerous financial obligations discourage the borrower from undertaking positive NPV projects as the benefits are mainly usurped by the financier, as depicted in Fig. 3. These two intertwined improprieties are connected with the issue of income inequality as risk-shifting [underinvestment] by the borrower [financier] harms the financier [borrower].

Financial decoupling refers to the high dependence on the debt-based financial market leads to its divergence from the real sector of the economy (Davis and Kim, 2015). Three possible scenarios linking financialization with inequality are documented in the literature, namely (i) the disproportionate increase in financial institutions directly impacts intersectoral wage inequality (Kaplan and Rauh, 2010), (ii) the high concentration of investment in the debt-based financial sector (Stockhammer, 2004; Van der Zwan, 2014), and (iii) the privatized gain and socialized loss of the plain vanilla financial assets (Stiglitz, 2012; Volscho and Kelly, 2012).

Price gouging is related to the steep pricing of interest-bearing debt over its 'just price.'<sup>9</sup> First, it impedes the access to finance of a significant portion of skilled entrepreneurs as they possess no assets for collateral (Claessens, 2006). Second, the excessive price of debt also deters the borrowers' growth potential (Ebrahim et al., 2016; Piketty, 2017). Finally, it prevents debt retirement (Mian et al., 2020).

### 2.2.2. *Gharar and inequality*

On the other hand, *gharar* involves information opacity or excessive risk-taking behavior (El-Gamal, 2006; Ebrahim et al., 2016; Jatmiko et al., 2023a).<sup>10</sup> Information opacity or risk-taking behavior can also contribute to earning inequality as it enlarges the gap in access to finance between the rich and the poor (De Mendonça and Esteves, 2018; Lei, 2019). This relationship is alluded to in Akerlof's (1970) classic paper. Furthermore, lack of transparency increases the cost of borrowing as the lender assumes that the issued debt is backed by a 'bad' project. It thus incentivizes the borrower to issue unsecured debt to the public while keeping the secured one limited to relationship lending (Duqi et al., 2018). This mechanism opens the door to the underinvestment issue (*ribā* – see Fig. 2) and further aggravates income inequality.

Studies such as Stiglitz (2012), Fligstein and Goldstein (2015), and Bazillier and Hericourt (2017) document that the excessive risk-taking embedded in the use of debt also contributes to inequality. One way to look at its underlying mechanism is through the potential speculation feature of the unsecured debt, which dominates the world economy (Chatterjee et al., 2007). Landier and Plantin (2017) attribute the endogenous increase in inequality to the tax avoidance schemes in conjunction with the risk-taking behavior of the rich employing varying debt arbitrage strategies. The phenomenon of the rise of the super-rich produced by hedge funds and subprime derivatives offers compelling evidence for this argument (Stockhammer, 2015). In the context of public debt, the highly unsecured leveraged economy can lose its growth potential and thus misallocate resources equitably (Stiglitz, 2012).

The GFC of 2008 exemplifies how the liquidity of debt securities was impaired by its toxicity stemming from asymmetric information and agency issues. The structural deterioration at the origination of these securities led to the freezing of the secondary debt market and the failure of institutions holding them as collateral (Ebrahim et al., 2016).<sup>11</sup> This aggravated inequality in the US, as roughly a million American families, lost their homes and thus their meager life savings in the form of home equity. This had a devastating impact on the global economy (Economist, 2007; Gapper, 2007).

## 2.3. *Transmission channels of sukūk-inequality nexus from the economic perspective*

Can *sukūk* practically curb the adverse impact of debt on income distribution? We put forth the ability of *sukūk* to reduce market frictions through (i) asset centrality and (ii) financial inclusion as potential mechanisms to explain the *sukūk*-inequality nexus.

<sup>7</sup> In its strict definition, the *Maqāsid Al-Sharī'ah* includes the preservation of faith, intellect, life, lineage, and wealth of human beings (see Jatmiko et al., 2023a).

<sup>8</sup> This terminology stems from the Arabic word *rabā*, implying an increase or growth (Al-Zuhayli, 2006).

<sup>9</sup> See Jatmiko et al. (2023a) for a terse debate on the definition of just price from neoclassical, Marxian, and Islamic economic perspectives.

<sup>10</sup> *Gharar* stemming from the triliteral Arabic root *gharra* means to deceive or fog the mind (Thomas, 1995).

<sup>11</sup> The finance literature attributes the lack of meticulous pricing of debt securities at origination to the capital structure puzzle (Graham and Leary, 2011; Graham et al., 2015). This is because the capital structure theories have yet to discuss the technical means to alleviate information opacity and the agency costs of debt. One also needs to account for 'managerial miscalibration' (Ben-David et al., 2013).

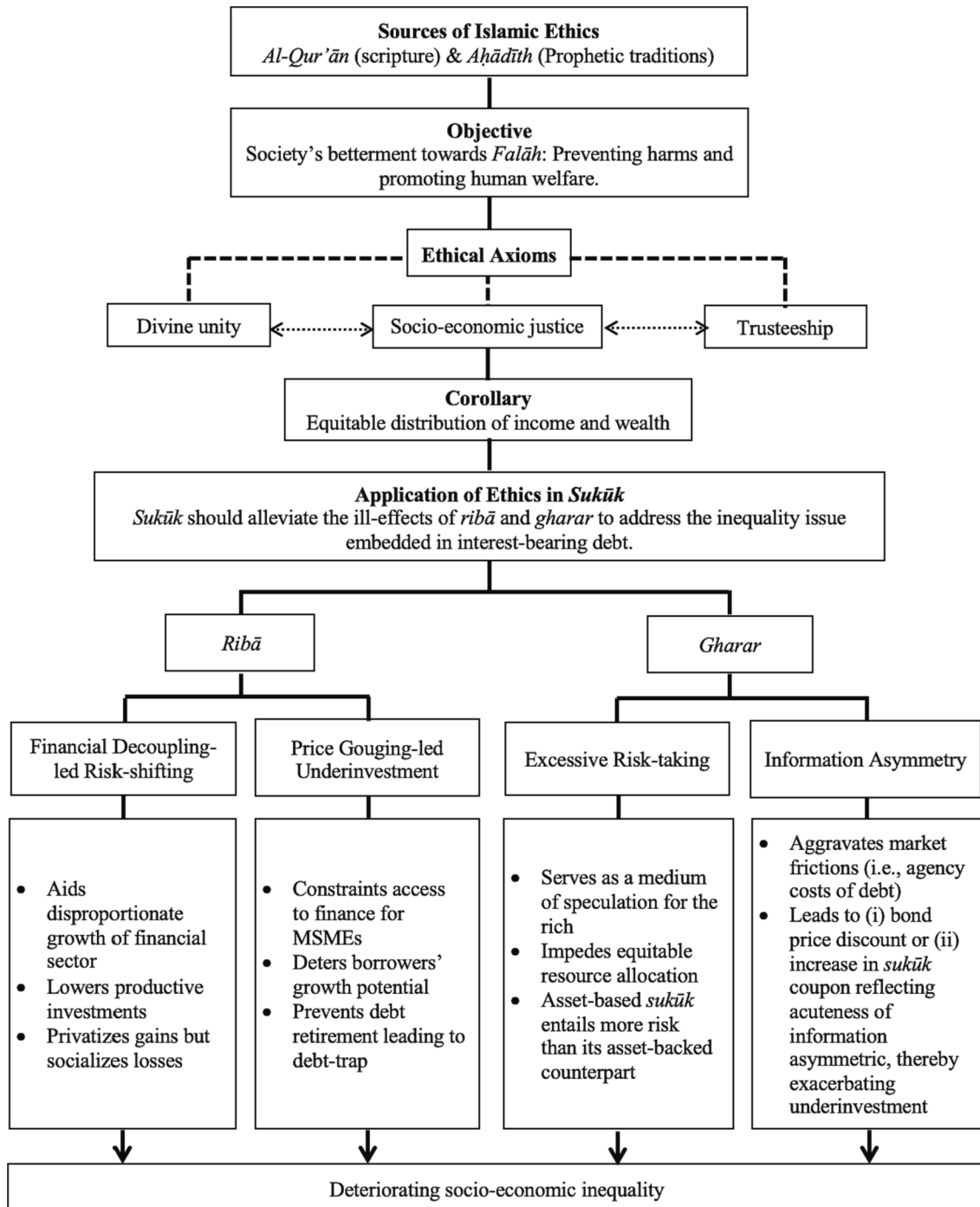
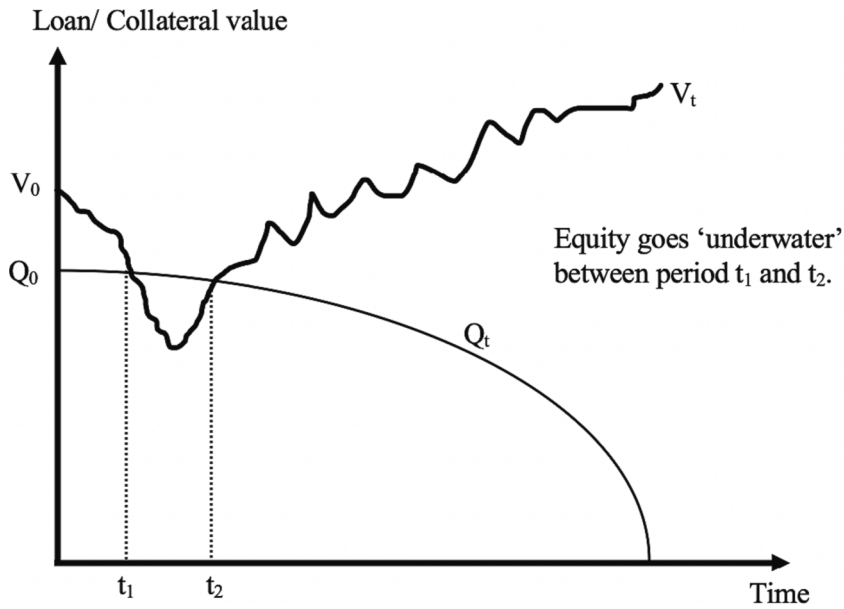


Fig. 1. Ethical Framework of sukuk.

