Investors' demand in Initial Public Offering (IPO): *Shariah* compliance, corporate governance and macroeconomic factors

Abdullah Al Masud and Burhan Uluyol
Department of Islamic Economics and Finance, Istanbul Sabahattin Zaim Universitesi, Istanbul, Turkey

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Abstract

Purpose – Initial Public Offering (IPO) is a major milestone for a company. It allows a private company to issue shares to a much broader group of investors and become public. But conclusive evidence of the driving forces behind investors' demand is yet to be identified. Therefore, the major purpose of this study is to assess the level of investors' demand in IPO and how investors' demand in IPOs is affected.

Design/methodology/approach – The study will employ 80 IPO companies of a Muslim-majority country, Bangladesh, starting from 2013 to 2021 with application of linear and quantile regressions. Apart from that, *t*-test will be used to compare means of groups of *Shariah*-compliant and non-*Shariah*-compliant firms and IPOs under fixed-price and book-building mechanism.

Findings – Oversubscription is higher for IPOs issued through fixed-price method compared to book-building method, but no significant difference is found in oversubscription for *Shariah* firms compared to non-*Shariah* firms based on *t*-tests. The authors found IPO size, firm size, IPO risk, proportion of shares offered to public, and bank interest rate to have significant impact on the IPO demand. Some models found non-*Shariah* compliance status of IPO companies to be a significant factor for the investors to demand IPO. Quantile regression results found board independence to have a positive association with larger, less-subscribed firms and board size to have a negative relation with IPO demand, for smaller firms with high demand.

Research limitations/implications – Future studies may apply the findings to other settings, especially into the reasons behind preference for non-*Shariah*-compliant firms and higher demand for IPOs during higher interest rate. Equity issuing firms and issue managers can benefit from this study by wisely deciding on the proportion of shares for public, issue size and board of director composition. *Shariah* considerations cannot be ignored given that more information on *Shariah* compliance is disseminated among investors despite current non-preference for *Shariah*-compliant IPOs. On the other hand, institutional investors and general investors should consider firm-specific, governance and macroeconomic factors in IPO investment. Likewise, regulators would do well to bring in quality IPOs with characteristics mentioned in this study for ensuring stability of the market.

Originality/value – The main contribution of the study is identifying determinants of IPO demand: faith, governance, macro issues – understanding whether one or many of the above factors drive investor demand in IPOs of a Muslim-majority country will be the main contribution.

Keywords Initial public offering (IPO), *Shariah* compliance, Corporate governance, Macroeconomic factors

Paper type Research paper

1. Introduction

Initial Public Offering (IPO) is a major milestone for a company. It allows a private company to issue shares to a much broader group of investors and become public. As such, the company's public exposure increases in addition to the scrutiny of

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company's performance. IPO performance has attracted attention from researchers, practitioners and media alike. Among many other factors, investors' demand has been found to affect IPO performance. Oversubscription, defined as the number of times a public issue has been subscribed to, is a measure of IPO demand or IPO performance. It is considered that oversubscription can be related to an IPO being a success; in contrast, undersubscription can be related to the IPO being a failure (Low and Yong, 2011).

But conclusive evidence of the driving forces behind investors' demand is yet to be identified, especially in Muslim-majority countries, where Muslims are supposed to maintain the Islamic Code of Conduct, or "Islamic *Shariah*" in every aspect of life. In line with the theory of faith-based investments, Muslim investors are to sort an IPO based on *Shariah* screening criteria set by Islamic scholars using an IPO prospectus to filter out *Shariah*-compliant stocks from the stock universe. Whether these investors' demand for IPO stock is motivated by *Shariah* compliance is up for research. Distinguishing a *Shariah*-compliant IPO company from a non-*Shariah*-compliant one requires analysis of company data to derive compliance status, as companies do not disclose *Shariah* compliance status directly.

On the other hand, perception regarding corporate governance, a system of rules and regulations by which a company is governed, can also affect investor demand in IPO. Measures of good corporate governance include an effective board of directors, the protection of rights of shareholders and related parties, transparency of information and so on (Pahlevi, 2023; Ullah *et al.*, 2023). Improved corporate governance is an indicator of lower agency problems; thus, shareholder interest is better upheld in such companies, according to agency theory. In IPO, there are significant information asymmetry between issuer and investors, leading to IPO underpricing. This information asymmetry is affected by IPO process or intrinsic characteristics of the issuing firm including corporate governance (Mutamimah and Saputri, 2023; Teti and Montefusco, 2022). Effective corporate governance of the firm helps reduce conflicts of interest between stakeholders and signals firm quality to external parties (Biswas and Bhuiyan, 2008). Like IPO underpricing, whether investors' demand in IPO is influenced by governance mechanisms is up for research.

In addition, macroeconomic factors can play a vital role in explaining investor demand. Firms generally go public when the business outlook is favorable and capital requirement to bolster investment is high; on the other hand, uncertainty regarding business environment will make firms wait for more information before raising funds for more investments (Lowry, 2003; Nguyen Thanh, 2020). For example, lower interest income in bank deposits at the time of IPO subscription can influence investors to put funds in IPOs instead of banks. In addition, lower returns in the secondary market can drive funds to primary market, i.e. an IPO. As such, market returns during an IPO subscription can potentially drive investors' demand.

Bangladesh is a Muslim-majority country, with 91.04% of the 165 million (official) population being Muslims (Bangladesh Bureau of Statistics, 2023). The country has been one of the fastest-growing economies in world. Prior to the COVID-19 pandemic, it recorded 8.2% growth in 2019, according to the World Bank (S. R. Chowdhury, 2021). Despite the economic growth, Bangladesh's Stock Market capitalization-to-gross domestic product (GDP) ratio was around 13% in 2021–2022, as mostly small companies are listed on the exchanges and bigger companies are shying away from raising funds from market (New Age, 2022). Besides, the stock market is mostly equity-based. The number of corporate bonds and sukuk are scarce and

less traded (Chowdhury *et al.*, 2024). On top of that, market investors comprise mostly small investors. The market experienced big market crashes in the recent past – in 1996 and 2011 – leading these investors to seek excess returns from the primary market, i.e. IPOs (Rahman *et al.*, 2017). Despite the obstacles, the Bangladesh market is growing and is an attractive investment destination for local and foreign investors in private equity as well as public offerings (Chowdhury *et al.*, 2024).

The country has two bourses, the Dhaka Stock Exchange (DSE) and the Chittagong Stock Exchange (CSE). IPOs in Bangladesh are offered mostly through the fixed price mechanism, despite the presence of book-building method. Under the book-building method, only 16 companies have been listed since 2010 to date (Bangladesh Securities and Exchange Commission, 2022). In the fixed price method, companies offer shares to investors at a fixed price set based on the valuation of the company. But that pricing does not take into account the actual price investors are willing to pay. But in the book-building method, firms can get information on demand for the share from investors before the final price and issue size are fixed. For this reason, the levels of underpricing and oversubscription tend to be lower in the book-building method relative to the fixed price mechanism (Agarwal *et al.*, 2008; Tajuddin *et al.*, 2018). Because IPOs in Bangladesh mostly come through the fixed price method, different factors may affect the IPO demand compared to countries with IPOs issued mostly under the book-building method.

The major objective of the study is to assess the level of investors' demand for IPO and how investors' demand in IPOs is affected. More specifically, the study will aim to:

- assess the level of oversubscription;
- examine the association between *Shariah* compliance and oversubscription;
- examine the relationship between corporate governance factors of firms and IPO oversubscription; and
- assess the relationship between macroeconomic factors and IPO oversubscription.

