Contribution of Islamic Debt Financing in Entrepreneurship Promoting Financial Sector Transformation

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ABSTRACT

Empirically conventional financial development theories provided mixed results in motivating entrepreneurship. The risk transferring and fixed returns based lending may harm the new venture if the borrower is not financial literate. In comparison, Islamic Finance provides a juristic, participative, and equitable alternative for new ventures, empirically showing growth-promoting effects. This study explores the holistic curvilinear effect of financial development on entrepreneurship while allowing the moderating role of rising Islamic debt financing in the economy. This study selected the unbalanced panel data of all Islamic banks of 16 countries and used panel quantile regression to estimate the quadratic financial development effects and moderation of the Islamic debt financing. The results showed that Islamic debt financing provides entrepreneurship support coverage in countries where the financial sector is not fully developed. Central Banks and Islamic advisory councils can follow the outcomes to integrate increasing Islamic financing into the national financial development policy in developing a facilitative environment for new businesses.

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Introduction

An entrepreneur is a person who focuses on opportunities rather than resources (Stevenson & Gumpert, 1985). He is “..who specializes in taking responsibility for and making judgmental decisions that affect the location, form, and the use of goods, resources or institutions” (Hebert & Link, 1989, p. 40). Entrepreneurs are mainly considered an asset to any economy (Bulmash, 2016). An entrepreneur is considered a critical part of economic development and growth. “Entrepreneurship also plays a crucial role in increasing the living standards of the people” (Abdullahi, 2008, p. 1).
Entrepreneurship helps create more jobs that help decrease the unemployment in the economy (Audretsch & Fritsch, 2003; Decker et al., 2014; Schmiemann, 2008). Entrepreneurship helps economic growth by providing jobs and helping in generating financial resources (Audretsch & Keilbach, 2004; Carree & Thurik, 2010; Van Praag & Versloot, 2007). Entrepreneurial activity is essential for economic growth and increasing job opportunities, which is confirmed by (Edmiston, 2003). Entrepreneurship creates job opportunities for economic growth and development (Aziz et al., 2020; Naudé, 2013). The gains from entrepreneurship depend on opportunities and recognition (McMullen & Shepherd, 2006).

Empirical determinants of entrepreneurship

Studies showed that higher education impacts entrepreneurship (Arshed et al., 2021; B. C. Martin et al., 2013). Similarly, good managerial skills are the main factors that affect the success of entrepreneurship (G. Martin & Staines, 2008; Mughan et al., 2004). At the same time, most include the role of financial resources as a determinant (Arshed et al., 2021; Kauermann et al., 2005). Parker and Robson’s (2004) study indicates that per capita GDP enhance entrepreneurship. If entrepreneurs get enough financial resources in income or savings, they can grow the firms more efficiently (Kauermann et al., 2005). Many previous studies proved that wealth is the main determinant that affects the new business (Evans & Leighton, 1990; Fairlie, 1999; Quadrini, 1999). Rusu and Roman (2017) found that inflation rate, FDI and access to finance are the main determinants of entrepreneurship. Berger and Udell (2002) suggest that ease of access to credit is the main determinant of entrepreneurship.
This study focuses on the financial services support to entrepreneurship, a crucial factor in developing economies. There are three ways an entrepreneur can get finance: using his own resources, acquiring debt, or acquiring equity. Studies showed that the business and financial environment dynamism impacts entrepreneurship success and profitability (Bamford et al., 2000; Dean, 2016; Eisenhardt & Schoonhoven, 1990; Peng, 2002; Peng et al., 2009).

**Role of Financial Market**

Financial development is very important, and it impacts economic growth. Financial development is defined as improving the quantity and quality of financial intermediation services (Abu-Bader & Abu-Qarn, 2005). The role of finance in entrepreneurship cannot be ignored, and finance is crucial for the growth and development of enterprises. Acquiring proper and sustainable finance is critical for entrepreneurs because it is vital for the life of the product or idea business cycle. Access to cash is the key factor in starting a business, but it is crucial to run it (Arshed et al., 2021; Lawal et al., 2018; Faiza et al., 2021).