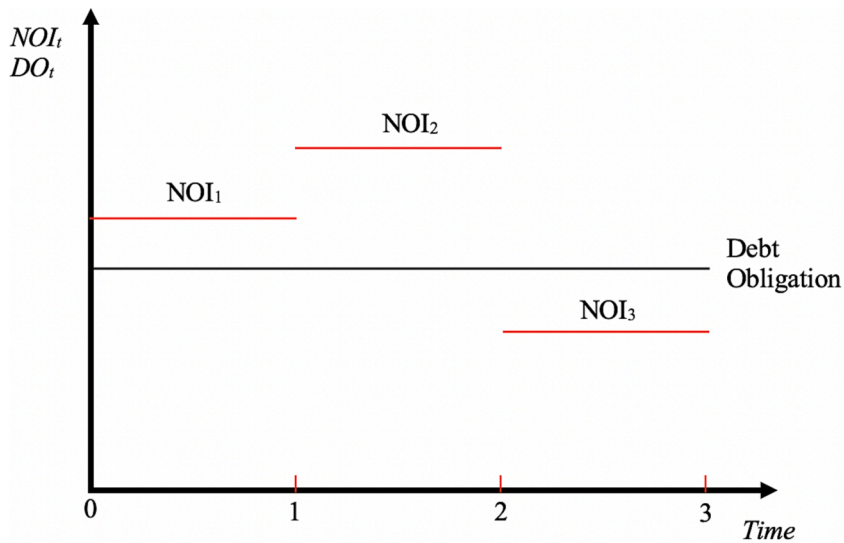
2.3.1. Asset centrality

In theory, the primary feature of sukuk lies in its asset centrality (El-Gamal, 2006). Sukuk should be conservatively structured as asset-backed instead of liberally asset-based security (Abdelsalam et al., 2021).<sup>12</sup> It should incorporate income-generating tangible assets from which the issuer can repay the coupon and the (risk-adjusted) principal to the holders. The asset-backed sukuk can promote

<sup>12</sup> The notable discrepancy between asset-backed and asset-based sukuk lies in the event of default. The former bestows recourse to the underlying assets of the Special Purpose Vehicle (SPV), while the latter does not (Friel and Kumpf, 2015).



**Fig. 2.** Risk-shifting. Notes: The equity goes underwater when the value of the asset ( $V_t$ ) is lower than the debt obligation ( $Q_t$ ), as observed in the interval ( $t_1, t_2$ ). This leads the borrower to default by transferring the downside risk of the asset to the financier. Source: [Jatmiko et al. \(2023a\)](#).



**Fig. 3.** Underinvestment. Notes: Underinvestment occurs in Period 3 when the borrower’s Net Operating Income ( $NOI_t$ ) is lower than its Debt Obligations ( $DO$ ). Here, the borrower rejects profitable (i.e., the positive net present value - NPV) projects as the additional wealth mainly accrues to the financier. Source: [Jatmiko et al. \(2023a\)](#).

income redistribution in the following ways. First, this feature allows the payoffs to be contingent on the assets’ performance and positions the underlying assets as collateral securing the contract.<sup>13</sup> Second, the existence of assets or projects underpinning *sukūk* ensures that this financing is channeled into the real sector of the economy in the form of new asset/project development or improvement of the existing ones. This prevents using *sukūk* as a mere refinancing vehicle delinked from the real economy ([Mian et al., 2020](#)). This established connection between *sukūk* issuance and the development in the real sector of the economy ensures that the socio-economic benefit can be attributed to the society at large rather than perceived only by issuers and investors.

<sup>13</sup> Asset value depreciation can lead to strategic default by the *sukūk* issuer thereby hurting *sukūk* holders. This ensues from the risk-shifting problem of the agency costs of debt. The *sukūk* holders, in anticipation of risk-shifting can still finance the issuer but at a higher cost of funding. This provokes the underinvestment issue of the agency cost of debt, thereby contributing to income inequality.

*Sukūk* structure is contingent on the location and religiosity of the underlying financial market (Abdelsalam et al., 2021). This ranges from a conservative (asset-backed) form of securitization to a liberal (asset-based) mode of securitization. The cautious (or conservative) approach endows *sukūk* with stronger legal rights in contrast to the liberal way (Abdelsalam et al., 2021). This is because the liberal method ensues from declining underwriting standards, aggravating credit market frictions (Abdelsalam et al., 2021).

Our paper adopts a conservative perspective as it is closer to the *Maqāsid* (objectives) of the *Shari'ah* (Islamic law) in preserving property rights, as stated earlier in the Introduction. The cautious approach is also consistent with the tradition of Prophet Muhammad, where he reportedly bought some foodstuff on credit from a merchant and mortgaged his iron armor to him (Sahih Al-Bukhari, Chapter 42, Hadith No. 578). The finance literature attributes collateralized financing to mitigate the agency costs of debt, thus reducing the risk of the financier (Ebrahim et al., 2016).

### 2.3.2. Financial inclusion

In theory, *sukūk* can also play an essential role in alleviating inequality through financial inclusion. This is because a non-trivial proportion of people are self-excluded from financial markets not because they have no access to it but because they choose not to engage with financial instruments due to their beliefs or values (Beck et al., 2009). Bonds are considered prohibited instruments from the perspective of Islamic law leading to the conservative Muslims' withdrawal from the market. Thus, *sukūk* is regarded as an alternative to bonds for them. Smaoui and Nechi (2017) and Bacha and Mirakhor (2018) argue that *sukūk* development is conducive to economic growth as it promotes financial inclusion by reducing the adverse impacts of religious self-exclusion.

## 2.4. Hypothesis development: The reality of *sukūk*

Many studies cast doubt on whether *sukūk*'s asset centrality holds practically (see, to name a few, El-Gamal, 2006; Khan, 2010; Kuran, 2018). The most common *sukūk* is the cost-plus, or the *Murabaha sukūk* is described below along with its financially engineered versions. According to the Bloomberg database, in early March 2021, this type of asset accounted for 41.76 % of outstanding *sukūk* worldwide.<sup>14</sup> This facility can be structured either as an asset-backed one or an asset-based one. In the asset-backed case, a Special Purpose Vehicle (SPV) is created by the originating firm. This firm sells an income-generating asset (or business) (thereby transferring its title) to the SPV. It simultaneously enters into a binding contract with the SPV to buy back the same at the original price at maturity.<sup>15</sup> The SPV generates the proceeds of this purchase by issuing a *sukūk* to investors. It uses the asset/business's payoffs to compensate the *sukūk* holders' coupon payments. At maturity, the SPV sells the asset/ business back to the firm and repatriates the received funds to the investors.

However, in reality, when the *sukūk* is structured as an asset-based one, the originating firm does not legally sell the asset to the SPV and withholds the transfer of its title. In other words, the firm retains the title, thereby aggravating the risk of default; if it falls on hard times and cannot repay the amount financed. This transition in structure not only deprives the source of income for the investors but also makes the contract unsecured. This change also transforms the asset-backed *sukūk* into an asset-based one, exacerbating its risk (Jatmiko et al., 2023b).<sup>16</sup> Unlike the former structure, the latter has no recourse to the underlying asset, leading to financial fragility. The same data from Bloomberg suggests that 72.98 % of *sukūk* are unsecured, i.e., they have no direct recourse to the underlying assets of the SPV in case of bankruptcy (Friel and Kumpf, 2015).<sup>17</sup>

Finally, the practical deviation of *sukūk* from its theoretical structure can negate the inclusion benefit offered by the product to the excluded religious investors. Fang and Foucart (2014) document that most western financial agents consider Islamic financial products as a mere repackaging of mainstream financial instruments with a '*halal*' label. However, the issuers' motive for *sukūk* is to exploit the asymmetric information in the growing demand for *sukūk* in some territories (Mohamed et al., 2015; Nagano, 2017; Abdul Halim et al., 2020). A study also suggests that the potential investors of Islamic financial products are not only segmented into a religious group but also those adhering to ethical economics (Muhamad et al., 2012). The majority of them are rational agents who rely heavily on cost-and-benefit analysis and thus are prone to displaced commercial risk. This suggests the hesitation of religious agents to adopt Islamic financial products (Jatmiko et al., 2023a).

The November 2007 criticism of Justice Taqi Usmani was a reality check on the structure of quasi-equity *sukūk* of joint partnership (*Musharaka*) and trust financing (*Mudharabah*) (Usmani, 2007). Usmani was of the view that 85 % of the *sukūk*, especially those emulating the above forms, were not distinct from mainstream bonds as they: (i) employed legal artifices (i.e., ruses) to classify income as non-interest bearing; and (ii) lacked the crucial risk-sharing element at the redemption stage. Usmani deduced that for all practical purposes, the majority of *sukūk* were not *Shari'ah* compliant. This negative feedback put a damper on *sukūk* issuance for some time and allowed the industry to initiate leasing-oriented structures (Oakley, 2008).

<sup>14</sup> The majority of *Murabaha sukūk* are issued in Malaysia, where the trading of debt is deemed permissible. Most countries forbid this practice (Abdul Halim et al., 2019).

<sup>15</sup> The mandatory arrangement to buy back the asset/ business by the firm relieves the SPV of the downside risk of the ownership of the asset. This is considered an infringement of the property rights of the owners of the firm and breaches the spirit of the *Shari'ah* (Azrak and Hazaa, 2021). This is one of the reasons why Taqi Usmani was up in arms against the structure of *sukūk* (Usmani, 2007).

<sup>16</sup> The aggravation of risk of the asset-based *sukūk* infringes up the property rights of investors. This is another reason why the structure of *sukūk* has earned the ire of Taqi Usmani (Usmani, 2007).

<sup>17</sup> The situation gets more complicated and thus more risky when the originator enters into a 'sale' and 'buy-back' arrangement with itself (in an *inah* sale) or with a third party (in a *tawarruq* or a reverse *Murabaha*, i.e., a synthetic loan) (see Jatmiko et al., 2023a).

In light of the above discussions, we thus argue that *sukūk*, in its current form, does not have the necessary transmission channels to alleviate income inequality, both from Islamic ethics as well as economic perspectives. On the contrary, the benefits of *sukūk* are not easily accessed by retail investors (except for some government retail ones), thus exaggerating the issue of inequality in its issuing countries. Consequently, we derive our hypothesis as follows.

