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Islam and early-stage entrepreneurial activity in Indonesia: religion is not the opium of entrepreneurship

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Abstract

Purpose – Our research examines the impact of Islamic religiosity, exploring the role of religious actors, religious ideas (knowledge-based religiosity) and religious practice, on the involvement in early-stage entrepreneurial activity at the provincial level in Indonesia.

Design/methodology/approach – We rely on the survey conducted by Global Entrepreneurship Monitoring in Indonesia, spanning from 2013 to 2017. The dataset comprises responses from 21,279 individuals. We use probit regression, and the main independent variable, Islamic religiosity, is measured using one factor that incorporates knowledge-based religiosity (extracted relying on Islamic schools, Mosques and Islamic seminaries) and practice-based religiosity (extracted relying on Halal products and Hajj applications). To further explore the role of individual variables, we also estimate the probit regression entering religiosity variables one by one. Our results are robust to endogeneity issues.

Findings – We find that areas characterised by stronger Islamic religiosity in terms of the presence of actors that disseminate religious ideas and in terms of religious practice have more people involved in early-stage entrepreneurial activity.

Originality/value – Irrespective of the growing interest in exploring the impact of religiosity on entrepreneurship, there is limited discussion on the impact of Islamic religiosity on entrepreneurial activity.

Keywords Islam, Religiosity, Entrepreneurship, Entrepreneurial activity, Indonesia

Paper type Research article

1. Introduction

The examination of religion's role in the economy traces its origins to the pioneering work by Max Weber (1930), who explored the connection between Calvinism and capitalism. Dana (2009) Argues that religious values may affect the economy and instil individuals with an entrepreneurial spirit through two distinct yet interconnected channels: (1) the impact of religious beliefs that may promote ideas and values that emphasise virtues such as hard work, diligence, and the pursuit of economic prosperity. Religion functions as a catalyst, stimulating individuals to become entrepreneurs (Audretsch *et al.*, 2013); (2) the role of religion in shaping social norms and defining the social status of entrepreneurs by promoting a high social status

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of business actors (Audretsch *et al.*, 2013). Thus, it is not a surprise that academics explore the impact of religion and religiosity on various facets of business activity, the broader economy, and entrepreneurship (Audretsch *et al.*, 2013; Balog *et al.*, 2014; Dana, 2009; Rietveld and Hoogendoorn, 2022). Past empirical evidence suggests belief in heaven and hell is positively associated with economic growth (Barro and McCleary, 2003), and within the spectrum of religious traditions, Protestantism emerges as the faith most conducive to supporting socio-economic development (Guiso *et al.*, 2003). In contrast, other religious traditions do not exhibit the same degree of alignment between religious beliefs and entrepreneurial activities as in the case of Hinduism (Audretsch *et al.*, 2013), Theravada Buddhism or Catholicism (Dana, 2009).

Islam's link with business and entrepreneurial activity is also explored. While some academics assert that the underdevelopment of socio-economic conditions in Muslim-majority countries serves as evidence of Islam's barrier to business and entrepreneurship (Atilgan, 2019; see Kuran, 2018 for the recent data), others have cast doubt on this simplistic link (Noland, 2005; Pryor, 2007). The argument against Islam's compatibility with entrepreneurship often builds on factors such as Sufi mysticism and themes of warfare within the faith (Sukidi, 2006; Turner, 1974) that hinder the development of an inner-worldly asceticism conducive to economic success. However, historical records present a different narrative: there is substantial evidence of a robust Islamic commercial and entrepreneurial tradition dating back to the medieval period (Greif, 1994; Lewis and Churcill, 2009), when the Islamic world played a crucial role in facilitating the transfer of various products vital for the economic development of the West (Lewis and Churcill, 2009). Furthermore, historical accounts reveal the existence of business activity within the first Islamic society in seventh-century Arabia (Kuran, 1997).