The papers used financial development proxies like Ibrahim and Alagidede (2018), who worked on economic growth, using financing to the private sector. Mushtaq et al. (2019), Ibrahim and Alagidede (2018) and Bist (2018) used domestic credits to the private sector. Recent studies have explored many forms of financial development like equity finance, including funds, family, friends, business angels, venture capital, and capital market. Equity financing is based on PLS and distinguished from conventional finance (Azmat et al., 2015). However, it is seen that due to government policies and different arrangements by commercial banks like interest rates and non-asset backed transactions, the merits of financial development became controversial (Abu-Bader & Abu-Qarn, 2005; Ibrahim & Alagidede, 2018; Mehmood et al., 2021).
Juristic and Asset-Backed financing as motivating factor

Religion is important in decision making, but studies mainly ignore this, especially in entrepreneurship studies that normally do not consider this at all (Busenitz & Lichtenstein, 2019; Henley, 2017; Janssen & Gundolf, 2021; Smith et al., 2019). Islam as a religion encourages people to become entrepreneurs (Kayed & Hassan, 2010). The entrepreneurs normally focus on the market conditions while taking risks and uncertainty and ignoring the divine law. They want to develop an economy without considering any specific target, i.e., profit-focused (Kuratko, 2016). Shari’ah (Islamic Law) has provided the guidelines for financial transactions, and a Muslim entrepreneur follows these rules.

Here, Muslim entrepreneurs should work within Shari’ah law, within which the financial matters comply with the Islamic rules. It considers the human role as a Khalifah (Caliph) in the world to grow and prosper the world. It means entrepreneurship actions should contribute to social welfare. Muslim entrepreneurs must avoid certain products, commodities, and services because harm is (not permissible) in Islam. In simpler words, if a Muslim wants to be an entrepreneur, he should follow the Maqasid al-Shari’ah (Objectives of Islamic Law), which is 1) protection of wealth, 2) protection of religion, 3) protection of lineage, 4) protection of life and 5) protection of intellect. Besides having a clear understanding and knowledge of Maqasid al-Shari’ah, Muslim entrepreneurs should be aware of what permissible (halal) is and what is not acceptable (haram) while starting businesses (Abdullah, 2020). An entrepreneur must also avoid prohibited things, high speculative risk and uncertainty (M. K. Hassan & Hippler, 2014).

Kuran (2010, p. 64) said that “there are many hardworking, energetic and enthusiastic Muslims who cannot start any business due to lack of permissible finance”. Islamic financing helps and
promotes entrepreneurs. It is seen that financing small and medium enterprises is a critical area of equity participation. Equity participation can be constructive because of sharing of returns and losses of the venture. Conventional banks have failed in facilitating entrepreneurs because of their risk mitigation/avoidance techniques like collateral and fixing returns. Conventional banks think of their risk coverage as a reason for high security or collateral. But, in Islamic finance, equity participation ensured the success of the venture and higher returns. In medium enterprises, some Islamic finance modes such as Mudarabah and Musharaka could be adopted (Sadique, 2008). Islamic bank financing is considered good not for starting a business but also considered beneficial for agribusiness. It is observed that Islamic banking PLS can be beneficial for other sectors (Sutawi, 2008). It can improve the performance of SMEs (Gronroos, 1990).

Islamic banks have asset-based products like leasing (Ijarah) and Markup sales (Murabaha), and these products will help potential entrepreneurs. Banks and entrepreneurs earn when the venture is successful (Kuran, 2010). The emerging Islamic financial system is the best alternative for interest-based financing, and Islamic financing works entirely on asset bases/or profit or loss bases. Therefore, Islamic finance is the best cure for usurious debt-based financing and is a great opportunity for entrepreneurs. Because Islamic finance entrepreneurs do not need to bear all the burden, now they can share the risk and start a new venture smoothly (Kayed, 2012).

Empirical studies lacked a comprehensive assessment of financial development and entrepreneurship relationship, rather than selecting the new business density or other single perception-based indicators for entrepreneurship from Global Entrepreneurship Monitor. This study has developed an entrepreneurship index using 9 indicators whose data is available from a wide array of indicators proposed by (Martins, 2007). Similarly, this study contributes to the literature by using a holistic indicator for financial development. This index will encompass
several indicators of the quality and quantity of financing extended by the financial sector (Ang & McKibbin, 2007; Gautam, 2015; Ali & Fatima, 2021). This study uses 6 indicators proposed by World Economic Forum (Schwab, 2017).

A dearth of studies has inculcated Islamic equity/asset-backed or Islamic debt/asset-based financing in promoting entrepreneurship via risk-sharing or risk-mitigating mechanisms within the financial system. Several empirical studies have explored the role of Islamic financing on growth (Arshed et al., 2021; Kayed, 2012; Mushtaq et al., 2018), but its role in entrepreneurship is still underexplored. This study shows how Islamic debt-based contracts are useful for all prospective entrepreneurs and how this contract can decrease the access to finance gap for the entrepreneurs. Tawfiqi et al. (2018) proved in their study that there is a positive relationship between Islamic banks and entrepreneurship. This study adds Islamic debt financing as a moderator to financial section development, expecting that the Islamic financing component will increase the entrepreneurship promotion capability of the financial sector extensiveness and its stability.