**Hypothesis 1.** *The development of sukūk has a positive association with income inequality.*

### 3. Methodology and data

#### 3.1. Empirical strategy

We examine the above hypothesis by emulating the empirical techniques of the key studies in the area. These include [Clarke et al. \(2006\)](#), [Beck et al. \(2007\)](#), [Ang \(2010\)](#), and [Cihák and Sahay \(2020\)](#). Our panel data regressions employ income inequality proxied by the country's Top 1 % of the highest earners as the dependent variable and *sukūk* issuance as the primary independent one. We employ the FRM estimator as the values of our dependent variable (Top 1 %) range between 0 and 1. This also applies to the Gini coefficients that are used for robustness. We benefit from the two-step FRM estimator to address the endogeneity problem of the Financial Development variable (FD) as reported by the previous literature (see [Beck et al., 2007](#)). Our first-step FRM model is represented in Equation (1) below, where the institutional quality of Legal origin (Lo), Investment profile (Ip), and Corruption (Corr) are used as Instrumental Variables (IVs), consistent with [Garretsen et al. \(2004\)](#) and [Zeqiraj et al. \(2022\)](#). Equation (2) depicts the second stage of our model, where we regress the Top 1 % on *Sukūk*, the fitted value of FD ( $\widehat{FD}$ ) obtained from Equation (1), and the remaining control variables (CTR) are listed in [Table 1](#). We also control for heteroscedasticity and serial correlation in the residuals using robust standard errors.

$$FD_{it} = \beta_0 + \beta_1 Lo_{it} + \beta_2 Ip_{it} + \beta_3 Corr_{it} + \mu_i + \epsilon_{it} \quad (1)$$

$$Top1\%_{it} = \delta_0 + \delta_1 Suk_{it} + \delta_2 \widehat{FD}_{it} + \theta CTR_{it} + \alpha_i + v_{it} \quad (2)$$

where  $i$  and  $t$  respectively represent the country and the year;  $\mu_i$  and  $\alpha_i$  are the unobserved country-specific effects;  $\epsilon_{it}$  and  $v_{it}$  denote the zero-mean disturbance terms.

#### 3.2. Data

[Table 1](#) summarizes the operational variables and data sources used to examine our hypothesis. The dependent variable, the Top 1 %, represents the claims of the highest 1 % earners over the country's total income. We retrieve this data from the World Inequality Database from 1995 to 2019.<sup>18</sup> Our independent variable of *sukūk* is measured with the ratio of *sukūk* market capitalization to the Gross Domestic Product (GDP). The numerator and denominator are obtained from Bloomberg and the World Bank, respectively. The same calculation and sources of data apply to the bond variable. Our proxy of FD is calculated as the proportion of the domestic financial institutions' financing and loans over the GDP. This data is also derived from the World Bank database, like most control variables, including Gender equality (Gender), Population growth (Popg), School enrolment (Educ), GDP per capita growth (Gdpg), Income, Inflation (Inf), and Telecommunication infrastructure (Telecom). The Globalization Index (Global) data is obtained from the KOF Swiss Economic Institute. This covers the economic and interpersonal, informational, cultural, and political aspects of globalization. A historical Index of Ethnic Fractionalization (Ethnic) data is employed to represent the country's ethnic diversity. This data is made available by Harvard Dataverse. We also employ IVs to predict the FD using [La Porta et al.'s \(1998\)](#) Legal origin (Lo) and the Investment Profile (Ip) and Control of Corruption (Corr) indexes provided by the International Country Risk Guide (ICRG). Finally, we also employ the Gini coefficient (Gini) from the World Bank and local statistics bureau to replace the Top 1 % in the robustness check.

Our dataset includes all *sukūk*-issuing countries recorded by Bloomberg between 1995 and 2019. However, we exclude countries with only one-off issuance (such as Morocco, Kazakhstan, and South Africa), the British Overseas Territories (including Bermuda, British Virgin Island, and Cayman Island), and the Crown Dependencies (i.e., Jersey and Guernsey). Luxembourg is also omitted as it has no Ethnic data. It is worth noting that the Ethnic data was terminated in 2013. We extrapolated seasonally-adjusted missing Ethnic data to forecast it as its trend is clearly observable. Our final sample covers 22 countries, namely (1) Bahrain; (2) Bangladesh; (3) Gambia; (4) Indonesia; (5) Ireland; (6) Ivory Coast; (7) Jordan; (8) Kingdom of Saudi Arabia; (9) Kuwait; (10) Malaysia; (11) Netherlands; (12) Nigeria; (13) Oman; (14) Pakistan; (15) Qatar; (16) Senegal; (17) Singapore; (18) Switzerland; (19) Turkey; (20) United Arab Emirate (UAE); (21) United Kingdom (UK); and (22) Yemen.

#### 3.3. Description of data

We summarize the descriptive statistics of our variables in [Table 2](#). Our balanced-panel dataset encompasses 550 observations across 22 countries from 1995 to 2019. The dependent variable representing inequality shows a relatively large income disparity. That

<sup>18</sup> Our data set does not include 2020 and 2021 as these periods constitute an abnormal one for *sukūk* issuance due to the Coronavirus pandemic.



**Table 1**  
Variable definitions and data sources.

| Variable name                              | Definition   | Source                                      |
|--|--|---|
| <b>Dependent Variables</b>                 |  |   |
| Income Inequality (Top1%)                  | The share of the Top 1 % income group over the population's total income.  | World Inequality Database (WID)             |
| GINI (Gini)                                | Gini Coefficient   | World Bank (WB), Local statistics           |
| <b>Independent and Control Variables</b>   |  |   |
| <i>Sukūk</i>                               | The <i>sukūk</i> development: the ratio of annual <i>sukūk</i> market capitalization to GDP.   | Bloomberg, WB                               |
| Bond                                       | The ratio of annual bond capitalization to GDP.  | Bloomberg, WB                               |
| Financial Development (FD)                 | The financial institutions' claim on the private sector as a percentage of GDP.  | WB  |
| Gender Equality (Gender)                   | The Women, Business and the Law (WBL): A 1–100-scale index gauging how institutions promote women's economic opportunity.  | WB  |
| Globalization Index (Global)               | The KOF Globalization Index: An aggregate index measuring the <i>de facto</i> and <i>de jure</i> level of globalization in the trade, financial, interpersonal, informational, cultural, and political dimensions. | KOF Swiss Economic Institute                |
| Ethnic-fractionalization (Ethnic)          | Historical Index of Ethnic Fractionalization: The likelihood of two random individuals in the same country coming from a different ethnic group.   | Harvard Dataverse                           |
| Population growth (Popg)                   | The annual percentage changes of the mid-year estimated population.  | WB  |
| School Enrolment (Educ)                    | The ratio of total primary school enrollment, regardless of age, to the population of the primary education age group.   | WB  |
| GDP per Capita Growth (Gdpg)               | The annual growth rate of the GDP.   | WB  |
| Income Category (Income)                   | A categorical variable: low (0), low-middle (1), upper-middle (2), and high-income country (3).  | WB  |
| Inflation (Inf)                            | The annual percentage changes of the Consumer Price Index.   | WB  |
| Telecommunication Infrastructure (Telecom) | The yearly subscriptions per 100 people of fixed telephone, voice-over-IP, fixed wireless local loop, ISDN voice-channel equivalents, and fixed public payphones.  | WB  |
| Post-Global Financial Crisis (Crisis)      | A dummy variable coded 1 for 2008 onwards.   |   |
| <b>Instrumental Variables</b>              |  |   |
| Legal Origin (Lo)                          | A categorical variable: French-origin (0); English-origin (1); German-origin (2).  | <a href="#">La Porta et al. (1998)</a>      |
| Investment Profile (Ip)                    | Factors affecting the risk to investment that are not covered by other political, economic, and financial risk components.   | The International Country Risk Guide (ICRG) |
| Corruption (Corr)                          | Risk of actual or potential corruption in the forms of excessive patronage, nepotism, job reservations, 'favor-for-favors,' secret party funding, and suspiciously close ties between politics and business.       | ICRG  |

**Table 2**  
Descriptive statistics.

|              | Obs. | Mean   | Std. Dev. | Min.    | Max.    |
|--------------|------|--------|-----------|---------|---------|
| Top1%        | 550  | 15.505 | 3.570     | 5.770   | 23.350  |
| Gini         | 300  | 37.181 | 5.431     | 27.600  | 49.100  |
| <i>Sukūk</i> | 550  | 0.981  | 3.421     | 0.000   | 37.970  |
| Bond         | 550  | 19.975 | 23.980    | 0.000   | 132.020 |
| FD           | 550  | 58.017 | 46.299    | 1.385   | 192.592 |
| Gender       | 550  | 53.996 | 23.288    | 17.500  | 97.500  |
| Global       | 550  | 64.978 | 14.664    | 34.445  | 90.984  |
| Ethnic       | 550  | 49.587 | 26.128    | 2.266   | 85.400  |
| Popg         | 550  | 2.667  | 2.467     | -3.219  | 19.138  |
| Educ         | 550  | 95.480 | 13.370    | 0.000   | 119.033 |
| Gdpg         | 550  | 5.150  | 12.101    | -56.384 | 91.35   |
| Inf          | 550  | 5.407  | 10.172    | -4.863  | 89.113  |
| Income       | 550  | 3.000* | 1.041     | 0.000   | 3.000   |
| Telecom      | 550  | 19.474 | 18.900    | 0.072   | 74.988  |
| Crisis       | 550  | 0.400  | 0.490     | 0.000   | 1.000   |
| Lo           | 550  | 0.000* | 0.584     | 0.000   | 2.000   |
| Ip           | 550  | 8.687  | 2.269     | 2.000   | 12.000  |
| Corr         | 550  | 2.908  | 1.128     | 1.000   | 6.000   |

All variables are presented in percentage (%) except Gender, Telecom, Income, Crisis, Lo, Ip, and Corr. \* represents the value of mode instead of mean. The variable definitions follow [Table 1](#).

is, on average, the Top 1 % income group claims 15.51 % of the whole population's earnings. In the worst-case scenario, only a tiny fraction of elites enjoy 23.35 % of the population's total income. The mean of Gini also indicates a high inequality, i.e., 37.32 %, with a minimum value of 27.6 % (i.e., Netherlands in 2012) and a maximum value of 49.1 % (i.e., Malaysia in 1997).<sup>19</sup>

The Organization of Islamic Countries (OIC) generally exhibit a higher inequality than their non-OIC counterparts, as shown in Fig. 4. The Top 1 % of the former's income taxpayers possess an average of 15.03 % to 20.63 % of the countries' total earnings. Indonesia and Nigeria are the only exceptions, where their proportions resemble the non-OIC countries, where the disparity ranges between 6.57 % and 13.25 %. Turkey is the most uneven income inequality country in the sample, followed by Qatar and Saudi Arabia, while the Netherlands, Ireland, and Switzerland are the least unequal. The time-varying income inequality trend is mixed. Some nations have experienced an increase in income disparity. This includes Turkey, Pakistan, the UK, and Singapore. Others, such as Gambia and Senegal, seem to reduce the shares of the Top 1 % income group over time.