The main contribution of the study is assessing the determinants of IPO demand in a Muslim-majority country. Specifically, whether faith along with governance and macroeconomic issues – drive the investor demand in IPO of a Muslim-majority country – will be the main contribution. Previous studies on IPO demand and *Shariah* compliance focused on IPO-related factors and *Shariah* compliance only. This study wants to address the gaps left by previous studies by including other important factors, such as corporate governance and macroeconomic factors recommended by previous studies. So, issuing firms and issue managers can utilize the insights from this paper to focus on the factors needed for creating demand for their IPOs. On the other hand, both institutional and general investors can utilize findings of the study in making IPO investments. Regulators can utilize the study findings to bring in companies with appropriate characteristics to prop up market. The study focuses on Bangladesh because it is an emerging Muslim-majority country with market dynamics different from those assessed in other similar studies, such as Saudi Arabia and Malaysia, in terms of investor composition, market efficiency and composition and governance. The market is mostly equity-based with a few good companies listed apart from limited number of corporate bonds and sukuk. As compared to other markets, investors have a limited basket to choose from (Chowdhury *et al.*, 2024). Foreign and domestic investors have increased interest in Bangladesh's Stock Market due to Bangladesh's economic growth. Thus, more research on the companies and the market dynamics would allow for more information dissemination and add to the body of knowledge regarding Bangladesh market.

The paper is organized as follows: Section 2 reviews the existing literature review and develops hypotheses from previous theories and literature. Section 3 briefly explains the data and methodology. Section 4 presents the findings of the study, and the concluding remarks are presented in Section 5.

2. Literature review and hypotheses development

2.1 Theories on IPO demand or oversubscription

A few theories have been proposed for oversubscription. One of the theories linked to oversubscription is the signaling theory (Allen and Faulhaber, 1989; Leland and Pyle, 1977). According to agency theory, information asymmetry between business owners and shareholders may drive business owners to indulge in opportunist conducts. Involvement of informed (institutional) investors prior to the IPO through private equity reduces adverse selection problem and send positive signal in the market regarding the IPOs prospects. It may lead to increased demand for the IPO shares. Because institutional investors usually make big investments, it requires them to make the investments after a thorough assessment. Their high participation proportion leads to higher participation from other potential investors.

Another form of signaling can be drawn from the Pecking order theory (Myers, 1984; Myers and Majluf, 1984). The theory suggests that firms will prefer internal financing first when in need of funds. If external financing is needed, firms will start with debt, then hybrid securities and equity as a last preference. The theory postulates that managers or firm owners are more informed about the firms than external investors, so there is an information asymmetry. So the theory assumes that an undervalued firm with favorable opportunities would not want to dilute the value of existing shareholders by issuing equities (Viswanath, 1993). Alternatively, a firm without a good investment opportunity will issue equity if the firm is overvalued to transfer wealth from new shareholders to existing shareholders (Harjoto and Garen, 2003). To compensate for this information asymmetry, the stock may be underpriced. If such underpricing is supplemented by a higher ownership dilution or higher proportion of ownership offered to the public, it gives a negative signal to investors, and demand for such an IPO could be low. In the opposite way, a firm with a genuine business opportunity and in need of funds would be likely to dilute less proportion of ownership, which gives a positive signal to investors and leads to higher demand for such IPOs.

Another theory on the investor demand is "winner's curse model" (Rock, 1986). It suggests that there is asymmetric information in the market and less-informed (general public) investors will take part in IPO subscription when issuing firms provide high discounts to the actual value of the IPO firm, thus leading to increase in demand and subsequently initial positive returns (Pons-Sanz, 2005; Ritter, 2011). Such underpricing is more evident in markets in which IPOs occur through fixed price method (Alqahtani and Boulanouar, 2017). The two above-mentioned signals – offering of shares by issuer at discount and the proportion of new issue held by issuer – have been identified as "unobservable intrinsic value of the company and its cash flows" (Grinblatt and Hwang, 1989).

2.2 Empirical studies on IPO demand or oversubscription

There are a limited number of empirical studies on oversubscription, as studies on IPO have mostly been on IPO underpricing and return with IPO demand is peripherally mentioned or used as a determinant for IPO return (Deng and Zhou, 2015; Hasan and Quayes, 2008). Arora and Singh (2020) analyzed determinants of oversubscription of small and medium enterprise (SME) IPOs in the Indian market without considering *Shariah* compliance status (Arora and Singh, 2020). The study found offer price, pricing method, listing delay to negatively affect

oversubscription; on the other hand, it found asset size, underwriter reputation, prior market performance and underpricing to positively affect oversubscription. Low and Yong (2011) looked at oversubscription in fixed price IPOs in Malaysia and found investors' opportunity cost of fund and offer price to have negative relationship to oversubscription, but did not find any significant relationship with issue size (Low and Yong, 2011). Banerjee and Rangamani (2015) studied the impact of firm-specific, macroeconomic and corporate governance factors on IPO oversubscription. It found market price-to-earnings (P/E) ratio to have a positive impact on oversubscription at 5% significance level; change in money supply were found to have a positive relationship and board size to have a negative relationship at 10% significance level with oversubscription (Banerjee and Rangamani, 2015).

Few studies have included *Shariah* status as a determinant for IPO demand. Alqahtani and Boulanouar (2017) tested *Shariah* compliance dummy effect on demand after controlling for size, age, offer risk, offer price, blockholding and market condition (Alqahtani and Boulanouar, 2017). Apart from *Shariah* compliance dummy, several control variables, such as size, blockholding and market condition, were found to be significant determinants of investor demand in the Saudi Arabia sample. Alqahtani and Boulanouar (2017) found *Shariah* compliance and oversubscription to be negatively associated and suggested that institutional investors seek to prioritize profit maximization over *Shariah* compliance. On the other hand, Tajuddin *et al.* (2018) found a different result in *Shariah* compliance and oversubscription as the relationship was positive in the study performed on Malaysian IPOs and suggested *Shariah* compliance status can attract attention of investors (Alam *et al.*, 2022; Tajuddin *et al.*, 2018).

Tajuddin *et al.* (2019) in another study used quantile regression and segmented the IPOs and found that investors' demand was more toward smaller companies with low offer prices (Tajuddin *et al.*, 2019). Investors also showed preference toward IPOs with high offer risks as investors sought high initial returns. But the study did not include underwriter's auditor reputation, macroeconomic factors and other financial and non-financial aspects and suggested for future research.

With relation to study on IPOs in Bangladesh, most of the studies dealt with the issue of IPO underpricing (Hasan and Quayes, 2008; Islam, Ali, and Ahmad, 2010; Islam, 1999). The studies found that market return in secondary market (Hasan and Quayes, 2008; Islam, 1999), issue size (Islam, Ali, and Ahmad, 2010; Islam, 1999) and deliberate underpricing from P/E ratio based fair value (Islam, 1999) to have positive relationship with IPO underpricing. On the other hand, director shareholding, proportion of shares offered to public, foreign shareholding (Hasan and Quayes, 2008) were found to have negative relationship with IPO underpricing in Bangladesh.

2.3 Hypotheses

Although Alqahtani and Boulanouar (2017) found a negative relationship between IPO demand and *Shariah* compliance, Tajuddin *et al.* (2018) found a positive relationship between these two variables (Alqahtani and Boulanouar, 2017; Tajuddin *et al.*, 2018). For Bangladesh, a positive relationship between IPO demand and *Shariah* compliance is assumed as well, because the market investors, part of a vast majority of the Muslim population, could prefer *Shariah*-compliant IPO companies more. The country's exchanges do have *Shariah* indices with clear methodologies, but do not necessarily disclose the *Shariah* compliance status of IPO companies. So, investors may filter out *Shariah*-compliant companies based on methodology or get input on *Shariah*-compliant status through information from brokerages and investment managers.

Based on the literature, the following hypotheses are formed for the current study:

H1. There is a positive association between *Shariah* compliance and IPO demand.

As mentioned earlier, based on signaling theory, prior-to-IPO involvement of institutional investors signals reduction of adverse selection problem, leading to higher demand for IPO shares in subscription phase (Allen and Faulhaber, 1989; Leland and Pyle, 1977).

H2. There is a positive relationship between institutional ownership and IPO demand.