Indeed, several key factors and scholarly observations underscore the compatibility of Islam with entrepreneurship: (1) The foundational religious texts of Islam, the *Quran*, and the *Sunnah* actively encourage principles such as hard work, productivity, and self-reliance (Abeng, 1997; Elfakhani and Ahmed, 2013; Gümüsay, 2015; Ishak and Osman, 2016; Ramadani *et al.*, 2015), promoting industriousness and productivity as virtuous activities; (2) within Islamic culture, entrepreneurship enjoys a significant degree of moral approval (Etzioni, 1987): Prophet Muhammad himself achieved success as a businessman (Beekun, 2012; Elfakhani and Ahmed, 2013; Gümüsay, 2015; Uddin, 2003). Empirical evidence also suggests a positive association between being Muslim and the decision to pursue self-employment (Audretsch *et al.*, 2013; Papageorgiou, 2012; Wijaya, 2019); (3) Islamic finance (e.g. *Mudharaba* and *Musharaka*), characterised by its adherence to Sharia-compliant principles, may play a supportive role in entrepreneurship (Soufani *et al.*, 2015), facilitating entrepreneurs' access to financial resources and capital (Wijaya *et al.*, 2023b). Intriguingly, despite these arguments and the significance of the topic, research about the relationship between Islamic religiosity and entrepreneurship remains quite limited (Balog *et al.*, 2014; Rietveld and Hoogendoorn, 2022; Zelekha *et al.*, 2014).

Our research aims to investigate the impact of Islam on the economy by examining the influence of Islamic religiosity on individuals' participation in early-stage entrepreneurial activities. Our study focuses on Indonesia (the world's most populous Muslim-majority country) since it offers several advantages. First, it mitigates the risk of confounding effects that may arise from the considerable diversity in the interpretation of Islamic teachings across different countries. Moreover, variations in legal systems, national cultures, and socio-economic factors can significantly impact the manifestation of Islam within different nations (Inglehart, 2007; Pryor, 2007). Second, by concentrating our analysis on Indonesia, we rely on a heterogeneous context (even if nationally Indonesia is mainly a Muslim country, nevertheless Islam is not homogeneously distributed, so there are provinces where the majority of the population is not Muslim) that allows to minimise confounding variables and enhance the internal validity of our findings.

We rely on the survey conducted by Global Entrepreneurship Monitoring (GEM) in Indonesia, spanning from 2013 to 2017. The dataset comprises responses from 21,279

individuals who expressed their intentions to pursue entrepreneurship. At variance with past research that relied on macro-level indicators such as the Muslim share of the national population (Noland, 2005; Pryor, 2007) and often used poor proxies to assess the impact of religiosity (Audretsch *et al*., 2013; Papageorgiou, 2012; Zelekha *et al*., 2014), we capture the impact of Islamic religiosity on the involvement in early-stage entrepreneurial activity using variables able to catch both cognitive and behavioural aspects of Muslims (Durkheim, 1995). We employ the presence of Islamic schools, seminaries, and mosques within a region (knowledge-based religiosity), and the number of *Hajj* applications at the provincial level and the number of certified *halal* products, reflecting individuals' commitment to adhering to Islamic principles in their daily lives (religious practice).

Our results indicate a positive association between Islamic religiosity at the provincial level and active participation in early-stage entrepreneurial activities, also by facilitating the connection among entrepreneurs (Centola, 2018; Granovetter, 2017). These results furnish robust empirical evidence for the supportive role Islam plays in promoting early-stage entrepreneurial engagement. The observed relationships are solid to a battery of additional tests designed to address potential endogeneity concerns.

Our contribution is twofold: first, we offer robust econometric evidence that both knowledge-based religiosity and practice-based religiosity exert a positive influence on early-stage entrepreneurial engagement. On the one hand, religious actors, i.e. Islamic schools, Islamic seminary schools and mosques, serve as vehicles for the dissemination of religious ideas so that Islamic educational and religious institutions are effective in promoting a favourable environment for entrepreneurship. On the other hand, religious practices impact people's behaviour by encouraging their involvement in entrepreneurial activities. Secondly, our results provide a deeper understanding of the cultural and religious underpinnings that contribute to the positive relationship between Islam and early-stage entrepreneurship, clarifying that religion's impact on entrepreneurship is underpinned by a constellation of Islamic values, practices, and beliefs that resonate with and support entrepreneurial behaviours (Giacomin *et al.*, 2023).

The remainder of the paper is organised as follows: in the next section, we discuss the conceptual framework and literature review. In section 3, we present the methodology, followed by results and analysis in section 4. In section 5, we present a discussion of the results, followed by the conclusion.