Malaysia has pioneered the rapid development of the government and corporate *sukūk*. Its market penetration has been impressive over the past three decades. The peak was in 2012 when the *sukūk* issuance of the South-east Asian Country reached 37.97 % of its GDP.

The Pearson correlations in Table 3 indicate a positive association between the *sukūk* and Top 1 %. The pairwise-correlation coefficients of our independent variables are small to moderate. *Sukūk* and FD have a very weak positive correlation of 0.186, while its correlation with bonds is only 0.06. FD covers only funding offered by financial institutions, while a significant proportion of *sukūk* holders come from non-financial corporations. Thus, the two variables are complements rather than substitutes. Two pairs have higher than 0.8 correlations, namely Global-FD and Global-Telecom. However, our further investigation using the Variance Inflation Factor (VIF) technique suggests moderate multicollinearity among them. Winsorizing the Top 5 % and bottom 5 % of data points also reduces the correlation between Global and FD below 0.8. This leaves the possibility of multicollinearity to Global-Telecom only. Therefore, we refrain from including the two independent variables in the same specification.

## 4. Empirical results

### 4.1. *Sukūk* issuance and income inequality

Tables 5 and 6 show the results of our two-stage Fractional Regression Model (FRM) estimation of the effect of *sukūk* on income inequality for our sample of 22 countries spanning 1995 to 2019 while controlling for the major determinants of income inequality. The first-stage regression employs three instrumental variables of Lo, Ip, and Corr to estimate FD within the framework of the random effect model (see Table 4). All the IVs significantly influence the FD at the 5 % significance level. The model offers a high explanatory power as indicated by the 0.517 of the adj-Rsquared. We, thus, conclude that the IVs can be used to predict FD in the second-stage of FRM.<sup>20</sup> The results of the second-stage of the FRM estimation are shown in Table 5. The table provides seven baseline specifications offering consistent and robust results. The *sukūk* development has a strong positive relationship with the Top 1 % earners at the 1 % significance level across all our specifications. This suggests the association between countries with well-developed *sukūk* markets and income disparity, supporting our hypothesis. The marginal effect of *sukūk* issuance is also economically significant, ranging from 1.52 to 2.12. This implies that a 1 % increase in the proportion of *sukūk* issuance over the GDP enhances the highest earners' claim on the population's income by 1.5 % to 2 %.

The positive nexus between *sukūk* development and income inequality seems to be moderated after the GFC, as evidenced by the negative and marginally significant coefficient of the interaction between Crisis and *Sukūk* in specification 7. It is possible that after the crisis, issuers improved the structuring of *sukūk*, thereby switching to asset-backed *sukūk* to attract investors and capture the flight-to-quality phenomenon. This is also in concurrence with the infamous statement of Taqi Usmani in late 2007 that 85 % of the *sukūk* in the market are not in compliance with Islamic law. It is also plausible that the industry also responded to Usmani's statement by offering more asset-backed *sukūk*. This result implies that a 1 % increase in *sukūk* issuance before 2008 corresponds to a 2.79 % increase in income inequality. Subsequently, the magnitude of this is reduced to only 1.7 % in post-2008. This suggests that the market seems to have incorporated Taqi Usmani's critique and has issued a more genuine (asset-backed) *sukūk*, reducing the negative impact of income redistribution. However, the net effect remains negative.

### 4.2. Financial development and income inequality

Table 5 also shows a negative link between FD and inequality, suggesting that a well-developed financial market leads to more equitable income redistribution. This result concurs with that of Banerjee and Newman (1993), Galor and Zeira (1993), Beck et al. (2007), and Zhang and Naceur (2019) but contrasts with Jaumotte et al. (2013) and Piketty (2017). This relationship is statistically significant at 5 % in specifications (1)-(4) and 10 % in specifications (5)-(7). The economic impact of FD is also non-trivial, even though it is lower than that of *sukūk*. Indeed, a 1 % increase in the former leads to an approximately 0.1 % lower income disparity.

<sup>19</sup> As far as the Gini is concerned, Luebker (2010) categorizes inequality into Low (around 20%), Medium (25%), High (35%), and Extreme (50%).

<sup>20</sup> It should be noted that the variable corruption (Corr) proxies the extent of information asymmetry emanating from credit risk. Thus, a positive impact of corruption on financial development (as indicated in Table 4) suggests that lower corruption levels are associated with higher levels of financial development.

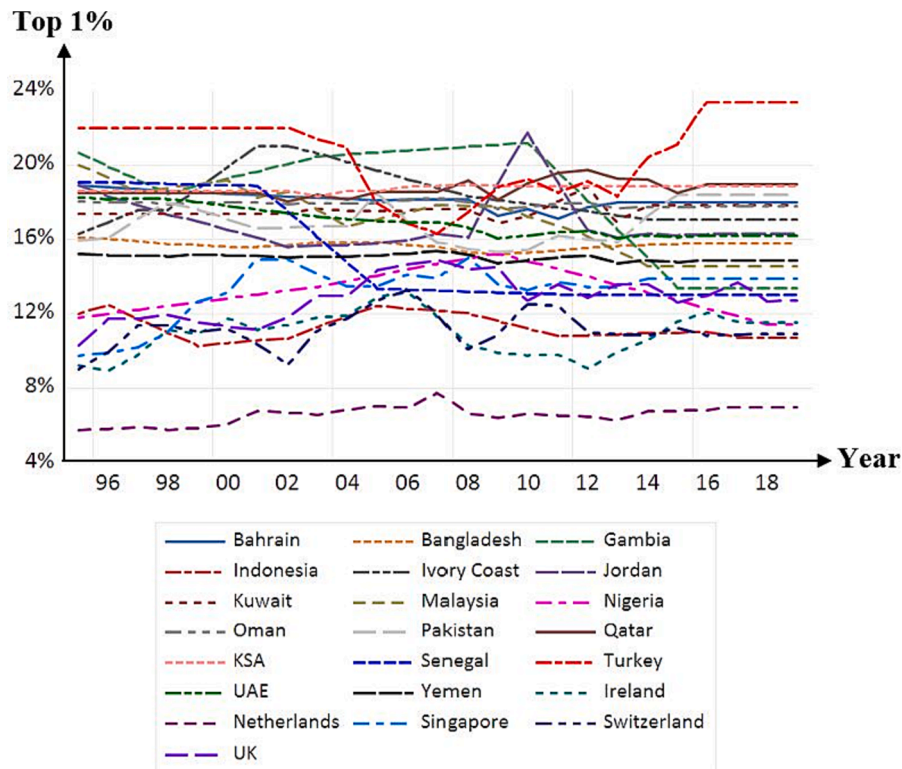


Fig. 4. Share of the Top 1 percent income group (1995–2019).

#### 4.3. Some other variables

Table 5 also provides interesting evidence of other determinants of income inequality. Bond issuance has a negative association with income inequality, consistent with the results of FD. The magnitude of its marginal effects ranges from 0.08 to 0.12. Gender loads are negative and significant at the 1 % significance level across all the specifications, implying a robust negative relationship between gender empowerment and inequality. For instance, a unit increase in Gender is associated with a 0.2 % or 0.3 % improvement in income redistribution. This expected finding is in harmony with the vast literature on gender inequality that documents the persistent lack of economic opportunities for women over men globally (see Lusardi and Mitchell, 2014; Hoffmann et al., 2020; Choi and Greaney, 2022). Lusardi and Mitchell (2014) document that women are disadvantaged in terms of financial literacy, contributing to income inequality. King and Mason (2001) suggest empowering women through equality in rights, resources, and voice leads to lower income inequality and higher growth.

Our findings also document an adverse effect of countries' openness on income inequality. Global adversely affects the income disparity at the 1 % significance level in 6 of our 7 specifications. A 1 % increase in the country's openness leads to a decrease of 0.37 % to 0.47 % in income disparity, consistent with Wood (1997). We argue that this negative outcome is not achieved through the conventional intervention channel in unskilled labor demand. It is instead realized by incorporating non-economic elements into the openness dimensions. This is because our Globalization Index aggregates the *de facto* and *de jure* countries' trade, financial, political, informational, and cultural openness. In other words, our study suggests that the non-economic elements of globalization play a crucial role in equalizing countries' income distribution.

Table 5 shows that population growth is also a strong positive determinant of income inequality. This relationship is highly significant (at the 1 % level) and economically meaningful. For instance, a 1 % annual population growth increases income disparity by 1.4 % to 1.7 %. Earlier studies also document this positive relationship between population growth and inequality (see Ram, 1984; Mierau and Turnovsky, 2014).

Our results also confirm the well-known negative association between education and income inequality (see Abdullah et al., 2015; Dioikitopoulos et al., 2020). Access to school, especially the primary one, leads to better income redistribution. This result is robust and statistically significant at 1 % across all our specifications. Its economic impact is also substantial. A 1 % increase in Educ decreases income inequality by 0.31 % to 0.45 %.