From the Pecking order theory discussion earlier, we can deduce that overvalued firms with less favorable business opportunities may go for IPO issue to transfer wealth from new investors to existing investors (Harjoto and Garen, 2003; Myers, 1984; Myers and Majluf, 1984; Viswanath, 1993). In this regard, such firms may offer a higher proportion of shares to the public. This sends a negative signal to the market and demand for companies with higher public share proportion could be low. Alternatively, higher retention by owners is a signal to investors of the owners' own belief in the prospect of the company. So IPO firms with higher ownership retention by owners can draw higher subscription. A study on IPO underpricing in Bangladesh also found that greater levels of insider participation in IPOs leads to lower underpricing (Hasan and Quayes, 2008). Similarly, Rock (1986) asserted that shares with a higher allocation to retail investors develop into a curse for uneducated investors and the shares would provide negative returns since they tend to be expensive (Rock, 1986). As a result, investors tend not to purchase shares of companies with a higher allocation to retail investors.

H3. There is negative association between public offer and IPO demand.

The information asymmetry between a new firm and potential investors can be reduced through corporate governance mechanisms. The board of directors is one such mechanism. The board of directors is a body of representatives of shareholders to oversee the activities of management. The board is supposed to be made up of directors who can bring expertise and experience that complements management. According to resource dependency theory (Pfeffer, 1972), companies can utilize board of director mechanism to reduce environmental uncertainty-related transaction costs and access resources. An effective board of directors adds value through arranging access to external financing and providing strategic advice to a company to gain a competitive advantage (Bertoni *et al.*, 2014). IPO issuers can signal the firm's quality through an experienced board of directors with professional connections. Larger board size and board composition (higher independent director proportion) have been linked to better advice, and receiving critical resources required by the company (Zahra and Pearce, 1989). But sometimes the board may be composed of free-riders who cannot complement management, rather increase complexity (Baker and Gompers, 2003). Larger board can be ineffective due to lack of proper communication and coordination (Jensen, 1993). In the case of Bangladesh, Rashid (2020) found a negative association between board size and foreign equity ownership, as foreign investors find small boards effective in communication and timely decision-making on strategies (Rashid, 2020). But for this study, it is hypothesized that for relatively new firms in IPO, a larger board may bode well for performance and lead to higher IPO demand.

H4. There is positive relationship of board size with IPO demand.

Board independence is the proportion of external or non-executive directors in corporate board of directors. It is an indicator of separation of ownership and management allowing protection of shareholders' interest as independent board would remove information asymmetry between owners and managers (Fama and Jensen, 1983). Similar to board size,

resource dependency theory postulates that firms requiring financial resources will include independent directors to increase access to financing, bolster firm image and decrease environment dependence (Badru *et al.*, 2017; Pfeffer, 1972). In addition, independent directors are considered as experts in the board of directors, act as advisor instead of decision makers (Garg, 2013). Independent directors were found to be effective tool in restricting earnings management of family firms in Bangladesh (Razzaque *et al.*, 2020).

Different studies found positive association between board independence and value of IPO stock, indicating firm value creation through a higher percentage of independent directors (Bertoni *et al.*, 2014; Roosenboom and van der Goot, 2005). Another study IPO initial return on US market found positive association between board independence and IPO return (Dolvin and Kirby, 2016). But no study on association of IPO demand with board independence was found. It is assumed that IPOs of companies with larger independent board will see higher demand.

H5. There is positive relationship of board independence with IPO demand.

Favorable sentiments of the investors toward the market can be reason of higher demand for new issues (Ljungqvist, 2008). Companies also choose to list when the investors have positive sentiment towards the market. Hot secondary market will lead to over-optimism from investors, translating into high demand for IPOs (Arora and Singh, 2020). Firms do tend to issue shares when the market situation is favorable. So we assume that positive market performance will be reflected on higher IPO demand and vice versa.

H6. There is positive relationship of market performance with IPO demand.

Previous studies on IPO demand did not exactly work with macroeconomic factors. Tran and Jeon (2011) analyzed the impact of macro factors such as inflation, interest rate and the Fed's monetary policy actions on number of IPOs, total proceeds in IPO and average IPO proceeds for US market (Tran and Jeon, 2011). It found interest rate to have a negative relationship with total IPO proceeds and average IPO proceeds.

H7. There is negative relationship between interest rate and IPO demand.

Age is a firm-specific information. Relatively older firms provide a track record for assessing their condition to the investors, which is not available for relatively new firms (Mayes and Alqahtani, 2015). So it is assumed that firm's age and IPO demand has positive association (Shelly and Singh, 2008). In Bangladesh, age and underpricing were found to be positively related (Islam *et al.*, 2010); so, firms with longer pre-IPO operating experience may see higher IPO demand.

H8. There is a positive association between age and IPO demand.

The IPO with a high offer price has a lower rate of initial return possibility; so, the offer risk is less. The risk-return tradeoff hypothesis predicts that enterprises with a greater offer risk may provide higher potential return. The offer price also reflects the pricing mechanism of the issues. Fixed price IPOs tend to have lower offer price, higher risk and higher IPO demand, and vice versa for book-building method (Benveniste and Busaba, 1997; Mehmood *et al.*, 2020); thus the demand for the IPO with low offer price and high offer risk may tend to be high (Abdul Rahim and Yong, 2010). In addition, the stock market in Bangladesh is mostly retail investor-based, so such investors generally likely demand IPOs with low offer price with big upside potential (Rashid *et al.*, 2019).

H9. There is positive relationship of IPO risk with IPO demand.

Big IPOs reduce the likelihood of the offering being significantly oversubscribed. Large IPOs make more shares available to investors, making oversubscription less likely. The bigness of IPO may be measured in two ways:

(1) the firm size or asset size; and

(2) IPO issue size.

In both cases, the number of shares available for subscription tends to be high which causes oversubscription ratio to be low (Alqahtani and Boulanouar, 2017; Low and Yong, 2011). I:

H10. There is negative relationship of firm size with IPO demand.

or

H11. There is negative relationship of IPO issue size with IPO demand.

3. Methodology

3.1 Sample selection and data collection

The study will use IPO companies of Bangladesh. The *Shariah* index methodology was introduced in the main bourse of Bangladesh – Dhaka Stock Exchange (DSE) from 2013. For this reason, the study analyzes IPOs from 2013 up to 2021. Among the IPOs, IPOs of banks (2), non-bank financial institutions (NBFIs; 1), insurance companies (6), mutual funds (9) and bonds (1) during the time period will be excluded from the sample due to difference in financial statements and operations, in line with previous studies (Tajuddin *et al.*, 2018). After excluding the IPOs of aforementioned sectors, we came up with a sample of 80 firms. The regulator in Bangladesh does not disclose the *Shariah* compliance status of IPO firms, but has a *Shariah*-compliant index for firms in secondary market. For the benefit of the study, we filtered the 80 companies into *Shariah* and non-*Shariah* category using MSCI Islamic Index Series Methodology (MSCI, 2014). The methodology uses total assets, instead of market capitalization, as a denominator for accounting screening. It is suitable for IPO companies, as IPO companies do not have market capitalization information during subscription period. The main bourse – DSE – uses S&P Dow Jones Shariah Methodology – which uses 36-month average of market capitalization as denominator (Dhaka Stock Exchange Limited, 2015), so it could not be used for this study.

So, after filtering the 80 companies based on MSCI index methodology, 48 companies were found to be *Shariah*-compliant and 32 companies were non-*Shariah*-compliant.

The sample selection process is summarized in Figure 1.

The study will be based on secondary data. The company-specific data and governance data will be collected from IPO prospectuses of individual companies. Oversubscription data

Figure 1.
Sample selection process

Source: Authors' own work

was collected from a website of a reputed securities firm (Lanka Bangla Securities Ltd, 2023). Macroeconomic data will be collected from monthly economic trend publications of Bangladesh Bank – the central bank of Bangladesh.