Motivating entrepreneurship is the need for an hour in an effort to increase employment, innovation and competition in the markets.

While exploring the role of financial sector development, studies find mixed results with economic growth (M. S. Hassan & Kalim, 2017). Hence, it is hypothesized to have a nonlinear relation with growth using (Haans et al., 2016) framework. This nonlinear effect was not captured against entrepreneurship (Arshed et al., 2021). This study will discuss the nonlinear effect of the multidimensional financial development index. Hence the objective of the study is to explore the moderating role of Islamic equity financing in financial sector development and quadratic entrepreneurship relationships.
The scope of the study is highlighted by the recent development in promoting entrepreneurship in many countries, like the Government of Pakistan’s Kamyab Jawan (Successful Youth) program to promote entrepreneurship among youth. For this, several countries are focusing on developing a macroeconomic ecosystem that may facilitate the production of entrepreneurs (Bosma et al., 2021). This study has highlighted the potential of Islamic finance as an integral component of entrepreneurship promotion. After a detailed and comprehensive introduction, this study has formulated empirical literature on how significantly other studies have shed some light on the subject matter in section 2. Later, this study included the data and methodology in section 3, which discussed the variables data and methodology. Later in section 4, there are results and discussion. In the end, this study has proposed policy implications and some conclusions.

**Literature Review**

**Theoretical Review**

Access to finance is one of the constraints entrepreneurs face (Fowowe, 2017; Ullah, 2020). Empirical studies highlighted that SMEs face an issue getting timely and affordable debt financing from conventional banks (Jagoda & Herath, 2010). Normally commercial banks require collateral as a backup to mitigate high risks (Nawai & Shariff, 2011; Zavatta, 2008). Further, the collateral requirement is also a constraint, a stumbling block for SMEs to avail loans from commercial lenders (Ramlee & Berma, 2013). One study has confirmed that conventional financing is not able to provide the required liquidity to the startups (Mensi et al., 2020). Rose (2012) states that only 0.25 – 2% of the startups in the United States do not get finance through banks and shift to venture capital financing.
The increase in domestic credit to the private sector expresses the ease of access to credit, which positively impacts entrepreneurship (Aghion et al., 2007; GEM, 2021; Vidal-Suñé & López-Panisello, 2013). Some theories advocate that finance and investment are crucial ingredients in starting or expanding a business (Abu & Ezike, 2012; Nkwabi & Mboya, 2019; Onyeneke & Iruo, 2012; Wang, 2016). Laplume and Yeganegi (2019) presented several theories prompting the role of financing on entrepreneurship. These theories are Pecking Order Theory, Real Options Theory (Bowman & Hurry, 1993), Signaling Theory of Entrepreneurship (Bhattacharya, 1979), Stewardship Theory, and Information Asymmetry Theory (Arshed & Kalim, 2021). These theories assert the linkage of financial development with entrepreneurship, which necessitates quantifying effects.

**Debt financing**

Bank debt and other private debt sources play a crucial role in financing entrepreneurs (Berger & Udell, 1998; shareef el al., 2017). It is also seen that bank debt represents a crucial source of external finance for SMEs (e.g., (Cassar, 2004; Cassia & Vismara, 2009; Cosh et al., 2009; Hanssens et al., 2016; Robb & Robinson, 2014). At the same time, getting bank debt remains a major challenge for many new firms due to irregularities in the system and moral hazard problems (Berger & Udell, 1998; Chua et al., 2011).

A paper has shared that there are many institutions and resources where credit availability is possible for SMEs (Altaf et al., 2019). The sources from which SMEs can get finance are also important. SMEs are one of the targeting sectors of Islamic banking. As SMEs are one of the country's most flourishing industries, Islamic banks also make SME financing available (SBP, 2008). Charging interest on any product is prohibited in Islam, but earning an investment profit
and sale based profit are allowed in Islam (Muhamad et al., 2020). Commercial banks and Islamic banks provide debt financing, but the main difference is that commercial banks charge the time value of money while Islamic banks change the market profit rate (Khan, 2000). The most important reason Islamic banking is preferred over conventional banking is the risk of using customers' funds in the wrong way. Islamic banking normally works by buying products or assets, ensuring vigorous economic activity. The underlying involvement of the "asset" in every transaction ensures that the funds lent through any Islamic banking product are utilized for the purpose they were taken. So it is considered that Islamic banking removes the risk of misuse of funds from customers or entrepreneurs. Thus, the fund cost does not include any injustice. Ijarah (leasing) is one of the debt financing products given by Islamic banks, and it denotes the lease of an asset or service for a specific period in exchange for a payment of rental instalments, which may, at the end of the leasing period, lead to a transfer of ownership of the leased asset. This debt base product can be used by entrepreneurship because it reduces the asset ownership tax and the rents, which are only levied upon use. Hence in Islamic banking, if the user of the leased asset is not able to use the asset, banks will not charge rent. This facility is not available in any conventional system (Patterson & Mujtaba, 2013; Lateef et al., 2017). The Islamic banking system is entirely based on Islamic law. That is why its operation is in line with the principles of Shari’ah (Nasiru & Mansur, 2015).