The results in Table 5 show that the coefficients of Income are all positive and significant at the 1 % significance level, indicating that the more developed economies generally suffer from higher income gaps. However, this puzzling result requires further analysis. The Muslim-majority countries contributing (the most) to this study are generally less developed but have higher income inequality than their non-OIC counterparts. The gap between the two is relatively high, ranging from 3.7 % to 4.3 %. This may be an early

**Table 3**  
Correlation matrix.

| Variables    | Top1%  | <i>Sukük</i> | Bond   | FD     | Gender | Global | Ethnic | Popg   | Educ   | Gdpg   | Inf    | Income | Tel    | Crisis | Lo     | Ip     | Corr   |
|--------------|--------|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| <i>Sukük</i> | 0.100  |              |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Bond         | -0.372 | 0.060        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| FD           | -0.416 | 0.186        | 0.497  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Gender       | -0.595 | -0.105       | 0.417  | 0.460  |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Global       | -0.480 | 0.164        | 0.532  | 0.866  | 0.523  |        |        |        |        |        |        |        |        |        |        |        |        |
| Ethnic       | 0.228  | 0.100        | -0.140 | -0.307 | -0.049 | -0.264 |        |        |        |        |        |        |        |        |        |        |        |
| Popg         | 0.365  | 0.016        | -0.174 | -0.253 | -0.462 | -0.170 | 0.247  |        |        |        |        |        |        |        |        |        |        |
| Educ         | -0.302 | 0.107        | 0.283  | 0.426  | 0.117  | 0.503  | -0.193 | -0.049 |        |        |        |        |        |        |        |        |        |
| Gdpg         | 0.005  | -0.005       | -0.024 | -0.141 | -0.031 | -0.080 | -0.010 | -0.002 | 0.016  |        |        |        |        |        |        |        |        |
| Inf          | 0.173  | -0.078       | -0.098 | -0.282 | -0.090 | -0.237 | 0.031  | 0.018  | -0.024 | 0.110  |        |        |        |        |        |        |        |
| Income       | -0.174 | 0.043        | 0.325  | 0.613  | 0.098  | 0.725  | -0.141 | 0.069  | 0.542  | -0.022 | -0.249 |        |        |        |        |        |        |
| Telecom      | -0.486 | -0.044       | 0.386  | 0.771  | 0.538  | 0.830  | -0.312 | -0.208 | 0.447  | -0.024 | -0.162 | 0.701  |        |        |        |        |        |
| Crisis       | -0.072 | 0.164        | 0.201  | 0.132  | 0.148  | 0.232  | 0.047  | -0.088 | 0.172  | -0.169 | -0.136 | 0.000  | -0.099 |        |        |        |        |
| Lo           | -0.261 | 0.164        | 0.175  | 0.439  | 0.380  | 0.259  | -0.094 | -0.246 | 0.087  | -0.018 | -0.108 | 0.000  | 0.389  | 0.000  |        |        |        |
| Ip           | -0.199 | 0.060        | 0.349  | 0.528  | 0.198  | 0.647  | -0.201 | 0.088  | 0.369  | 0.017  | -0.261 | 0.608  | 0.577  | 0.068  | 0.086  |        |        |
| Corr         | -0.502 | -0.099       | 0.392  | 0.732  | 0.551  | 0.729  | -0.337 | -0.304 | 0.294  | -0.059 | -0.267 | 0.520  | 0.752  | 0.081  | 0.263  | 0.512  |        |
| Gini         | 0.671  | 0.275        | -0.235 | -0.211 | -0.212 | -0.249 | 0.442  | 0.540  | -0.348 | 0.003  | 0.076  | -0.361 | -0.320 | -0.082 | -0.123 | -0.136 | -0.297 |

The variable definitions follow [Table 1](#). While the two correlations between Global-FD and Global-Telecom are higher than 0.8, their calculated Variance Inflation Factors (VIFs) show moderate multicollinearity. Global-FD: 4.01 and Global-Telecom: 3.21. Moreover, winsorizing the outliers of the data leaves the Global-Telecom as the only pair with a correlation higher than 0.8. (Global-FD becomes 0.619). We control this potential multicollinearity by not including Global-Telecom in the same system equation.

**Table 4**  
First-stage regression results.

|                         | Financial Development (FD) |
|-------------------------|----------------------------|
| Legal Origin (Lo)       | 27.126**<br>(11.475)       |
| Investment Profile (Ip) | 1.500**<br>(0.727)         |
| Corruption (Corr)       | 9.154**<br>(4.288)         |
| Intercept               | 3.918<br>(14.924)          |
| Observations            | 550                        |
| Adj R-squared           | 0.517                      |
| Chi-square              | 19.686***                  |

This table reports the marginal effects of the first-stage Fractional Regression Model (FRM) with robust standard errors in parentheses. Financial Development is instrumentalized by Lo, Ip, and Corr employing the Random Effect GLS model. All variable definitions follow Table 1. \*\*\*, \*\*, \* respectively represent significance at 1%, 5%, and 10%.

**Table 5**  
Second-stage baseline FRM results.

|                       | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  | (7)                  |
|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                       | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                |
| <i>Sukuk</i>          | 1.670***<br>(0.333)  | 2.100***<br>(0.363)  | 2.105***<br>(0.365)  | 2.124***<br>(0.392)  | 2.052***<br>(0.396)  | 1.518***<br>(0.375)  | 2.790***<br>(0.691)  |
| Bond                  | -0.084**<br>(0.047)  | -0.077*<br>(0.047)   | -0.076*<br>(0.046)   | -0.077**<br>(0.046)  | -0.083**<br>(0.045)  | -0.118***<br>(0.047) | -0.082**<br>(0.045)  |
| FD                    | -0.104**<br>(0.061)  | -0.104**<br>(0.061)  | -0.105**<br>(0.061)  | -0.104**<br>(0.059)  | -0.090*<br>(0.059)   | -0.094*<br>(0.064)   | -0.090*<br>(0.059)   |
| Gender                | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.002***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) |
| Global                | -0.100<br>(0.076)    | -0.374***<br>(0.088) | -0.388***<br>(0.086) | -0.388***<br>(0.087) | -0.457***<br>(0.092) |                      | -0.472***<br>(0.092) |
| Ethnic                | 0.068***<br>(0.030)  | 0.041<br>(0.030)     | 0.040<br>(0.030)     | 0.039<br>(0.030)     | 0.032<br>(0.030)     | 0.055**<br>(0.028)   | 0.033<br>(0.030)     |
| Popg                  | 1.742***<br>(0.414)  | 1.620***<br>(0.420)  | 1.601***<br>(0.421)  | 1.590***<br>(0.439)  | 1.520***<br>(0.425)  | 1.538***<br>(0.429)  | 1.397***<br>(0.435)  |
| Educ                  | -0.305***<br>(0.082) | -0.410***<br>(0.083) | -0.404***<br>(0.083) | -0.411***<br>(0.086) | -0.440***<br>(0.086) | -0.424***<br>(0.091) | -0.450***<br>(0.086) |
| Income                |                      | 0.043***<br>(0.010)  | 0.044***<br>(0.010)  | 0.045***<br>(0.013)  | 0.053***<br>(0.014)  | 0.037***<br>(0.015)  | 0.055***<br>(0.014)  |
| Gdpg                  |                      |                      | -0.088<br>(0.084)    | -0.091<br>(0.091)    | -0.067<br>(0.091)    | -0.071<br>(0.093)    | -0.070<br>(0.092)    |
| Inf                   |                      |                      |                      | 0.050<br>(0.313)     | 0.067<br>(0.314)     | 0.071<br>(0.317)     | 0.074<br>(0.315)     |
| Crisis                |                      |                      |                      |                      | 0.028*<br>(0.017)    | -0.003<br>(0.017)    | 0.036**<br>(0.018)   |
| Telecom               |                      |                      |                      |                      |                      | -0.002**<br>(0.001)  |                      |
| <i>Sukuk</i> *Crisis  |                      |                      |                      |                      |                      |                      | -1.091*<br>(0.742)   |
| Intercept             | -1.075***<br>(0.071) | -0.885***<br>(0.071) | -0.878***<br>(0.070) | -0.876***<br>(0.071) | -0.832***<br>(0.073) | -1.075***<br>(0.085) | -0.818***<br>(0.073) |
| Observations          | 550                  | 550                  | 550                  | 550                  | 550                  | 550                  | 550                  |
| Pseudo R <sup>2</sup> | 0.471                | 0.489                | 0.490                | 0.490                | 0.493                | 0.482                | 0.494                |

This table reports the marginal effects of the second-stage FRM with robust standard errors in parentheses. We instrument the FD variable using Lo, Ip, and Corr (see Table 4). All variable definitions follow Table 1. In addition to the post-Global Financial Crisis, the Crisis variable also captures the aftermath of the infamous statement of Taqi Usmani, suggesting the majority of the *Sukuk* are non-*Shari'ah* Compliant. \*\*\*, \*\*, \* respectively represent significance at 1%, 5%, and 10%.

indication of how the disparity in the quality of the political and economic institutions between OIC countries and non-OIC ones leads to the divergence of income inequality between the two regions, as suggested by Acemoglu et al. (2002).

Finally, our findings indicate a negative relationship between Telecommunication Infrastructure (Telecom) and income inequality, in harmony with Cihák and Sahay (2020). The marginal effect suggests that every additional Telecom subscription per 100 population reduces the income inequality by 0.2 basis points (bps). This result is plausible as access to Telecom infrastructure can expose households to many economic opportunities, hence improving income redistribution.

**Table 6**  
Robustness check: Government *Sukūk*.

|                       | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  | (7)                  |
|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                       | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                |
| <i>Sukūk</i> g        | 1.789***<br>(0.533)  | 2.334***<br>(0.558)  | 2.330***<br>(0.561)  | 2.347***<br>(0.600)  | 2.147***<br>(0.600)  | 1.587***<br>(0.582)  | 3.134***<br>(1.040)  |
| Bonds                 | -0.081**<br>(0.047)  | -0.074*<br>(0.047)   | -0.074*<br>(0.046)   | -0.074*<br>(0.046)   | -0.079**<br>(0.046)  | -0.112***<br>(0.047) | -0.078**<br>(0.046)  |
| FD                    | -0.096*<br>(0.062)   | -0.095*<br>(0.062)   | -0.096*<br>(0.062)   | -0.095*<br>(0.059)   | -0.082<br>(0.060)    | -0.081<br>(0.064)    | -0.083*<br>(0.060)   |
| Gender                | -0.004***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) |
| Global                | -0.077<br>(0.076)    | -0.325***<br>(0.089) | -0.338***<br>(0.088) | -0.338***<br>(0.088) | -0.397***<br>(0.096) |                      | -0.405***<br>(0.095) |
| Ethnic                | 0.076***<br>(0.030)  | 0.051**<br>(0.030)   | 0.050**<br>(0.030)   | 0.049*<br>(0.031)    | 0.045*<br>(0.030)    | 0.060**<br>(0.028)   | 0.046*<br>(0.030)    |
| Popg                  | 1.727***<br>(0.406)  | 1.615***<br>(0.409)  | 1.597***<br>(0.409)  | 1.591***<br>(0.428)  | 1.530***<br>(0.415)  | 1.561***<br>(0.422)  | 1.440***<br>(0.428)  |
| Educ                  | -0.307***<br>(0.082) | -0.404***<br>(0.084) | -0.398***<br>(0.084) | -0.401***<br>(0.087) | -0.427***<br>(0.087) | -0.410***<br>(0.091) | -0.431***<br>(0.087) |
| Income                |                      | 0.039***<br>(0.010)  | 0.040***<br>(0.010)  | 0.041***<br>(0.014)  | 0.048***<br>(0.014)  | 0.037***<br>(0.015)  | 0.049***<br>(0.014)  |
| Gdpg                  |                      |                      | -0.084<br>(0.084)    | -0.086<br>(0.091)    | -0.063<br>(0.092)    | -0.069<br>(0.094)    | -0.067<br>(0.093)    |
| Inf                   |                      |                      |                      | 0.027<br>(0.318)     | 0.038<br>(0.319)     | 0.050<br>(0.322)     | 0.043<br>(0.320)     |
| Crisis                |                      |                      |                      |                      | 0.026*<br>(0.018)    | -0.003<br>(0.017)    | 0.030*<br>(0.019)    |
| Telecom               |                      |                      |                      |                      |                      | -0.002**<br>(0.001)  |                      |
| <i>Sukūk</i> *Crisis  |                      |                      |                      |                      |                      |                      | -1.308<br>(1.115)    |
| Intercept             | -1.085***<br>(0.071) | -0.911***<br>(0.072) | -0.904***<br>(0.071) | -0.903***<br>(0.071) | -0.866***<br>(0.074) | -1.09***<br>(0.086)  | -0.858***<br>(0.074) |
| Observations          | 550                  | 550                  | 550                  | 550                  | 550                  | 550                  | 550                  |
| Pseudo R <sup>2</sup> | 0.465                | 0.480                | 0.482                | 0.482                | 0.484                | 0.477                | 0.485                |