3.2 Analysis used

Multiple regression and quantile regression analysis will be used to run the models. In addition, *t*-tests are used to compare the differences in means in different IPO-specific factors classified in two criteria: first, *Shariah* and non-*Shariah* IPOs; second, fixed price method and book-building method IPOs.

3.3 Model and variables

The study assesses investors' demand in IPOs (oversubscription) and its determinants. Here, oversubscription may be a function of *Shariah* compliance status, different firm characteristics, corporate governance variables and macroeconomic variables.

The study will apply the following two models for the multiple regression:

$$Model\ 1: \ Oversubscription = f(ShariahD, InstOwn, PublicOffer, BoardSize, BoardInd\ MktPerf, InterestRate, Age, IPORisk, lnAssets) \tag{1}$$

$$Model\ 2: \ Oversubscription = f(ShariahD, InstOwn, PublicOffer, BoardSize, BoardInd, MktPerf, InterestRate, Age, IPORisk, lnIPOSize) \tag{2}$$

The definitions of variables are presented in Table 1.

IPO oversubscription times will be proxy for investor demand and dependent variable of the study. Overall amount of shares investor demanded from IPO will be divided by total shares offered by company to calculate oversubscription. Independent variables will be subdivided in three categories: *Shariah* compliance, corporate governance and macroeconomic variables. The study will use dummy variable to identify *Shariah* compliance of IPOs (1 for *Shariah*-compliant stock, 0 for non-*Shariah*-compliant stock).

For corporate governance variables, board size and board independence will be taken along with the two variables used in previous studies – institutional ownership and general public ownership.

In addition, previous studies of investor demand did not include macro-economic factors. In this study, macro factors such as interest rate (Bangladesh Bank, 2020) and before-IPO market performance are employed. Apart from main variables, some control variables such as firm size and IPO risk (measured by inverse of IPO offer price) will be included.

Due to the diverse size and offer prices of the IPO companies, the possibility of a skewed distribution cannot be ignored in the variables which may cause non-fulfillment of the assumption of normal distribution of errors for standard multiple least-squares regression (Tajuddin *et al.*, 2019). For such skewed data sets, the use of quantile regression is warranted (Tajuddin *et al.*, 2019; Waldmann, 2018). So the general model that will be tested for quantile regression is:

$$Y_{i'\tau} = \beta_{0,\tau} + \beta_{i,\tau} X_i + \varepsilon_{i,\tau} \tag{3}$$

Based on this equation, τ (tao) = (0.25, 0.50, 0.75), represents the quantile levels to be applied; $Y_{i,\tau}$ represents predicted value of dependent variable – oversubscription at specific quantile

Variable label	Variables	Variable definition	Predicted sign
Dependent variable			
OSR	Oversubscription ratio	Shares demanded divided by shares offered	
Independent variables			
ShariahD	*Shariah* compliance, dummy variable	1 for *Shariah*-compliant stock, 0 for non-*Shariah* compliant stock	+
InstOwn	Institutional ownership	Institutional shares dividend by total shares	+
PublicOffer	Percentage of Post-IPO shares offered in IPO	Publicly issued shares divided by total shares after IPO	−
BoardSize	Board size	No. of board members during IPO	+
BoardInd	Board independence	Independent directors divided by board size during IPO	+
MktPerf	Pre-IPO market performance	Average market return of 30 days prior to IPO Subscription Close	+
InterestRate	Interest rate	Weighted interest rate on lending of scheduled banks on IPO Month	−
Age	Firm age	Difference between IPO issue year and commencement of operation year	+
IPORisk	IPO risk or offer risk	1/offer price	+
lnAssets	Firm size	Logarithm of Total Assets reported in audited balance sheet before IPO	−
lnIPOSize	IPO issue size	Logarithm of IPO issue size reported in prospectus	−

Source: Authors' own work

Table 1. Definition of the variables

level (τ) where $i = 1, 2, 3, \ldots\ldots\ldots, 10$; $\beta_{i,\tau}\, X_i$ represents coefficients (β_i) for independent variables (X_i) at specific quantile level (τ) where $i = 1, 2, 3, \ldots\ldots\ldots, 10$; $\varepsilon_{i,\tau}$ represents the error term.

More specifically, the following two models of quantile regression will be tested in this study:

Model 1:

$$\begin{aligned} Oversubscription_{i'\tau} = {} & \beta_{0,\tau} + \beta_{1,\tau} ShariahD + \beta_{2,\tau} InstOwn + \beta_{3,\tau} PublicOffer \\ & + \beta_{4,\tau} BoardSize + \beta_{5,\tau} BoardInd + \beta_{6,\tau} MktPerf + \beta_{7,\tau} InterestRate \\ & + \beta_{8,\tau} Age + \beta_{9,\tau} IPORisk + \beta_{10,\tau} lnAssets + \varepsilon_{i,\tau} \end{aligned} \tag{4}$$

Model 2:

$$\begin{aligned} Oversubscription_{i'\tau} = {} & \beta_{0,\tau} + \beta_{1,\tau} ShariahD + \beta_{2,\tau} InstOwn + \beta_{3,\tau} PublicOffer \\ & + \beta_{4,\tau} BoardSize + \beta_{5,\tau} BoardInd + \beta_{6,\tau} MktPerf + \beta_{7,\tau} InterestRate \\ & + \beta_{8,\tau} Age + \beta_{9,\tau} IPORisk + \beta_{10,\tau} lnIPOSize + \varepsilon_{i'\tau} \end{aligned} \tag{5}$$

4. Findings and analysis

4.1 Descriptive statistics

Table 2 presents the descriptive statistics for the sample of companies. The oversubscription ratio for the IPOs stood between 2.27 and 73.22 times, with the mean oversubscription ratio being 25.39 times, suggesting a skewed distribution to the right. The gap shows that demand for IPOs varies in Bangladesh. In addition, the sample was divided as *Shariah* and non-*Shariah* firms. In total, 48 firms were found to be *Shariah*-compliant and 32 non-*Shariah*-compliant. Mean oversubscription ratio seemed higher (27.11 times) for *Shariah* firms compared to non-*Shariah* firms (22.80 times). Moreover, average age of operation of the firms was 13 years with range of 1–63 years. Institutes held on average 11.86% of the post-IPO shares, with the percentage slightly higher for *Shariah* firms. In addition, firms issued about 27.59% of the post-IPO shares through the IPO. Both institutions' holding and publicly offered ownership percentage varied significantly with ranges about 0%–63.5%. Typical board size of the companies was about seven members, of which average 14% were independent directors. Offer price varied from minimum BDT 10, which is also the common par value of shares, to maximum BDT 252 per share.

The average asset size of firms was BDT 7,399m. But *Shariah* firms, on average, were much smaller in size compared to non-*Shariah* firms, probably due to presence of excess debt in non-*Shariah* firms. Similarly, mean IPO size of *Shariah* firms was also smaller than that of non-*Shariah* firms.