Islamic banking facilitates SMEs and firms by providing contract base financing involving risk factors, which is managed with different agreements like Murabaha and Ijaraha (Hameed et al., 2020).
Islamic finance, growth and entrepreneurship

Martins (2007) discussed numerous indicators that quantify entrepreneurship in an economy. He proposed various variables like employment rate in services, survival rates of new enterprises, social economy enterprises, newly created enterprises/existing enterprises, and many more. Different research papers worked on the relationship between economic growth and entrepreneurship (Lepojevic et al., 2016; Liñán & Fernandez-Serrano, 2014; Stoica et al., 2020; Yusuf et al., 2021). Numerous studies have different opinions regarding the importance of financial development and how it helps an economy to grow. Wujung and Fonchamnyo (2016) proved in their papers that domestic credit and saving mobilization are the factors that impact private entrepreneurship. They also showed that improving access to finance will benefit entrepreneurship growth in the economy. Financial development is directly related to economic growth (Naceur & Ghazouani, 2007; Saci et al., 2009; Ujunwa & Salami, 2010).

Tabash and Dhankar (2014) studied the correlation between the Islamic financial system development and economic growth in UAE. Between 1990 - 2010, they found that the Islamic banks’ financing has positively contributed to UAE investment in the long run. The financial sector affects economic growth, but it is also considered that if the financial sector is not mature, it will negatively affect the economy (Chong et al., 2017; Ductor & Grechyna, 2015). Muhmad and Rahim (2020) proposed a framework for SMEs and how Islamic financing products can be more helpful in providing financing applications. Arshed et al. (2020) worked on Islamic banking and economic growth relationship. They have found a positive relationship whereby Islamic banking increases, then the economy's growth also increases. Dutta and Meierrieks (2021) talked about
financial development and entrepreneurship. According to them, if the financial sector is stable, low-cost credit will be available for entrepreneurs and grow their businesses efficiently.

Hidiroglu (2017) worked on research where he was trying to find a relationship between financial development and entrepreneurship. The study has used four indicators of financial development, affordability, soundness of the bank, venture capital and access to loans. The study results showed an insignificant relationship between affordability and bank soundness with entrepreneurship and a significant relationship between access to loans and venture capital with entrepreneurship. Some studies showed a negative and insignificant relationship between the financial market and economic growth (Naceur & Ghazouani, 2007; Narayan & Narayan, 2013).

**Entrepreneurship context factors**

Mauro (1995) proved in his paper that corruption is a factor that affects financial development and economic growth. Demirguc-Kunt and Detragiache (2005) showed that political instability and corruption are the factors that affect the financial development of any economy. Aggarwal and Goodell (2009) also said corruption affects the economy, creating financial development problems. Studies like (Arshed et al., 2019, 2021) have explored the role of human capital or education level in the economy on the number of registered new businesses. According to them, education increases the individual’s competencies to endure the risks of starting a new business.

**Theoretical framework**

This study is divided into 5 sub-objectives. Figure 1 provides the details of each sub-objective and relevant variable. The data is collected from reputable sources like World Development Indicators...
(WDI), Worldwide Governance Indicators (WGI), World Economic Forum (WEF) and Global Entrepreneurship Monitor (GEM).

Sub-objectives 1 and 2 constitute financial sector development and macroeconomic entrepreneurship indices. We have taken 6 indicators used as a proxy for financial development. Previous papers have used different financial development indicators like money supply, domestic credit to the private sector, and market capitalization as financial development indicators (Beck et al., 2009; Küçüksakarya, 2021). Enowbi-Batu and Kapukile (2010) used liquid liabilities and money supply as financial development indicators. The indicators used in this study are proposed global competitiveness reports that constitute a holistic representative of financial development. Based on data availability, there are 9 variables taken for entrepreneurship from the list proposed by (Martins, 2007). This study has constituted a holistic representative of entrepreneurship using different forms.