This table focuses on the government *Sukūk* sample (*Sukūk*g). The marginal effects of the second-stage FRM are reported with robust standard errors in parentheses. We instrument the FD variable using Lo, Ip, and Corr (see Table 4). \*\*\*, \*\*, \* respectively represent significance at 1%, 5%, and 10%.

#### 4.4. Robustness

##### 4.4.1. Robustness check: Government and corporate *sukūk*

The positive association between *sukūk* development and income inequality may be contingent on the type of *sukūk*: government versus corporate. To check for this likelihood, we re-estimate our models using two explanatory variables: (1) Government *sukūk* market development measured by the ratio of government *sukūk* issuances to GDP (*sukūk*g), (2) corporate *sukūk* market development measured by the ratio of corporate *sukūk* market capitalization to GDP (*sukūk*c).<sup>21</sup> Table 6 shows the results of our government *sukūk* regressions, while Table 7 illustrates the regression outcomes for the corporate *sukūk*. The results in Tables 7 and 8 persistently show the positive effect of *sukūk* (both government and corporate) on income inequality. Moreover, the relationship between FD and other independent variables and income inequality is highly consistent. It is worth mentioning that the marginal effect of *sukūk*c on income inequality is significantly higher than that of *sukūk*g. One plausible reason behind this difference stems from the divergence of the investor base between the two types. Corporate *sukūk* is practically designated and sold to institutional or high-net-worth investors.

On the other hand, government *sukūk* offers investment opportunities for all investors, including those in the middle and bottom income categories. Therefore, the adverse impact of *sukūk*c issuances on income inequality is expected to be higher than that of their government counterparts. This is attributed to access to capital markets.

##### 4.4.2. Robustness check: Reduced samples

Tables 9 and 10 provide additional robustness checks by excluding countries with the biggest *sukūk* issuance and those with a proportion of *sukūk* issuance to the GDP of less than five bps, respectively.<sup>22</sup> The view is that the regression results may be affected by Malaysia as the biggest-issuing country or diluted by including countries with an insignificant amount of *sukūk* issuances, namely

<sup>21</sup> The International Islamic Financial Markets (IIFM) Sukuk Report 2022 (page 51) specifies the proportion of government *sukūk* to its corporate counterpart as 84:16.

<sup>22</sup> Given that Telecom and Globalization have a high correlation, Tables 9 and 10 report only Globalization for brevity. However, substituting Globalization with Telecom yields consistent findings.

**Table 7**  
Robustness check: Corporate *Sukūk*.

|                       | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  | (7)                  |
|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                       | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                |
| <i>Sukūk</i>          | 9.460***<br>(1.762)  | 11.853***<br>(2.038) | 12.035***<br>(2.026) | 12.022***<br>(2.075) | 12.764***<br>(2.108) | 8.516***<br>(1.792)  | 12.489***<br>(2.945) |
| Bond                  | -0.064<br>(0.047)    | -0.051<br>(0.047)    | -0.050<br>(0.046)    | -0.050<br>(0.046)    | -0.059<br>(0.044)    | -0.109***<br>(0.045) | -0.059<br>(0.044)    |
| FD                    | -0.095*<br>(0.060)   | -0.092*<br>(0.059)   | -0.093*<br>(0.059)   | -0.093*<br>(0.057)   | -0.073<br>(0.057)    | -0.092*<br>(0.062)   | -0.072<br>(0.057)    |
| Gender                | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.003***<br>(0.001) | -0.002***<br>(0.001) | -0.003***<br>(0.001) | -0.002***<br>(0.001) |
| Global                | -0.138**<br>(0.078)  | -0.450***<br>(0.098) | -0.469***<br>(0.095) | -0.469***<br>(0.095) | -0.599***<br>(0.100) |                      | -0.599***<br>(0.100) |
| Ethnic                | 0.072***<br>(0.029)  | 0.044*<br>(0.030)    | 0.041*<br>(0.029)    | 0.041*<br>(0.030)    | 0.027<br>(0.029)     | 0.060***<br>(0.027)  | 0.027<br>(0.029)     |
| Popg                  | 1.860***<br>(0.446)  | 1.747***<br>(0.459)  | 1.726***<br>(0.460)  | 1.729***<br>(0.473)  | 1.622***<br>(0.455)  | 1.586***<br>(0.448)  | 1.639***<br>(0.462)  |
| Educ                  | -0.304***<br>(0.081) | -0.421***<br>(0.082) | -0.414***<br>(0.082) | -0.411***<br>(0.083) | -0.466***<br>(0.084) | -0.441***<br>(0.091) | -0.465***<br>(0.084) |
| Income                |                      | 0.048***<br>(0.010)  | 0.049***<br>(0.010)  | 0.049***<br>(0.013)  | 0.063***<br>(0.013)  | 0.036***<br>(0.015)  | 0.063***<br>(0.013)  |
| Gdpg                  |                      |                      | -0.106<br>(0.082)    | -0.105<br>(0.088)    | -0.067<br>(0.089)    | -0.069<br>(0.092)    | -0.067<br>(0.089)    |
| Inf                   |                      |                      |                      | -0.017<br>(0.303)    | 0.022<br>(0.304)     | 0.030<br>(0.308)     | 0.022<br>(0.303)     |
| Crisis                |                      |                      |                      |                      | 0.045***<br>(0.017)  | 0.004<br>(0.017)     | 0.044***<br>(0.018)  |
| Telecom               |                      |                      |                      |                      |                      | -0.002**<br>(0.001)  |                      |
| <i>Sukūk</i> *Crisis  |                      |                      |                      |                      |                      |                      | 0.558<br>(3.549)     |
| Intercept             | -1.068***<br>(0.072) | -0.856***<br>(0.073) | -0.846***<br>(0.073) | -0.846***<br>(0.073) | -0.762***<br>(0.076) | -1.063***<br>(0.085) | -0.763***<br>(0.075) |
| Observations          | 550                  | 550                  | 550                  | 550                  | 550                  | 550                  | 550                  |
| Pseudo R <sup>2</sup> | 0.478                | 0.498                | 0.501                | 0.501                | 0.508                | 0.489                | 0.508                |

This table focuses on the corporate *Sukūk* sample (*Sukūk*). The marginal effects of the second-stage FRM are reported with robust standard errors in parentheses. We instrument the FD variable using Lo, Ip, and Corr (see Table 4). \*\*\*, \*\*, \* respectively represent significance at 1%, 5%, and 10%.

Bangladesh, the Netherlands, Switzerland, and the United Kingdom from our sample. Again, Tables 9 and 10 illustrate consistent and robust findings concurring with the previous results. *Sukūk* positively impacts income inequality across different types of government and corporate issuances. The economic magnitude of corporate *sukūk* is the highest among the different types of issuance. This is in harmony with Tables 6, 7, and 8. The impacts of bonds and FD on income inequality are also consistently negative across different panels.

#### 4.4.3. Robustness check: Gini coefficient

Finally, to assess the robustness of our results, we re-estimate our models using the Gini coefficient as an alternative measure of income inequality. The Gini coefficient complements the Top 1 % as it captures the income inequality of the entire population and is more sensitive to the center of the income distribution instead of its tails. The evidence in Table 10 shows that the results are consistent with the original ones. *Sukūk* issuance is positively and significantly related to Gini regardless of the types of *Sukūk* and the regression models used. Here, the positive effect of *Sukūk* on inequality has also been moderated after the GFC. Bond and FD also persistently have a significant negative relationship with Gini.

Interestingly, the positive effects of ethnic diversity on income inequality are evident in the Gini model. All the regression models in Table 8 indicate that countries with higher ethnic diversity tend to experience higher income inequality, consistent with Desmet et al. (2012) and Sturm and De Haan (2015). A 1 % increase in the probability of the two randomly selected individuals (in the country) coming from different racial backgrounds is associated with 0.06 % or 0.08 % higher income inequality.