Figure 2 shows the number of companies by year of subscription, i.e. from 2013 to 2021, number of *Shariah*-compliant companies and average oversubscription in each year. In 2014, highest number of companies came for issued shares for subscription, and that year also saw a fall in subscription times from 2013. Demand for IPOs picked in 2017 as average subscription was over 30 times in that year, but number of companies coming for subscription was also low (six companies) that year. It suggests that the year with number of IPO companies in a year has negative relationship with subscription times. From *Shariah*

Variables	Mean			SD	Min.	Max.
	Whole ($n = 80$)	*Shariah* ($n = 48$)	Non-*Shariah* ($n = 32$)			
Oversubscription (times)	25.39	27.11	22.80	16.70	2.27	73.22
ShariahDummy	0.60	–	–	0.49	0.00	1.00
Age	13.14	11.29	15.91	10.05	1.00	63.00
InstOwn	11.86%	12.70%	10.61%	11.69%	0.00%	63.43%
PublicOffer	27.59%	27.12%	28.30%	13.09%	0.97%	63.56%
BoardSize	6.55	6.60	6.47	1.99	4.00	12.00
BoardInd	13.97%	14.10%	13.77%	12.84%	0.00%	40.00%
MktPerf	0.04%	0.03%	0.05%	0.28%	−0.39%	0.95%
InterestRate	10.90%	10.85%	11.0%	1.99%	7.15%	13.72%
OfferPrice (BDT)	23.09	22.19	24.44	30.53	10.00	252.00
IPORisk	7.29%	7.79%	6.53%	3.49%	0.40%	10.00%
TotalAsset (in BDT million)	7,398.6	4,626.6	11,556.6	22,266.6	102.99	171,968.6
lnAssets	7.86	7.51	8.39	1.19	4.63	12.06
IPOSize (in BDT million)	644.06	468.62	907.22	839.30	120.00	5,237.93
lnIPOSize	5.98	5.79	6.25	0.92	4.79	8.56

Source: Authors' own work

Table 2. Descriptive statistics

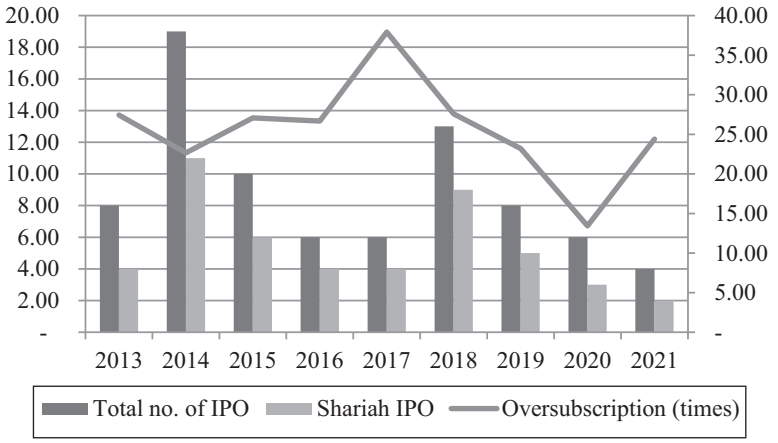

Figure 2.
Number of IPOs, *Shariah* IPOs and oversubscription times

Source: Authors' own work

compliance perspective, above 50% of the companies coming for IPO in each sample year passed the *Shariah* compliance benchmark used in this study.

4.2 Comparisons of means

In Table 3, the firm-specific characteristics related to IPO are segregated between *Shariah* and non-*Shariah*-compliant firms. The means of different variables were compared with *t*-test. At first, it is seen that the 32 non-*Shariah* IPOs were oversubscribed by 22.80 times on average, whereas 48 *Shariah* IPOs were oversubscribed by 27.11 times on average, but means are not significantly different. Age of non-*Shariah* firms were found to be higher while coming for IPO, suggesting *Shariah*-compliant firms or less-indebted firms seek to offer shares earlier than non-*Shariah* firms. Another significant difference was found in means of IPO risk in two categories of firms. IPO risk was slightly higher in *Shariah*-compliant firms, indicating lower offer price on average. And finally non-*Shariah* firms were significantly larger in asset sizes at the time of IPO; subsequently, the IPO issue sizes of these firms are much larger compared to *Shariah*-compliant firms.

Table 4 classifies sample companies in terms of method of issue-fixed price and book-building and the means of firm-specific characteristics were compared again.

The above table suggests that the oversubscription from IPOs coming in fixed-price method is greater than that in book-building method (Benveniste and Busaba, 1997). It is understandable as the offer price and one offer lot value in the book-building method are much higher than in fixed-price method, making it expensive for very small investors. Fixed-price method firms tend to be smaller in asset size and their issue size is also smaller; the issuer "leaves money on the table" in this method (Pukthuanthong *et al.*, 2007). Adding to that, a low offer price causes firms to offer more number of shares to the public in the fixed-price method to raise the necessary amount of capital. Looking at age of firms, firms coming through book-building are more mature in operation compared to those coming through the fixed-price method. Therefore, the IPO risk is higher for firms coming under the fixed-price method.

From other corporate governance factors, board size and board independence tend to be higher for IPOs coming through the book-building method, indicating better-governed firms choose to come through the book-building method.

Table 3.
Shariah vs non-*Shariah* IPOs

Group	Oversubs	Age	InstOwn	PublicOffer	BoardSize	BoardInd	OfferPr. (BDT)	IPORisk	Assets (BDT million)	IPOSize (BDT million)
Non-Shariah (n = 32)	22.80	15.90	0.11	0.28	6.46	0.14	24.43	0.07	11556.61	907.21
Shariah (n = 48)	27.11	11.29	0.13	0.27	6.60	0.14	22.19	0.08	4626.63	468.62
Mean difference	−4.32	4.61	−0.02	0.01	−0.14	0.00	2.25	−0.01	6929.97	438.59
t-statistic	−1.17	2.05	−0.78	0.39	−0.30	−0.11	0.32	−1.60	1.37	2.35
p-value	0.12	0.02**	0.22	0.35	0.38	0.46	0.37	0.06*	0.09*	0.01***

Note: ***, **, * represent 1, 5, and 10% significance level, respectively
Source: Authors' own work

Table 4.
IPOs through fixed price vs book-building method

Group	Oversubs	Age	InstOwn	PublicOffer	BoardSize	BoardInd	OfferPrice (BDT)	IPORisk	Assets (BDT mn)	IPOSize (BDT mn)
Fixed price (n = 70)	27.59	11.99	0.11	0.29	6.43	0.13	15.87	0.08	5591.56	519.58
Book-Building (n = 10)	9.99	21.20	0.13	0.18	7.40	0.24	73.60	0.02	20048.10	1515.45
Mean difference	17.60	−9.21	−0.02	0.11	−0.97	−0.11	−57.73	0.06	−14456.54	−995.87
t-statistic	7.60	−2.02	−0.20	3.23	−1.45	−2.67	−2.80	13.02	−1.47	−2.82
p-value	0.00***	0.04**	0.42	0.00***	0.08*	0.00***	0.01***	0.00***	0.09*	0.01***

Note: ***, ** and * represent 1%, 5% and 10% significance levels, respectively
Source: Authors' own work

4.3 Correlation matrix

The correlation matrix shows the inter-relationships between variables. In the correlation matrix for study presented in Table 5, we see oversubscription is negatively related with age at a significant level, indicating higher IPO demand for younger firms. Moreover, oversubscription and public offer are negatively related, suggesting higher proportion of shares offered to public creates less demand for that IPO. In addition, Oversubscription and IPO Risk is positively related at a significant level, suggesting investors are willing to take more risk for higher return.

In addition, it is seen that oversubscription has a negative relationship with firm size and IPO size, indicating bigger IPO issues are less likely to be oversubscribed.

Other significant positive relationships are that between age with assets and IPO size, indicating expected growth in size of firm with time. Assets and IPO size is also positively related, indicating larger firms having larger issue sizes.

On the other hand, negative relationships are seen between IPO size and asset size with IPO risk, indicating less volatility in price risk for bigger IPOs and firms. In addition, asset size of firms and proportion of shares offered to public is negatively related, suggesting two things. First, larger firms may be unwilling to let go ownership and control to public investors. Second, the scale aspect of being the larger asset size may make the proportion of shares offered to public smaller. Other mention-worthy relationships are those between asset size and IPO size with *Shariah* Dummy. It indicates *Shariah*-compliant IPO firms are typically smaller in asset size and IPO size.

Only one relationship among independent variables, between board independence and interest rate, is −0.82, which is higher than the common threshold of multicollinearity of ±0.8. Two logics can be given for ignoring this issue. First, two variables are logically uncorrelated as one is a macro factor and another is a firm-specific governance factor. So, the relationship can be assumed to be numerical coincidence. Second, variance inflation factor (VIF) scores of regression results found in this study (provided later) are <5, another threshold of multicollinearity. So high correlations are not problematic all the time (Belsley *et al.*, 1980). Apart from that, other relationships between independent variables in the matrix are not high enough (<0.80) to cause a multicollinearity problem in the model.