Social Cognitive Theory (SCT) describes the influence of individual experiences, the actions of others, and environmental factors on individual behaviours (Bandura, 1986). Few studies have used SCT to determine entrepreneurship (Boudreaux et al., 2019; Kisubi et al., 2021). Omri (2020) worked on the relationship between financial development and entrepreneurship. Their study disclosed that the relationship could be positive or negative. Their results showed a negative impact on informal entrepreneurship and a positive impact on formal entrepreneurship. To account for both positive and negative effect, this study has proposed a nonlinear effect of financial development on entrepreneurship whereby the actual effect depends on the size of financial development. Literature has denoted such types of relationships as quadratic or self-moderator effects (Hayes, 2017), whereby relationships follow variable returns to scale (Gans et al., 2018).
Studies like (Deidda & Fattouh, 2002; Law & Singh, 2014) have assessed the quadratic effect of financial development on economic growth and denoted it as a diminishing/vanishing effect whereby a higher level of financing increases the burden of debt repayment and lower gains from investment (Prochniak & Wasiak, 2017). Further, the financial sector in high-income countries facilitates growth with volatility (Beck et al., 2014).

![Theoretical Model](image)

**Fig. 1. Theoretical Model**

An increase in financial growth leads to increased opportunities for a new business to enter into business (Gans et al., 2018). Few studies have explored this relationship. Hurst and Lusardi (2004) advocated that liquidity constraints to wealth create a U-shaped effect on the probability of starting a business. A study by Pinto and Augusto (2014) confirmed a U shaped relationship between financial sector stability and operational performance of Portuguese SMEs. A study by Gaies et
al. (2021) explored 22 economies of Europe between 2009-2017 and showed that the financial sector has a U shaped relationship with nascent entrepreneurship, and this relationship is sensitive to economic conditions. Some other studies worked on the U-shape relationship in their studies (Gambacorta et al., 2014; Li et al., 2015). The confirmation of the U-shaped relationship shows a lower limit threshold beyond which financial development supports the entrepreneur.

A study by (De Bettignies & Brander, 2007) theoretically assessed the role of the share of venture capitalist (VC) on the entrepreneurs’ payoff and venture capitalist returns follow an inverted U shaped relationship, whereby higher financing with higher VC share initially increases gains to entrepreneur, but at a higher rate it reduces the gains. Similarly, Raharja and Mranani (2019) study estimated the quadratic effect of financing debt on the firm’s performance. For the case of Indonesian firms, the results confirmed an inverted U shape of the relationship.

Adelekan (2021) tried to find the effect of Islamic financing on SMEs, and the study results showed that Islamic finance positively impacts SMEs. Faisol (2017) investigated the influence of Islamic finance on SMEs of Kideri, and the study revealed that Islamic financing benefits SMEs. Manzilati (2020) found that PLS boosts sustainability for SMEs. Using qualitative research in Indonesia showed that PLS reduced the principal-agent problem. Tawfiqi et al. (2018) worked on the role of Islamic banks in the success of entrepreneurship. The results show that Islamic banks play a great role in entrepreneurship success in the case of Bahrain. Thus the quadratic assessment of financing on entrepreneurship is covered in sub-objective 3.
Fig. 2. Quadratic relationship moderation (Source: Haans et al., 2016)

This study tests this quadratic relationship theoretically and empirically and explores the moderating effect of Islamic debt financing. Haans et al. (2016) provide the framework which explains how quadratic functions are determined and how they can be moderated theoretically. Since the potential positive and negative effects of financial development and entrepreneurship co-exist in the quadratic function, figure 2 shows how an increase in Islamic financing would change the positive or negative effect leading to a change in the shape of the quadratic function. The moderator can change the curve by weakening/strengthening the linear part, flattening/steeplening the curvilinear part, turning-point shifting up/down and flipping (Haans et al., 2016). This assessment is covered in sub-objective 4. Lastly, the control variables are covered in sub-objective 5, which constitutes the contextual environment of macroeconomic entrepreneurship.
Research Methodology

This study is based on the secondary type of data. The population is all the countries where Islamic banks are present, and the sample will include 21 countries with available data (Arshed & Kalim, 2020, 2021; Kalim & Arshed, 2018). The unbalanced time periods selected are 2008-2018. Table 1 and 2 provides the variables used for developing the financial sector development index and entrepreneurship index with definitions and sources. Table 3 shows all other variables used in the study.

The data sets are collected from World Economic Forum (WEF), World Development Indicators (WDI), Global Entrepreneurship Monitor (GEM), Financial Statements (FS), Global Competitiveness Reports (GCR), Islamic Financial Services Board (IFSB), and Worldwide Governance Indicators (WGI).