**Table 8**  
Robustness check: Big-issuing Country Excluded.

|                            | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
|----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                            | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                |
| <i>Sukūk</i> (All)         | 1.078***<br>(0.459)  |                      |                      | 0.452<br>(0.473)     |                      |                      |
| <i>Sukūkg</i>              |                      | 1.208**<br>(0.71)    |                      |                      | 1.012<br>(0.752)     |                      |
| <i>Sukūkc</i>              |                      |                      | 8.128***<br>(3.091)  |                      |                      | 0.241<br>(2.237)     |
| Bonds                      | -0.094**<br>(0.045)  | -0.094**<br>(0.045)  | -0.079**<br>(0.044)  | -0.097**<br>(0.046)  | -0.094**<br>(0.045)  | -0.074**<br>(0.044)  |
| FD                         | -0.092*<br>(0.059)   | -0.088*<br>(0.059)   | -0.081*<br>(0.057)   | -0.091*<br>(0.059)   | -0.088*<br>(0.060)   | -0.071<br>(0.056)    |
| Gender                     | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) |
| Global                     | -0.664***<br>(0.104) | -0.669***<br>(0.104) | -0.680***<br>(0.103) | -0.660***<br>(0.104) | -0.669***<br>(0.104) | -0.650***<br>(0.103) |
| Ethnic                     | 0.0002<br>(0.030)    | -0.001<br>(0.030)    | 0.008<br>(0.030)     | -0.002<br>(0.031)    | -0.001<br>(0.030)    | 0.013<br>(0.030)     |
| Popg                       | 1.930***<br>(0.456)  | 1.992***<br>(0.455)  | 1.843***<br>(0.445)  | 2.024***<br>(0.475)  | 2.001***<br>(0.473)  | 2.194***<br>(0.473)  |
| Educ                       | -0.475***<br>(0.086) | -0.476***<br>(0.086) | -0.476***<br>(0.084) | -0.472***<br>(0.086) | -0.476***<br>(0.086) | -0.474***<br>(0.083) |
| Income                     | 0.078***<br>(0.015)  | 0.079***<br>(0.015)  | 0.076***<br>(0.015)  | 0.078***<br>(0.015)  | 0.079***<br>(0.015)  | 0.071***<br>(0.014)  |
| Gdpg                       | -0.083<br>(0.094)    | -0.084<br>(0.094)    | -0.078<br>(0.093)    | -0.081<br>(0.094)    | -0.084<br>(0.094)    | -0.063<br>(0.091)    |
| Inf                        | 0.175<br>(0.317)     | 0.185<br>(0.321)     | 0.103<br>(0.312)     | 0.175<br>(0.317)     | 0.185<br>(0.321)     | 0.072<br>(0.307)     |
| Crisis                     | 0.055***<br>(0.018)  | 0.056***<br>(0.018)  | 0.060***<br>(0.017)  | 0.052***<br>(0.019)  | 0.055***<br>(0.019)  | 0.046***<br>(0.018)  |
| <i>Sukūk(a/g/c)*Crisis</i> |                      |                      |                      | 0.854<br>(0.649)     | 0.243<br>(0.938)     | 18.147***<br>(7.016) |
| Intercept                  | -0.752***<br>(0.076) | -0.753***<br>(0.076) | -0.739***<br>(0.077) | -0.760***<br>(0.076) | -0.754***<br>(0.076) | -0.766***<br>(0.075) |
| Observations               | 525                  | 525                  | 525                  | 525                  | 525                  | 525                  |
| Pseudo R <sup>2</sup>      | 0.514                | 0.513                | 0.517                | 0.515                | 0.513                | 0.524                |

This robustness check excludes Malaysia, the highest *Sukūk* issuing country, from our sample to control. The marginal effects of the second-stage FRM are reported with robust standard errors in parentheses. We instrument the FD variable using Lo, Ip, and Corr (see Table 4). All variable definitions follow Table 1. In addition to the post-Global Financial Crisis, the Crisis variable also captures the aftermath of the infamous statement of Taqi Usmani, suggesting the majority of the *Sukūk* are non-*Shari'ah* Compliant. *Sukūk(a/g/c)\*Crisis* represents the interaction between Crisis and *Sukūk* (Panel 4), *Sukūkg* (Panel 5), and *Sukūkc* (Panel 6). \*\*\*, \*\*, \* respectively represent significance at 1%, 5%, and 10%.

## 5. Discussion of our results

The positive relationship between *sukūk* development and income inequality reinforces the socio-economic problems of debt market frictions suggested by Foellmi and Oechslin (2010) and Azzimonti et al. (2014).<sup>23</sup> Our ethical framework in Fig. 1 predicts that these issues stem from the agency costs of debt (*ribā*) and excessive risk-taking (*gharar*) in its structure. Even though this conclusion is unfavorable to the IF proponents, it is unsurprising. The half-century of IF experimentation has been mainly centered around jurisprudential (*fiqh*)-based product development with little emphasis on socio-economics. It is in no way that we underestimate the role of *fiqh* in the innovation process. However, the following fundamental structural flaws of *sukūk* illustrate that reliance on only legal theory is insufficient to realize Islamic law's ethical objectives.

First, the design of *sukūk* is captivated by traditional transaction methods at the expense of socio-economic efficiency. IF strives to restructure conventional debt contracts by reviving medieval (8th to the late 14th century) contracts of the prosperous era of the Muslim world (Pamuk and Shatzmiller, 2014). The industry employs those contracts merely as a legal stratagem to evade the issue of *ribā* and *gharar*. In practice, *sukūk* design is similar to a debt facility but less efficient and riskier, as elaborated below.<sup>24</sup>

First, according to Bloomberg, the cost-plus Murabaha contract (accounting for roughly 41.76 % of the existing *sukūk* in March

<sup>23</sup> It should be noted that the pricing of both *sukūk* and debt is contingent on the extent of development of the relevant financial market. This development issue is linked to how market frictions are abated by the relevant security. Bond issuance in conformity with financial development has a negative relationship with income inequality in contrast to *sukūk*. This is attributed to the rudimentary stage of *sukūk* development, where market frictions are higher than that in the more developed bond market.

<sup>24</sup> The empirical literature documents that *sukūk* is generally issued by less profitable and high leveraged firms with severe information opacity (Mohamed et al., 2015; Minhat and Dzolkarnaini, 2017; Nagano, 2017; Klein et al., 2018).



**Table 9**  
Robustness check: Small-issuing Countries Excluded.

|                            | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
|----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                            | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                | Top1%                |
| <i>Sukūk</i> (All)         | 1.769***<br>(0.383)  |                      |                      | 2.273***<br>(0.618)  |                      |                      |
| <i>Sukūkg</i>              |                      | 1.827***<br>(0.602)  |                      |                      | 2.471***<br>(0.909)  |                      |
| <i>Sukūkc</i>              |                      |                      | 10.776***<br>(2.047) |                      |                      | 10.500***<br>(2.752) |
| Bonds                      | -0.101**<br>(0.054)  | -0.103**<br>(0.055)  | -0.075*<br>(0.054)   | -0.100**<br>(0.054)  | -0.102**<br>(0.055)  | -0.074<br>(0.054)    |
| FD                         | -0.119*<br>(0.079)   | -0.106<br>(0.080)    | -0.104*<br>(0.075)   | -0.119*<br>(0.079)   | -0.106<br>(0.080)    | -0.104<br>(0.075)    |
| Gender                     | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) |
| Global                     | -0.220**<br>(0.121)  | -0.152<br>(0.125)    | -0.378***<br>(0.129) | -0.237**<br>(0.122)  | -0.160<br>(0.125)    | -0.377***<br>(0.129) |
| Ethnic                     | 0.030<br>(0.034)     | 0.042<br>(0.034)     | 0.021<br>(0.033)     | 0.029<br>(0.034)     | 0.043<br>(0.034)     | 0.021<br>(0.033)     |
| Popg                       | 1.229***<br>(0.427)  | 1.214***<br>(0.421)  | 1.345***<br>(0.452)  | 1.145***<br>(0.436)  | 1.155***<br>(0.432)  | 1.364***<br>(0.462)  |
| Educ                       | -0.450***<br>(0.098) | -0.440***<br>(0.099) | -0.462***<br>(0.095) | -0.452***<br>(0.098) | -0.442***<br>(0.099) | -0.462***<br>(0.096) |
| Income                     | 0.050***<br>(0.013)  | 0.045***<br>(0.014)  | 0.059***<br>(0.013)  | 0.051***<br>(0.013)  | 0.046***<br>(0.014)  | 0.059***<br>(0.013)  |
| Gdpg                       | -0.111<br>(0.095)    | -0.109<br>(0.096)    | -0.106<br>(0.094)    | -0.113<br>(0.096)    | -0.111<br>(0.096)    | -0.106<br>(0.094)    |
| Inf                        | 0.027<br>(0.304)     | 0.002<br>(0.309)     | -0.020<br>(0.295)    | 0.031<br>(0.305)     | 0.005<br>(0.309)     | -0.021<br>(0.295)    |
| Crisis                     | 0.0003<br>(0.019)    | -0.004<br>(0.020)    | 0.019<br>(0.019)     | 0.006<br>(0.021)     | 0.000<br>(0.022)     | 0.017<br>(0.021)     |
| <i>Sukūk(a/g/c)*Crisis</i> |                      |                      |                      | -0.750<br>(0.676)    | -0.862<br>(0.986)    | 0.563<br>(3.378)     |
| Intercept                  | -0.952***<br>(0.08)  | -0.995***<br>(0.080) | -0.876***<br>(0.085) | -0.941***<br>(0.080) | -0.989***<br>(0.081) | -0.877***<br>(0.084) |
| Observations               | 450                  | 450                  | 450                  | 450                  | 450                  | 450                  |
| Pseudo R <sup>2</sup>      | 0.318                | 0.308                | 0.333                | 0.319                | 0.309                | 0.333                |

This robustness check excludes Bangladesh, Netherlands, Switzerland, and the United Kingdom from our sample as their average proportion of the *Sukūk* issuance to the GDP is less than 5 bps. The marginal effects of the second-stage FRM are reported with robust standard errors in parentheses. We instrument the FD variable using Lo, Ip, and Corr (see Table 4). All variable definitions follow Table 1. In addition to the post-Global Financial Crisis, the Crisis variable also captures the aftermath of the infamous statement of Taqi Usmani, suggesting the majority of the *Sukūk* are non-*Shari'ah* Compliant. *Sukūk(a/g/c)\*Crisis* represents the interaction between Crisis and *Sukūk* (Panel 4), *Sukūkg* (Panel 5), and *Sukūkc* (Panel 6). \*\*\*, \*\*, \* respectively represent significance at 1%, 5%, and 10%.

2021) implies a fixed rate that exposes the transaction to the market risk and hence the risk-shifting problem. This is not to mention that the reverse *Murabaha* (organized *Tawarruq*) or sale and buy-back arrangement (*Inah*) replicates a conventional debt facility, thereby suffering from the twin issues of *ribā* and *gharar*. The financial leasing (*Ijara*) contract (roughly employed in 21.65 % of the *sukūk* in March 2021) may reduce the risk-shifting and underinvestment issues as a floating (i.e., adjustable) rate incorporates short-term inflationary expectations. However, the contract requires the issuer to have an income-generating asset for the underlying transaction. It disallows the securitization of intangible or even non-income producing (i.e., growth) assets and discourages greenfield (non-existing) infrastructure financing (Jatmiko et al., 2023b).