4.4 Linear regression

Ordinary least squares (OLS) regression with robust standard errors is run over the two models of the oversubscription, the results of which are given in Table 6.

In Model 1, R^2 value of 0.73, or 73%, suggests the 73% of the variability in oversubscription can be explained by the independent variables selected in the model. Similarly, in Model 2, 75% of variability in oversubscription can be explained by variability of independent variables. We see both the models are jointly significant as evidenced by *p*-values (0.00 in both models) of *F*-statistic.

In Model 1, we find that *Shariah* compliance Dummy and oversubscription has a negative association at a significant level, in contrast with *H1*. In Model 2, we don't find *Shariah* compliance Dummy being significant in explaining oversubscription. Model 1 result, perhaps, can be explained by the fact that *Shariah*-compliant stocks had traditionally been more stable provider of return, instead of abnormal return which some investors expect (Alqahtani and Boulanouar, 2017). As the market is composed of individual investors who seek quick and excess return, the demand for *Shariah*-compliant stocks is low compared to non-*Shariah*-compliant stocks. This result is in line with Farooq and Alahkam (2016) which found *Shariah*-compliant firms to underperform non-*Shariah*-complaint firms (Farooq and Alahkam, 2016). It suggested that underperformance of *Shariah*-compliant firm is evident in common law

Table 5.
Correlation matrix

Variables	Oversubs	Age	ShariahD	InstOwn	PublicOffer	BoardSize	BoardInd	MktPerf	InterestRate	IPORisk	lnAssets	lnIPOSize
Oversubs	1.00											
Age	−0.33*	1.00										
ShariahD	0.13	−0.23*	1.00									
InstOwn	0.03	0.05	0.09	1.00								
PublicOffer	−0.23*	−0.19	−0.04	−0.14	1.00							
BoardSize	−0.18	−0.02	0.03	0.08	0.00	1.00						
BoardInd	−0.03	0.14	0.01	−0.10	−0.09	0.24*	1.00					
MktPerf	−0.09	0.07	−0.04	−0.01	−0.01	−0.00	0.03	1.00				
InterestRate	0.02	−0.18	−0.03	0.02	0.25*	−0.19	−0.82*	−0.10	1.00			
IPORisk	0.71*	−0.38*	0.18	−0.03	0.01	−0.07	0.14	−0.20	−0.17	1.00		
lnAssets	−0.50*	0.51*	−0.36*	−0.03	−0.42*	0.22*	0.13	0.12	−0.20	−0.56*	1.00	
lnIPOSize	−0.82*	0.38*	−0.25*	−0.05	0.13	0.15	0.02	0.11	0.04	−0.77*	0.66*	1.00

Note: *Significant at 5% level
Source: Authors' own work

Dep. Variable: Oversubscription	Model 1 Coef.	*p*-value	Model 2 Coef.	*p*-value
ShariahD	−4.61	0.04**	−2.49	0.17
age	0.01	0.95	−0.05	0.59
InstOwn	−0.89	0.92	1.50	0.85
PublicOffer	−66.87	0.00***	−33.72	0.00***
BoardSize	−0.10	0.85	−0.47	0.50
BoardInd	16.17	0.23	19.91	0.11
MktPerf	552.83	0.16	362.09	0.31
InterestRate	241.22	0.01***	241.49	0.01***
IPORisk	291.68	0.00***	178.01	0.00***
lnAssets	−5.64	0.00***		
lnIPOSize			−9.32	0.00***
_cons	41.63	0.04	53.28	0.00
N	80		80	
R^2	0.73		0.75	
F(10, 69)	23.18		34.90	
Prob > *F*	0.00		0.00	
VIF range	1.08–3.68		1.07–3.66	

Note: ***, ** and *indicate results are significant at 1, 5 and 10% levels, respectively
Source: Authors' own work

Table 6.
OLS regression

countries; Bangladesh is a common law country as well. It also suggested high debt of non-*Shariah*-compliant firms act as discipline mechanism. In addition, high accounts receivable and cash of non-*Shariah* firms allow effect business network to arrange funding for large investments. This may explain the higher demand for non-*Shariah* IPOs.

In Model 1 and 2, Public offer has a negative association with oversubscription (IPO demand), which is in line with *H3*. As more proportion of shares are offered to public, investors may become a bit cautious regarding the purpose of new company's owners, whether to sell their stake for higher value than usual (Rock, 1986). From signaling theory and pecking order theory, it is found that overvalued firms with lack of profitable investment opportunities offer shares to public to transfer wealth from new investors to existing investors (Harjoto and Garen, 2003; Myers, 1984; Myers and Majluf, 1984; Viswanath, 1993). In such cases, higher proportion of shares offered to public signals negative outlook by old shareholders to the potentially new shareholders.

In both models, interest rate has a positive relationship with oversubscription, the opposite of *H7*. It can be explained in a few ways. First, higher interest rates motivate investors to put money in the IPO stocks, which historically has generated above-normal and relatively safe return for seasonal IPO investors, as IPOs are mostly underpriced in Bangladesh in fixed-pricing method (Rashid *et al.*, 2019). In addition, there is the tendency of some loan borrowers in Bangladesh to divert loan to stock market with the expectation of higher return compared to their real market activity (Shah, 2014). Third, from issuer point of view, firms are mainly going for IPOs during higher interest rate scenario and raising fund through issuing shares. With moderate dividend payout practices and low minority investor protection in Bangladesh (Hasan *et al.*, 2023), issuer may find IPO a better source of fund-raising instead of bank loans. In addition, lower tax rates for listed firms in Bangladesh may influence firms to issue shares during high borrowing cost. As per current tax rules, listed companies' tax rate is 7.5% less than similar non-listed companies in Bangladesh (The Business Standard, 2022). Firms may

want to take advantage of lower tax rate during high interest rate period. Short-term return-seeking IPO investors may regard these aspects positively, leading to higher demand.

In Models 1 and 2, respectively, asset size and IPO size have a negative relationship with oversubscription, in line with *H10* and *H11*, respectively. Larger the IPO issues, the less the issue being oversubscribed (Alqahtani and Boulanouar, 2017; Low and Yong, 2011).

In both models, IPO risk and IPO demand are positively associated. Lower offer price indicates higher IPO risk, leading to higher IPO demand. This is in line with previous studies (Abdul Rahim and Yong, 2010; Bradley and Jordan, 2002).

In both models, the study did not find any significant association of IPO demand with age, institutional ownership and market performance. In previous studies, age (Shelly and Singh, 2008), institutional ownership (Rock, 1986) and market performance (Alqahtani and Boulanouar, 2017) were found to have positive association with IPO demand. But Hasan and Quayes (2008) also did not find any relationship between age and IPO underpricing in Bangladesh. In addition, corporate governance factors such as board size and board independence were not found to have significant relationship with IPO demand.

In Table 7, segregated regression analyses results using Model 1 and 2 run for *Shariah* and non-*Shariah* IPOs are presented. In Model 1 for *Shariah* firms, IPO risk has positive relationship with oversubscription, whereas assets, public offer and age (to a lesser significance level) have negative relationships with oversubscription. In Model 1, results for variables are similar to as found in for all firms together presented in Table 6, except that for age and interest rate. But interest rate was found to be significant in Model 2 for *Shariah* firms, but IPO risk was found to have insignificant association with oversubscription.