2. Religion and entrepreneurship

2.1 Religion and entrepreneurship

Religion's significant influence on individuals' perspectives and behaviours in the realm of economic activities was first examined by Weber (1930), who looked at the Protestant Ethic of English Puritanism. He argues that the protestant ethical framework not only forgives but actively encourages entrepreneurial activities, as long as they are in line with God's divine will, and they refrain from adopting a rentier position since the accumulation of wealth must not be solely for personal enjoyment (Weber, 1930). Weber's analysis highlights the central role played by Calvinism in promoting the concept of the "calling" as a motivation for entrepreneurial activities (Weber, 1930): diligent work undertaken in the pursuit of God's glory and resulting success signifies one's divine calling, while idleness and time-wasting are condemned strengthening the positive correlation between Protestantism and entrepreneurship (Drakopoulou Dodd and Seaman, 1998). As pointed out by Eaton (2013), the German term "*Beruf*", which intriguingly means both "calling" and "work", removes the spiritual distinction between professional ministry and secular vocations, as both are regarded as a form of service to God. All in all, this belief system creates a powerful incentive for individuals to engage in strenuous work and economic activities, driven by the desire for a favourable eternal outcome.

Empirical investigations support the positive association between the Protestant tradition and socio-economic development, as well as the propensity for Christian traditions to foster

behaviours and activities conducive to economic growth when contrasted with other religions (Grier, 1997; Guiso *et al.*, 2003; Mayer and Sharp, 1962). Moreover, the Pentecostal churches in the United Kingdom offer a concrete example of religious institutions actively promoting entrepreneurship by organising seminars and workshops with a deliberate emphasis on entrepreneurship, also transforming the church into a hub for networking (Nwankwo *et al.*, 2012). In a similar vein, Henley (2017) finds a positive association between evangelical Christianity and early-stage entrepreneurial activity rates. Furthermore, in East Germany, Protestants exhibit a greater propensity to initiate or plan business ventures compared to their non-Protestant counterparts (Wyrwich, 2018). Nunziata and Rocco (2018) have revealed that the probability of an individual engaging in entrepreneurship is 5.4% points higher among Protestant minorities than among Catholic minorities. Intriguingly, the influence of religious traditions extends beyond Christianity. Woodrum (1985) has examined Japanese immigrants adhering to Buddhist traditions, which share certain commonalities with Protestantism, and found a positive association between these traditions and both self-employment and annual income. Additionally, individuals with high levels of "intrinsic" religiosity exhibit a predilection for self-employment over traditional employment arrangements (Noble *et al.*, 2007). More recent studies show that religiosity is positively associated with social entrepreneurial venturing (McIntyre *et al.*, 2023), entrepreneurial intentions (Ali, 2023), and green entrepreneurial motivation (Pusparini *et al.*, 2025). All in all, a substantial body of empirical research corroborates the influential role of religion in shaping socio-economic development and entrepreneurial inclinations.

A different viewpoint is provided by neo-institutional theory (Dimaggio and Powell, 1983), which argues that the external environment is posited to affect entrepreneurial activity via the mechanism of isomorphism. The differing value on entrepreneurship among different religions influences individuals' intentions to pursue entrepreneurial endeavours (Dana, 2010; Etzioni, 1987). In an environment that greatly values entrepreneurship, individuals are more inclined to establish their businesses. Moreover, by conforming to the expectations of society, including established norms, values, and practices, entrepreneurs may attain enhanced legitimacy from stakeholders that may be particularly relevant when it can be used in a context of weak links, as pointed out by Granovetter (2017) and Centola (2018). Interestingly, active religious participation may legitimise the entrepreneur in the eyes of the people who are not members of the inner circle (Suddaby *et al.*, 2017; Suddaby and Greenwood, 2005), so that the entrepreneur may benefit from the weak links (Granovetter, 1985, 2017).