Second, asset centrality holds only in theory, as most *sukūk* are asset-based instead of asset-backed (Jatmiko et al., 2023b). In the latter, the underlying asset is real. Not only does it become the source of cash flows for the *sukūk* holders, but it also serves as collateral. In the event of default, the holders have recourse to the underlying asset. These features, however, barely exist in the contemporary *sukūk*. Its asset-based structure does not truly transfer the title of the underlying asset to the SPV. This leaves the *sukūk* holders no recourse to the collateral in the event of default, thus aggravating the risk of the facility. The payoffs of securitization also diverge from that of the underlying assets. On the contrary, the industry prices *sukūk* employing interest-based benchmark, as discussed below.

Third, interest-based pricing is one of the most endemic problems of the IF industry. *Sukūk* is no exception (Kuran, 2018). This pricing disconnects with the underlying asset's performance and amplifies the agency costs of debt in IF products. The industry mainly relies on local variants of LIBOR for pricing, except that the *sukūk* rate is more expensive. This is regardless of the contractual types of

**Table 10**  
Robustness check: Gini Coefficients.

|                            | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
|----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                            | GINI                 | GINI                 | GINI                 | GINI                 | GINI                 | GINI                 |
| <i>Sukūk</i> (All)         | 3.336**<br>(1.04)    |                      |                      | 4.508***<br>(1.083)  |                      |                      |
| <i>Sukūkg</i>              |                      | 1.894*<br>(1.582)    |                      |                      | 2.112*<br>(1.774)    |                      |
| <i>Sukūkc</i>              |                      |                      | 20.305***<br>(3.817) |                      |                      | 22.223***<br>(3.844) |
| Bond                       | -0.118***<br>(0.063) | -0.139***<br>(0.065) | -0.110***<br>(0.060) | -0.125***<br>(0.062) | -0.139***<br>(0.065) | -0.119***<br>(0.060) |
| FD                         | -0.067*<br>(0.063)   | -0.117***<br>(0.062) | -0.016<br>(0.063)    | -0.065<br>(0.063)    | -0.117***<br>(0.062) | -0.021<br>(0.063)    |
| Gender                     | 0.002**<br>(0.001)   | 0.0001<br>(0.001)    | 0.004***<br>(0.001)  | 0.002**<br>(0.001)   | 0.0001<br>(0.001)    | 0.004***<br>(0.001)  |
| Telecom                    | 0.211<br>(0.280)     | 0.642***<br>(0.262)  | -0.145<br>(0.286)    | 0.202<br>(0.277)     | 0.644***<br>(0.262)  | -0.095<br>(0.286)    |
| Ethnic                     | 0.055*<br>(0.05)     | 0.078**<br>(0.054)   | 0.069**<br>(0.047)   | 0.059*<br>(0.049)    | 0.078**<br>(0.054)   | 0.079***<br>(0.048)  |
| Popg                       | 8.755***<br>(1.960)  | 8.619***<br>(1.990)  | 8.544***<br>(1.697)  | 8.530***<br>(1.905)  | 8.601***<br>(1.998)  | 8.326***<br>(1.659)  |
| Educ                       | 0.038<br>(0.166)     | 0.094<br>(0.173)     | 0.077<br>(0.151)     | 0.036<br>(0.165)     | 0.093<br>(0.174)     | 0.092<br>(0.149)     |
| Income                     | -0.018<br>(0.038)    | -0.059***<br>(0.037) | 0.002<br>(0.036)     | -0.018<br>(0.037)    | -0.059***<br>(0.036) | -0.005<br>(0.034)    |
| Gdpg                       | 0.027<br>(0.112)     | 0.035<br>(0.113)     | 0.033<br>(0.112)     | 0.019<br>(0.112)     | 0.034<br>(0.114)     | 0.030<br>(0.113)     |
| Inf                        | 0.007<br>(0.346)     | -0.174<br>(0.365)    | 0.072<br>(0.322)     | 0.033<br>(0.345)     | -0.173<br>(0.366)    | 0.060<br>(0.322)     |
| Crisis                     | -0.045***<br>(0.024) | -0.048***<br>(0.025) | -0.032**<br>(0.023)  | -0.034**<br>(0.025)  | -0.047***<br>(0.026) | -0.024<br>(0.024)    |
| <i>Sukūk(a/g/c)*Crisis</i> |                      |                      |                      | -1.808***<br>(0.804) | -0.207<br>(0.948)    | -1.216***<br>(0.690) |
| Intercept                  | -1.142***<br>(0.206) | -1.283***<br>(0.209) | -1.150***<br>(0.185) | -1.135***<br>(0.203) | -1.281***<br>(0.210) | -1.179***<br>(0.180) |
| Observations               | 300                  | 300                  | 300                  | 300                  | 300                  | 300                  |
| Pseudo R <sup>2</sup>      | 0.496                | 0.461                | 0.557                | 0.505                | 0.461                | 0.563                |

This robustness check replaces the proxy of inequality Top 1% with the Gini Coefficient. The marginal effects of the second-stage FRM are reported with robust standard errors in parentheses. We instrument the FD variable using Lo, Ip, and Corr (see Table 4). All variable definitions follow Table 1. In addition to the post-Global Financial Crisis, the Crisis variable also captures the aftermath of the infamous statement of Taqī Usmani, suggesting the majority of the *Sukūk* are non-*Shari'ah* Compliant. *Sukūk(a/g/c)\*Crisis* represents the interaction between Crisis and *Sukūk* (Panel 4), *Sukūkg* (Panel 5), and *Sukūkc* (Panel 6). \*\*\*, \*\*, \* respectively represent significance at 1%, 5%, and 10%.

### *sukūk*.<sup>25</sup>

Finally, the disconnect between the innovation process and *Maqāsīd al-Sharī'ah* (Objectives of Islamic Law) is also attributed to the shortfall of *Shari'ah* certification. Gözübüyük et al. (2020) argue that the lack of innovation roots in the interlocking network and monopoly in the *Shari'ah* certification process. Another study raises the classic governance issue (i.e., conflict of interest), as the *sukūk* issuer pays the certification service fee (Al Mannai and Ahmed, 2019). Hasan (2014) documents that the technical knowledge of financial instruments, institutions, and markets is also essential in making innovative *sukūk*.

To summarize, the deviation of *sukūk* in practice from that hypothesized is not surprising. Developing products without implementing the objectives of Islamic law converges the securitization to a facility that is even less efficient and riskier than plain vanilla debt. It thus fails to establish the negative nexus with inequality through asset centrality as well as financial inclusion arguments.

## 6. Conclusions

Equitable income distribution is an integral part of the ethical objectives of Islam to attain socio-economic justice. However, to the best of our knowledge, there has been no attempt to link the development of *sukūk* with inequality. This is despite its growing importance as a corporate and government financing facility in developing and developed economies. The literature offers divergent views of the finance-inequality nexus discussed in Section 4.2.

This paper reconciles the conflicting perspectives of the literature by examining the role of *sukūk* development on income

<sup>25</sup> In 2011, the IF industry attempted to delink from LIBOR by inventing the IIBR. However, this alternative pricing offered a trivial difference from and was priced higher than the LIBOR. Jatmiko et al. (2023a) document the short-run and long-run convergence between LIBOR (and its local variants) and IIBR. It is thus obvious that the IIBR was discontinued from August 18, 2016.

inequality. We theoretically rationalize the link between the two by employing market friction theory as follows. Financial development (i.e., *sukūk* evolution from an asset-based structure to an asset-backed one) can gradually mitigate agency costs of debt. That is, if these frictions are addressed meticulously, then financial development will not contribute to income inequality. However, if market frictions are exacerbated by financial development, then the resulting asymmetric information will necessitate a higher return on *sukūk*. This will impinge on income inequality.

We employ a large cross-country sample of both OIC and non-OIC *sukūk*-issuing countries over the 1995–2019 period to prove the above notions empirically. Our findings document a positive nexus between *sukūk* development and the Top 1 % of earners. A 1 % increase in the *sukūk* issuance is associated with 1.5 % to 2.1 % higher income inequality. However, our findings indicate that *sukūk* development has improved, especially post-GFC, where flight-to-safety may have incentivized issuers to offer more asset-backed facilities. This motive may also be driven by the infamous 2007 statement of Taqi Usmani, suggesting that 85 % of *sukūk* are not Islamic. The statement seems to have induced a feedback mechanism in the structure of *sukūk* and thus reduces its adverse impact on income redistribution.

Our results suggest a negative link between inequality and FD [Bond Development]. In general, a 1 % improvement in our proxy of FD [Bond Development] corresponds to a 0.09–0.11 % [0.08–0.12 %] reduction in income inequality. This suggests the lower frictions in the more well-established bond market.

The *sukūk*-inequality implication is prevalent in our study. *Sukūk* fails to incorporate the ethical objectives of Islamic law in its product development. *Sukūk* design is captivated by inefficient medieval contracting, preferential employment of asset-based (instead of asset-backed) structures, and reliance on interest-based pricing models. The overly concentrated network of religious scholars who grant *Shari'ah* certifications exacerbates these problems. Like other IF products, *Sukūk* has hitherto been developed on a narrow adherence to legal theory without contextualizing its socio-economic ramifications. This makes 'Islamic' securitization mimic conventional bonds, albeit inefficiently and with excessive risk. The ill effects of agency costs of debt (*ribā*) and unreasonable risk (*gharar*) persist. These two endemic issues embedded in debt are among the sources of inequality from an ethical and economic perspective. This is why our study documents a positive link between *sukūk* and inequality. The only way forward is by incorporating the moral objectives of Islamic law in the *sukūk* development process.

We acknowledge some limitations of our study. We do not categorize *sukūk* based on the form of contract (*Murabaha*, *Ijara*, *Wakala bil Istithmar*, *Musharaka*, *Mudharaba*, etc.) due to data availability and sufficiency constraints. In this paper, we have argued that *sukūk* comprises primarily unsecured securities that mimic conventional bonds. However, accounting for the above categories can help us evaluate their varied impacts on income redistribution. Finally, our paper only emphasizes the flow concept of inequality (i.e., income) and is silent on wealth disparity. These are the gaps that future research can aim to fill.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

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### Authors' Statements.

#### Author Contributions.

All authors contributed to the study's conception and design. Jatmiko Wahyu initially performed material preparation, data collection, and analysis. He also wrote the first draft of the manuscript while the remaining authors restructured the same. All authors read and approved the final manuscript.

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