Table 1. Description of Variables for Financial Development Index

<table>
<thead>
<tr>
<th>Variables</th>
<th>FSD variables (Scale: 1 Worst and 7 Best)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afford of Finance</td>
<td>“In your country, to what extent does the cost of financial services (e.g. insurance, loans, trade finance) impede business activity?”</td>
<td>WEF</td>
</tr>
<tr>
<td>Finance via equity market</td>
<td>“In your country, to what extent can companies raise money by issuing shares and/or bonds on the capital market?”</td>
<td>WEF</td>
</tr>
<tr>
<td>Ease of Loans</td>
<td>“How easy is it for businesses to obtain a bank loan in your country?”</td>
<td>WEF</td>
</tr>
<tr>
<td>Venture capital</td>
<td>“In your country, how easy is it for startup entrepreneurs with innovative but risky projects to obtain equity funding?”</td>
<td>WEF</td>
</tr>
<tr>
<td>Soundness of banks</td>
<td>“In your country, how healthy is your bank?”</td>
<td>WEF</td>
</tr>
<tr>
<td>Regulataions of security exchange</td>
<td>“In your country, to what extent do regulators ensure the stability of the financial market?”</td>
<td></td>
</tr>
</tbody>
</table>


Table 2. Description of Variables for Macroeconomic Entrepreneurship Index

<table>
<thead>
<tr>
<th>Variables</th>
<th>Entrepreneurship variables</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tertiary enrollment</td>
<td>“Gross enrollment ratio for tertiary school is calculated by dividing the number of students enrolled in tertiary education regardless of age.”</td>
<td>WDI</td>
</tr>
<tr>
<td>New business density</td>
<td>“The new business entry density, it is the number of newly registered limited liability corporations per calendar year.”</td>
<td>WDI</td>
</tr>
<tr>
<td>Patents registered</td>
<td>“This is indicative of the new inventions and knowledge created in regions and countries.”</td>
<td>WEF</td>
</tr>
<tr>
<td>Employment in services and industry</td>
<td>“The number of people employed in new enterprises and in surviving enterprises percent of total employment”</td>
<td>WEF</td>
</tr>
<tr>
<td>High tech exports</td>
<td>“High-technology exports are products with high R&amp;D intensity, such as in aerospace.”</td>
<td>WDI</td>
</tr>
<tr>
<td>Employers % of total</td>
<td>“Employers are those workers who, working on their own account or with one or a few partners, hold the type of jobs defined as &quot;self-employment jobs.&quot;”</td>
<td>WDI</td>
</tr>
<tr>
<td>Firm R&amp;D Spending</td>
<td>“Percent of firms that spend on research and development.”</td>
<td>WDI</td>
</tr>
<tr>
<td>Technician's in R&amp;D</td>
<td>“The number of specialists who participated in Research &amp; Development (R&amp;D), expressed as per million. Technicians and equivalent staff are people who perform scientific and technical tasks.”</td>
<td>WDI</td>
</tr>
</tbody>
</table>

Table 3. Description of Other Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Variables for Islamic Finance and Controls</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Islamic Debt Financing</td>
<td>Total Islamic debt financing as a percent of total financing</td>
<td>Financial statements</td>
</tr>
<tr>
<td>Regulatory Quality</td>
<td>“Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations.”</td>
<td>WDI</td>
</tr>
<tr>
<td>Institutions</td>
<td>Public and private innovations which take place in an economy</td>
<td>WEF</td>
</tr>
</tbody>
</table>

The constructs of both indices are selected from literature; principal component analysis is used to develop these indices using (Spearman, 1987) methods. This indexation approach reduces the dimensions of the data without a proportional reduction of the level of information. Thus, they simplify the model and avoid collinear or biased estimates (Gujarati et al., 2012). Since the data varies across time and countries, estimation models should control one factor and randomize the other. Standard Fixed Effect (FE) and Random Effect (RE) are commonly used in such cases, but it has certain limitations. This study has used panel quantile regression to take a more robust
approach by estimating the point estimates using median (or any specified quantile) rather than arithmetic mean. The advantage of this approach is that medians are robust to outliers and non-normal data. Several studies have used this model for panel data (Amjad et al., 2021; Sardar & Rehman, 2022).

\[
ENT_{it} = \alpha_1 + \alpha_2 FSD_{it} + \alpha_3 FSD_{it}^2 + \beta_4 DBFIN_{it} + \theta_5 DBFIN_{it} \times FSD_{it} + \alpha_7 Controls_{it} + \epsilon_t \quad (1)
\]

Here \(ENT\) = Entrepreneurship Index, \(FSD\) = Financial Sector Development, \(DBFIN\) = Log of Islamic Debt Financing, and Controls include \(HET\) = Higher education and training and \(RQ\) = Regulatory Quality. And “\(i\)” denotes countries, “\(t\)” denotes time periods, and “\(\epsilon\)” denotes independent and identically distributed (iid) residuals. Here \(DBFIN\) is the indicator of Islamic debt financing whereby all debt based Islamic financing tools are aggregated with data available across 21 countries.