Religion comprises various elements, including religious actors, religious ideas, and religious practices (e.g. the pilgrimage of Hajj, consumption of halal) (Basedau *et al.*, 2018; Durkheim, 1995). Religious actors and ideas are closely intertwined, as individuals (such as preachers), official organisations (e.g. Islamic schools, seminaries, and religion-based organisations), and informal organisations (e.g. mosques) disseminate the ideas, values, and norms of the religion. In Islamic culture, entrepreneurship is regarded with respect due to the great business skills of the Prophet Muhammad (Beekun, 2012; Dana, 2010). Consequently, it is prevalent for Islamic religious figures to advocate for Muslims to engage in entrepreneurship and demonstrate the values of hard work, integrity, and trustworthiness, reflecting the example of the Prophet Muhammad.

2.2 Islam and entrepreneurship

In Islam, the notion of *maqasid al-shariah* signifies the objectives of the divine regulations (*shariah*) established by *Allah*, which aim to achieve maslahah or the well-being of humanity. In the context of Islam, well-being encompasses not only material wealth but also socio-economic justice, brotherhood, happiness, and social harmony (Chapra, 2000). Imam Al-Ghazali (1111 CE), as referenced by Chapra (2008), stated that *maqasid al-shariah* comprises five elements: the protection of faith, the self, intellect, posterity, and human wealth. Moreover, Chapra (2008) supports Fakhr al-Dīn al-Rāzi's (1209 CE) argument that the self

(*al-nafs*) becomes the primary point of the *maqasid al-shariah*. The aim of *Shariah* to safeguard humanity can be achieved through the fulfilment of fundamental human needs, the elimination of poverty, and the creation of opportunities for employment and self-employment (Chapra, 2008). Islam condemns the concentration of wealth among the rich, condemns beggary, and encourages the fulfilment of basic human requirements through one's own efforts. Thus, human dignity is attained.

The Islamic principles pertinent to fostering entrepreneurial activities within Islamic culture are the concepts of *ikhtiyar* (effort and perseverance) followed by *tawakkal* (trust in divine providence) (see Quran 65:3). In contrast to predestination in Protestant culture, these concepts maintain a balance between human agency and divine will. *Ikhtiyar* emphasises human effort, but *tawakkal* signifies trust in Allah's plan, acknowledging that the results of one's efforts are not wholly under human control (Gümüsay, 2015; Hoque *et al.*, 2014). These principles are pertinent to entrepreneurial activities as they reduce the fear of failure while promoting risk-taking.

The idea of *Tawhid* (unity) is another relevant one that encourages entrepreneurial activities in the Islamic culture. Crucially in supporting the entrepreneurial intentions, *Tawhid* underline the principles of brotherhood, sisterhood, cooperation, solidarity, and feeling to belong to the same *Umma* (mother/Islamic community) (Greif, 1994; Rice, 1999; Richardson, 2014; Wijaya *et al.*, 2023a). For instance, *Tawhid* is shown to affect personal values of honesty, trust, and solidarity (Forster and Fenwick, 2015), it enables the simplification of the negotiations with business partners who have similar values even by reducing any cultural difference in international business (Richardson, 2014), it emphasises the need of establishing trust before one can sign a contract (Rice, 2004), and it protects the interests of the community (Lalonde, 2013).

Kuran (1997) presents a nuanced perspective on the impact of Islamic beliefs on economic development and entrepreneurship, highlighting three contrasting views that offer useful insights into the complex interplay between Islam and economic activities.

The first viewpoint, referred to as the "economic irrelevant thesis", suggests that Islamic beliefs hold no significant influence over economic development. Empirical support for this stance is drawn from the observation that the proportion of the Muslim population within a given country has shown no significant impact on GDP growth or unemployment rates (Pryor, 2007). This perspective claims that Islamic religious principles do not exert a direct influence on a nation's economic development.

The second perspective takes a critical position by arguing that Islamic teachings tend to be static and resistant to change, thereby hindering the evolution of knowledge and ideas. Lewis (1993) stresses this argument by noting the Islamic education system emphasises knowledge acquisition rather than knowledge discovery and expansion. Additionally, the absence of scientific methods, such as experimentation and observation within Islamic schools, is cited as a factor inhibiting intellectual development. Lewis further observes that the freedom of innovation, known as "*ijtihad*", prevalent in early Islam, gradually waned between the 9th and 11th centuries. This decline in the spirit of innovation is seen as an interference by limiting the ability to exploit the opportunities of a changing world and to fulfil entrepreneurial activities. Moreover, Islamic teachings prohibit behaviours such as engaging in high-risk contracts (*gharar*), which may impede entrepreneurial activities (Pryor, 2007). Interestingly, religious individuals are less inclined to engage in excessive risk-taking (Miller and Hoffmann, 1995).