Model 1s and 2 OLS results for non-*Shariah* firms also find factors such as public offer, IPO risk, asset size or IPO size to be significant as was found for *Shariah* firms. One difference for non-*Shariah* firms is board independence. In Model 2, board independence was found to be positively associated with oversubscription, indicating higher demand for firms with higher outside, non-shareholding director in the board, assumed i*n H5*. Higher proportion of

	Shariah ($n = 48$)				Non-*Shariah* ($n = 32$)			
Dependent variable:	Model 1		Model 2		Model 1		Model 2	
Oversubscription	Coef.	*p*-value	Coef.	*p*-value	Coef.	*p*-value	Coef.	*p*-value
Age	−0.44	0.09*	−0.56	0.06*	0.11	0.24	0.06	0.47
InstOwn	1.35	0.93	0.28	0.98	6.48	0.55	6.53	0.45
PublicOffer	−61.35	0.00***	−27.87	0.06*	−62.23	0.00***	−25.23	0.01***
BoardSize	0.36	0.68	−0.29	0.76	−1.31	0.19	−1.12	0.13
BoardInd	10.57	0.57	12.32	0.47	20.16	0.23	31.32	0.03**
MktPerf	773.33	0.21	557.89	0.38	275.20	0.65	454.60	0.41
InterestRate	225.23	0.11	213.81	0.09*	181.86	0.14	230.88	0.04**
IPORisk	323.83	0.00***	143.04	0.20	250.70	0.00***	177.86	0.00***
lnAssets	−4.27	0.04**			−7.09	0.00***		
lnIPOSize			−11.60	0.02**			−8.62	0.00***
_cons	26.81	0.30	73.78	0.05	66.65	0.01	47.86	0.01
N	48		48		32		32	
R^2	0.70		0.72		0.87		0.90	
F (10, 69)	12.70		16.75		21.93		27.90	
prob > F	0.00		0.00		0.00		0.00	
VIF range	1.16–3.49		1.12–5.08		1.27–4.69		1.25–4.59	

Note: ***, ** and *indicate results are significant at 1, 5 and 10% levels, respectively
Source: Authors' own work

Table 7.
OLS regressions for *Shariah* and non-*Shariah* IPOs

independent directors signals the less probability of earnings management by the firm to the investors, thus demand for such firms is higher (Razzaque *et al.*, 2020). Another difference is that for age, which does not have a significant relationship with oversubscription of non-*Shariah* firms. For non-*Shariah* firms as well, interest rate was positively related to oversubscription or IPO demand in Model 2. It may indicate that during high interest rate scenario, firms' ability to raise higher amount of funds through higher IPO issue size, is considered positively by investors. This is applicable for both *Shariah* and non-*Shariah* firms.

4.5 Quantile regression

The next analysis done is the quantile regression. Quantile regression measures the relationship of independent variables with a conditional quantile of a dependent variable without considering any specific distribution. The quantile regression can explain relationships better than classical methods of regression when the assumptions of homoscedasticity and normality of distribution are not fulfilled (Waldmann, 2018). In this study, the dependent variable – IPO demand or oversubscription – had a right skewed distribution, evident from mean, minimum and maximum values in Table 2. So in Tables 8 and 9, Model 1 and Model 2 relationships, respectively, between 25th, 50th and 75th quantiles of oversubscription with independent variables are depicted.

Looking at the *Shariah* Dummy variable, it was found to have significant negative relationship with relatively IPOs with less oversubscription (25th quantile) in Model 1. It indicates that investors do not prefer *Shariah* compliance in IPOs with less demand. In addition, board independence and market performance had positive association with IPO demand of firms in 25th quantile oversubscription rage. Interest rate had positive impact only in the 25th quantile oversubscription range, in line with *H5* and *H6*. Public offer had negative and IPO risk had positive relationship with IPO demand in all the three quantiles, as was found in OLS. Firm size was found significant in 25th and 50th quantiles, but not in 75th quantile. Finally in Model 1, it is seen that board size has negative relationship with 75th quantile group of oversubscribed IPOs, suggesting high demand for highly subscribed IPO companies with small board size. Although the result is not consistent with *H4*, it is consistent with the philosophy that smaller boards are more effective for proper internal communication and quick

Model 1 Dependent variable: Oversubscription ratio (times)

	25th Quantile			50th quantile			75th quantile		
variables	Coef.	*t*	*p*-value	Coef.	*t*	*p*-value	Coef.	*t*	*p*-value
ShariahD	−4.94	−2.69	0.01**	−5.08	−1.00	0.32	−1.22	−0.47	0.64
Age	−0.04	−0.57	0.57	0.11	0.41	0.68	−0.12	−1.11	0.27
InstOwn	8.05	1.27	0.21	−5.03	−0.25	0.81	10.06	1.18	0.24
PublicOffer	−57.80	−9.05	0.00***	−52.85	−2.45	0.02**	−58.61	−5.38	0.00***
BoardSize	−0.24	−0.59	0.56	−0.14	−0.12	0.91	−1.25	−2.15	0.04**
BoardInd	36.21	3.82	0.00***	24.28	0.84	0.41	0.09	0.01	1.00
MktPerf	856.83	3.01	0.00***	439.37	0.51	0.61	518.46	1.31	0.20
InterestRate	217.44	2.83	0.01***	315.30	1.56	0.12	144.20	1.38	0.17
IPORisk	204.85	5.71	0.00***	285.33	3.13	0.00***	368.64	7.70	0.00***
lnAssets	−5.18	−3.40	0.00***	−5.50	−1.67	0.10*	−1.80	−1.24	0.22
_cons	35.04	1.96	0.05	25.84	0.61	0.55	28.45	1.30	0.20
Pseudo R^2	0.52			0.53			0.55		

Note: ***, **, *indicate results are significant at 1, 5 and 10% level, respectively
Source: Authors' own work

Table 8.
Quantile regression results for Model 1

Variables	Model 2 Dependent variable: Oversubscription ratio (times) 25th quantile Coef.	*t*	*p*-value	50th quantile Coef.	*t*	*p*-value	75th quantile Coef.	*t*	*p*-value
ShariahD	−3.18	−1.21	0.23	−2.72	−1.03	0.31	−0.87	−0.28	0.78
age	−0.05	−0.43	0.67	−0.05	−0.39	0.70	−0.11	−0.74	0.46
InstOwn	0.56	0.06	0.95	−2.20	−0.21	0.84	3.07	0.19	0.85
PublicOffer	−20.68	−1.95	0.06*	−31.55	−3.01	0.00***	−31.15	−2.17	0.03**
BoardSize	−0.37	−0.52	0.60	−0.33	−0.54	0.59	−1.10	−1.54	0.13
BoardInd	32.05	2.17	0.03**	23.57	1.38	0.17	7.77	0.40	0.69
MktPerf	339.32	0.77	0.45	339.87	0.76	0.45	345.66	0.62	0.54
InterestRate	176.00	1.42	0.16	226.94	1.90	0.06*	149.40	1.13	0.26
IPORisk	138.10	2.33	0.02**	155.74	2.90	0.01**	193.03	2.87	0.01***
lnIPOSize	−7.49	−3.91	0.00***	−9.59	−5.24	0.00***	−8.81	−3.44	0.00***
_cons	41.21	1.95	0.06	56.49	2.51	0.02	68.58	2.65	0.01
Pseudo R^2	0.54			0.57			0.58		

Table 9.
Quantile regression results for Model 2

Note: ***, **, *indicate results are significant at 1, 5 and 10% levels, respectively
Source: Authors' own work

decision-making, especially for smaller firms with high IPO subscription (Baker and Gompers, 2003; Jensen, 1993); it also justifies lack of demand by foreign investors for firms with high board sizes in Bangladesh (Rashid, 2020).

Table 9 reports the quantile regression for Model 2 where IPO size is considered instead of asset size. Like previous results, public offer was found to have negative relationship for all the quantiles, suggesting higher stakes allocated for public is seen negatively by investors. In addition, IPO risk was found to have positive impact for all three quantiles, suggesting highly priced IPO offers has lower risk and lower potential return, leading to less IPO demand. Moreover, IPO size was found to have negative relationship with IPO demand in all quantiles, as was found in OLS results. In Model 2 as well, board independence is a significant factor for 25th quantile group of IPOs, having positive relationship with IPO demand. Interest rate was found to have somewhat significant effect on 50th quantile. But we did not find *Shariah* Dummy as a significant factor of oversubscription in all quantiles for Model 2.