Haans et al. (2016) provide the mechanism to identify the shifting of the nonlinear model based on the slope coefficients. Here the \(\alpha_2\) and \(\alpha_3\) of the equation are the quadratic effect of \(FSD\) on \(ENT\) (addressing sub-objective 3), the \(\theta_5\) is the moderation of \(DBFIN\) on the linear portion of \(FSD-ENT\) relationship, and \(\Omega_6\) is the moderation of \(DBFIN\) on a curvilinear portion of \(FSD-ENT\) relationship (addressing sub-objective 4). Further, Dawson (2014) provides the visualization method for the effect of the moderator on a quadratic model. Haans et al. (2016) provide the framework for setting the hypothesis. Following are the hypothesis developed from the perspective of figure 2 and equation 1. The index development will provide the indicators and their contribution to address hypotheses 1 and 2 for financial sector development and macroeconomic entrepreneurship indices.
Hₐ₁: The proposed constructs are suitable for FSD
Hₐ₂: The proposed constructs are suitable for ENT

Though Islamic finance promotes entrepreneurship, the limited literature on quadratic effects pointed out that FSD – ENT should have a U-shaped relationship (Hurst & Lusardi, 2004; Pinto & Augusto, 2014). This denotes that FSD has a negative linear effect and a positive curvilinear effect.

Hₐ₃: DBFIN does positively affect ENT.
Hₐ₄: FSD does have a negative linear effect on ENT before a certain threshold
Hₐ₅: FSD does have a positive curvilinear effect on ENT after a certain threshold

Islamic banks engage in risk-sharing and risk-mitigating partnerships, which are juristic and address moral hazards and adverse selection problems (Arshed et al., 2020; Arshed & Kalim, 2021). Thus, increasing the share of Islamic financing will reduce the negative resource constraint effect on the financial system. Since Islamic financing only levies cost upon its fair and productive use, hence the cost of Islamic debt is lower than conventional debt. Consequently, Islamic debt financing will reduce the non-productive/consumption-based use of banking credit, reducing the cost of debt in the economy as in conventional banking, the interest rate on consumer credit is higher than producer credit. Since debt incurs cost, so higher debt will hinder the autonomy in the decision-making of the entrepreneur. These dynamics lead to the development of the following hypothesis.

Hₐ₆: DBFIN does positively moderate FSD – ENT linear effect before a certain threshold
Hₐ₇: DBFIN negatively moderates FSD – ENT curvilinear effect after a certain threshold.
Lastly, indicators like higher education and institutions positively affect entrepreneurship.

H_{a8}: HET does positively affect ENT

H_{a9}: RQ does positively affect ENT

**Data Analysis**

Table 4 provides the statistics generated from the factor analysis showing the association of the items/indicators with their respective indices. Here we can see that the 6 indicators of entrepreneurship and 5 indicators of financial sector development have MSA values higher than the threshold.

<table>
<thead>
<tr>
<th>Table 4. Selected Indicators of ENT and FSD Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicators of ENT</strong></td>
</tr>
<tr>
<td>ENT1</td>
</tr>
<tr>
<td>ENT2</td>
</tr>
<tr>
<td>ENT3</td>
</tr>
<tr>
<td>ENT5</td>
</tr>
<tr>
<td>ENT6</td>
</tr>
<tr>
<td>ENT9</td>
</tr>
</tbody>
</table>

**Descriptive analysis**

Table 5 provides the descriptive statistics of the variables used in equation 1. Here we can see that HET and FSD have mean values higher than standard deviation, indicating under-dispersed while others are over-dispersed across countries and time. Further, the correlations below 0.9 indicate no apparent multicollinearity among variables.
Table 5. Descriptive Statistics

<table>
<thead>
<tr>
<th>Name</th>
<th>Descriptive</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>ENT</td>
<td>-0.00</td>
<td>0.94</td>
</tr>
<tr>
<td>FSD</td>
<td>0.00</td>
<td>0.97</td>
</tr>
<tr>
<td>DBFIN</td>
<td>-11.87</td>
<td>3.18</td>
</tr>
<tr>
<td>HET</td>
<td>4.34</td>
<td>0.71</td>
</tr>
<tr>
<td>RQ</td>
<td>0.22</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Figure 3 plots the empirical incidence of the variables, here we can see that there was a rapid rise in debt financing from 2008 to 2012, which stabilized later on, while entrepreneurship and financial sector development followed a U shaped pattern in terms of falling in the early 2010s and increasing in late 2010s.

Table 6 provides the regression estimates for equation 1. These results are based on 100 country year observations comprising 16 countries. In control variables, an increase in higher education and training (HET) has shown a positive effect on entrepreneurship, confirming previous studies (Arshed et al., 2019, 2021).
Table 5. Estimates of Panel Quantile Regression

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Err.</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSD</td>
<td>-0.296</td>
<td>0.066</td>
<td>0.00</td>
</tr>
<tr>
<td>FSD²</td>
<td>-0.543</td>
<td>0.072</td>
<td>0.00</td>
</tr>
<tr>
<td>DBFIN</td>
<td>0.049</td>
<td>0.011</td>
<td>0.00</td>
</tr>
<tr>
<td>DBFIN*FSD</td>
<td>-0.043</td>
<td>0.004</td>
<td>0.00</td>
</tr>
<tr>
<td>DBFIN*FSD²</td>
<td>-0.051</td>
<td>0.006</td>
<td>0.00</td>
</tr>
<tr>
<td>HET</td>
<td>0.124</td>
<td>0.044</td>
<td>0.00</td>
</tr>
<tr>
<td>RQ</td>
<td>0.018</td>
<td>0.028</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Post Regression Statistics

| Sample | 100 Countries | 16 |

For the case of financial sector development, the coefficient of linear FSD and squared FSD is negative, which means that FSD has a negative exponential effect on ENT. Further, there is a positive direct effect of DBFIN on ENT while it has a negative coefficient of cross product with FSD and FSD squared. This means that an increase in Islamic debt financing (DBFIN) reduces the linear and curvilinear effect of FSD on ENT. The effects discussed here are true when the data values are strictly positive, but FSD and ENT are indices with a mean value 0. Hence the exact outcome of nonlinear effects could be visualized using (Dawson, 2014) algorithm. This algorithm uses the coefficients of the model and compare it with the mean and standard deviation of the data to plot the outcomes.

Figure 4 provides the plot of nonlinear effects. Here, it can be seen that there is a U-shaped effect of financial sector development at low levels of Islamic debt financing. This entails that countries should ensure the development of the financial sector to promote entrepreneurship, which is difficult in the case of developed countries involved in the sample. Study by (Hassan & Kalim, 2017) pointed out that developing countries cannot extract positive effects from financial sector development. This problem is sorted via Islamic debt financing as, at its high levels, it can fill in to provide the support required to motivate entrepreneurship in the economy. The relationship now is inverted U shaped. Consequently, Islamic debt financing flips the relationship between financial
sector development and entrepreneurship to support entrepreneurship where it matters the most in the case of developing economies.

Figure 5 provides the marginal effect of a 1% increase in the Islamic debt financing, here we can see that Islamic financing is entrepreneurship promoting at a low to medium level of financial sector development. This points to the potential of Islamic financing for the low and medium developed countries trying to improve the financial sector. It also confirms that there are diminishing returns in Islamic debt financing, which can be catered to by developing a proper debt and equity financing portfolio in the economy.

Fig. 4. Plotting the debt financing moderated quadratic effect (Source: Dawson, 2014)
Conclusion and Policy Implications

This study explored the complementary role of Islamic financing with the financial sector development in motivating entrepreneurship in the economy. Conventional studies have provided mixed outcomes of the use of financing in entrepreneurship, especially in the case of debt financing, its higher use is expected to create a debt burden. But the contractual agreement in the Islamic debt financing prohibits the user from the non-productive/consumption-based use, which increases the productivity of the debt resource availed by the borrower. On one hand it appears less expensive because of an increase in productivity. On the other hand, there will be lower demand in the economy as it is restricted for the non-productive/consumption-based use, so we will observe a fall in the overall cost of debt.

This study has constituted a model to estimate the Islamic debt financing moderator effect on the quadratic financial development and entrepreneurship relationship. Based on the data from 16 countries, there is a U-shaped relationship between financial development and entrepreneurship at
low levels of Islamic debt financing, while there is an inverted U-shaped relationship at high levels of Islamic debt financing. This entails that Islamic financing sorts the minimum threshold financing requirements evident in low Islamic financing. Firms/entrepreneurs can benefit from Islamic financing based on financial development even at low development levels, which is crucial for developing countries.

Policymakers can develop appropriate policies to increase the share of Islamic debt financing as an alternative to conventional financing, considering its role in entrepreneurship promotion. New businesses can see potential in favouring Islamic debt financing because of its lower cost levied when the leased asset is in use. The outcomes of the study are limited to the sample and time frame selected, the results may improve and open doors for the curvilinear effects based studies for Islamic financing in growth and entrepreneurship. Future studies can incorporate the proportion of equity and debt financing or product based financing as, unlike conventional banks, the products in Islamic banks are not perfectly substitutable.
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