4.6 Summary findings

To summarize the findings, IPO demand proxied by oversubscription is evident in IPOs in Bangladesh. *t*-Test results revealed that oversubscription times in *Shariah*-compliant IPOs are not significantly different from non-*Shariah*-compliant IPOs. But non-*Shariah*-compliant IPOs do have relatively higher age, IPO risk, asset size and issue size than *Shariah*-compliant IPOs. Another comparison of means between IPOs coming through fixed-price and book-building method revealed that oversubscription, shares offered to public and IPO risk are higher for IPOs coming in fixed-price method, whereas age, board size, board independence, asset size and issue size are higher for IPOs coming through the book-building method.

The significant findings of OLS and quantile regression are summarized in Table 10.

From the OLS and quantile regression, we hypothesized that investors in a Muslim-majority country such as Bangladesh would prefer *Shariah*-compliant IPOs over non-*Shariah*-compliant IPOs. But the investors were found to demand non-*Shariah*-compliant stocks over *Shariah*-compliant stocks based on Model 1 results of OLS and quantile

Variables	Predicted Sign	OLS		Quantile regression					
				Model 1			Model 2		
		Model 1	Model 2	25th Q	50th Q	75th Q	25th Q	50th Q	75th Q
ShariahD	(+)	(−)		(−)					
age	(+)								
InstOwn	(+)								
PublicOffer	(−)	(−)	(−)	(−)	(−)	(−)	(−)	(−)	(−)
BoardSize	(+)					(−)			
BoardInd	(+)			(+)			(+)		
MktPerf	(+)			(+)					
InterestRate	(−)	(+)	(+)	(+)				(+)	
IPORisk	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
lnAssets	(−)	(−)	n/a	(−)	(−)		n/a	n/a	n/a
lnIPOSize	(−)	n/a	(−)	n/a	n/a	n/a	(−)	(−)	(−)

Note: n/a = not applicable
Source: Authors' own work

Table 10. Summary of the hypotheses and regression outcomes

regression (Table 10). Investors may think non-*Shariah* IPOs have better prospects than *Shariah* IPOs in a common law country like Bangladesh (Farooq and Alahkam, 2016).

In addition, proportion of shares offered to public also seems to affect IPO demand negatively, based on all the models of OLS and quantile regression (Table 10). Higher ownership proportion offered to public is a signal toward potential investors that older shareholders may be seeking to transfer wealth from new shareholders towards themselves, as per signaling theory (Grinblatt and Hwang, 1989; Harjoto and Garen, 2003). Also implication from the Pecking order theory postulates that firm with favorable opportunity would not dilute shares by issuing equity (Myers, 1984; Myers and Majluf, 1984; Viswanath, 1993). These factors may cause lower demand for IPOs with higher equity dilution.

Similar negative relationships were found between firm size and IPO size with IPO demand, suggesting lower rate of oversubscription for bigger firms due to scaling effects (Alqahtani and Boulanouar, 2017; Low and Yong, 2011). Also bigger IPOs are likely to have higher number of shares available for investors, leading to less oversubscription.

As most of the IPOs in Bangladesh have been offered on the fixed-price method, the real value of the company shares was not reflected in the offer price, as most of the IPOs were significantly underpriced, compared to book-building IPOs (Abdul Rahim and Yong, 2010; Rashid *et al.*, 2019). Lower offer prices meant higher IPO risk, and that IPO risk had a significant positive impact on IPO demand due to potential upside expectations from investors.

From the corporate governance side, although we did not find board size and board independence to be significant in OLS, significance of these variables were found in quantile regression. Board independence was found to positively affect IPO demand for firms with less oversubscription (25th quantile). Oversubscription was less for bigger firms; in bigger firms, more independent directors in the board is seen as positive value addition by investors in terms of transparency and advisory benefits (Garg, 2013; Razzaque *et al.*, 2020). Resource dependency theory also suggests that higher external directors allow more access to financing and increase public image (Pfeffer, 1972). Board size was found to negatively affect IPO demand, with firms having a high oversubscription (75th quantile). Typically, smaller firms have higher subscriptions or demand, so investors may feel that larger boards may hinder the speed of decision-making and hinder communication between boards, especially in smaller firms (Baker and Gompers, 2003; Jensen, 1993).

From the macroeconomic side, lending interest rate and IPO demand have positive association in this study, contrary to our initial hypothesis. Few conclusions can be drawn from this result. First, as most of the companies in Bangladesh come to IPO under a fixed-price method; this method allows for underpricing stocks. It presents investors with an above-normal return when the stock starts trading. Loan diversion practice in Bangladesh from the real market to the capital market is evident in literature (Shah, 2014). So, borrowers could be inclined to invest in IPOs to generate a relatively guaranteed return within a short time (Rashid *et al.*, 2019). Another explanation is that firms intentionally go for IPOs to take advantage of tax benefits for listing in Bangladesh during higher borrowing costs (The Business Standard, 2022); it may give a positive signal to IPO investors who seek an above-average return. The findings involving interest rate and IPO demand add a unique finding to the research domain, especially for emerging countries with weak governance, tax systems and loan diversion practice.

Finally, despite market condition at the time of IPO fund-raising was found significant in some studies; this is not a significant determinant for IPOs in Bangladesh, rather significant for IPOs with less demand or subscription according to 25th quantile results of quantile regression. We can conclude that bigger firms with typical lower oversubscription is associated more that secondary market returns, compared to smaller firms.

5. Conclusion and recommendation for further research

Demand for IPOs is a major factor in IPO performance. The study attempted to analyze factors behind the demand for IPOs, including *Shariah* compliance and macroeconomics and corporate governance factors, in addition to the IPO-related factors. It seems that IPO-related factors such as issue size or asset size of companies, and IPO risk are important considerations for investors in demand for IPOs. But the study performed on a Muslim-majority market does not find the *Shariah* compliance of IPO companies to be influencing factors for investors to demand IPOs. Further research can be undertaken to understand the reasons for avoiding *Shariah*-compliant IPO stocks.

In addition, the study dealt with some corporate governance factors. The percentage of shares offered to the public by the company's owners reflects the level of conviction of the owners regarding the company's prospects. Thus, a lower proportion offered for public is seen positively by the investors. Board characteristics do not seem to affect IPO demand in the overall model. Rather, board independence is a useful consideration for less subscribed companies. And higher board size leads to lower demand for highly demanded IPOs. Other issues, such as auditor quality, issue manager reputation, etc., may be tested to evaluate the linkage between corporate governance issues and IPO demand. Also, there is scope to see combined effects of multiple independent variables on IPO demand.

Finally, macroeconomic factors such as interest rates and market conditions during the IPO also seem to dictate IPO demand. Specially the positive relationship found between interest rate and IPO demand is a finding which can be tested in other markets.

Bangladesh Stock Market mostly comprises individual investors who seek to make quick returns through IPOs. Although investors have preferred non-*Shariah*-compliant firms more, more information on faith-based investing may make investors change investment behavior, as found in some countries. So issuers and issue managers cannot ignore the *Shariah* compliance issue in this Muslim-majority country while going for IPO in future. In addition, effective board of directors and right proportion of share offered to public are important issue to consider as well. Macroeconomic factors such as economic outlook and interest rate trend are also to be considered in addition to political risk elements, which were not covered in the study. Researchers in emerging countries may utilize the findings of the study in other emerging country settings. In addition, stakeholders such as institutional and retail investors should also consider factors such

as public offer, board composition, *Shariah*-compliance in making selection of firms for IPOs. Finally, the regulators in such emerging countries have a big role in approving good firms for IPOs with operational strength and good governance practices. For bringing in foreign and domestic investment seeking *Shariah* investment alternatives, regulator may approve IPOs with *Shariah* compliance and increase disclosure in this regard.

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Corresponding author
Burhan Uluyol can be contacted at: borhanseti@gmail.com