The third perspective, termed the "economic advantage" viewpoint, states that Islam's teachings contain provisions that promote entrepreneurship and economic development. This perspective draws attention to Quranic verses that encourage diligence and enrichment, implicitly motivating Muslims to engage in entrepreneurial activities (Guiso *et al.*, 2003). For instance, Quran 13:11 shows the importance of innovativeness: "Indeed, Allah will not change the condition of a people until they change what is in themselves." In the same vein, Quran 8:22 emphasises the importance of opportunity identification: "Indeed, the worst of living creatures in the sight of Allah are the deaf and dumb who do not use reason." Islamic teachings are seen as

providing guidelines for financial regulations, contracting principles, distribution mechanisms, and behavioural norms that promote the development of an entrepreneurial culture. These norms also regulate interactions among entrepreneurs and business partners. For instance, the Quranic verse 62:10 emphasises the importance of industriousness: "And when the service of prayer is over, spread out in the land, and look for the bounty of God and remember God a great deal that you may prosper" (Abeng, 1997; Anggadwita *et al.*, 2017; Gümüsay, 2015; Kuran, 1997). This verse aligns with Uygur (2009) findings in Turkey, where SME owner-managers believe that Muslims must strike a balance between hard work in this world and the hereafter since, in Islam, work may be a form of worship and dedication to one's work is considered virtuous (Ali and Al-Owaihan, 2008; Gümüsay, 2015; Sidek *et al.*, 2018). Interestingly, Turkish Muslim managers exhibit a stronger work ethic compared to their Protestant counterparts in Britain and Catholic counterparts in Ireland (Arslan, 2001). Indeed, Prophet Muhammad even preached that sins can be expiated through hard work (Yousef, 2001). Productivity takes centre stage in Islamic economics, with Islamic financial institutions emphasising project productivity over collateral (Soufani *et al.*, 2015). Also, Islam encourages self-reliance, as epitomised by the saying attributed to Prophet Muhammad that "No one eats better food than that which he eats out of the work of his hand" and "No earnings are better than that of one's effort" (Ali and Al-Owaihan, 2008). The Prophet also denounced begging and idleness, urging people to develop land and utilise resources efficiently, implicitly advocating entrepreneurship (Beekun, 2012; Elfakhani and Ahmed, 2013; Uddin, 2003). Moreover, the moral approval of entrepreneurship within Islam is stressed by the role model provided by the Prophet Muhammad, who was not only a religious leader but also a successful businessman. Many of his disciples engaged in manual and craft work, including tailoring, carpentry, and butchery, reflecting the positive perception of such professions (Ali and Al-Owaihan, 2008; Bayat, 1992). When a religious figure embodies entrepreneurial activities, it tends to influence followers towards self-employment (Audretsch *et al.*, 2013) so it is not surprising that merchants and craftsmen enjoy high moral esteem in Islam, as reflected in various sayings attributed to the Prophet (Ali and Al-Owaihan, 2008), such as "Nine out of 10 sources of income are coming from business activities" and "An honest and sincere businessman will be placed with the prophets" (Ramadani *et al.*, 2015).

In sum, the multifaceted aspects of Islamic teachings (emphasis on hard work, its opposition to idleness, and its positive moral stance toward entrepreneurship), as elaborated upon by scholars and religious figures, reflect a complex interplay between faith and economic behaviours, underscoring the potential for Islamic beliefs to shape entrepreneurial culture and economic development (Dana, 2009; Ramadani *et al.*, 2015).

However, it is also important to point out that Islam may work and stimulate entrepreneurship via institutions that have been created and follow Islamic principles. First, the regular prayer in the mosque can generate opportunities to meet other people, which, in turn, allows for gaining and disseminating information from/about people who do not belong to the entrepreneurs' inner circle. This suggests that mosques can be a very effective location to establish and exploit the weak links (Granovetter, 2005, 2017). In fact, as pointed out by Granovetter (2005, 1985), Centola (2009), and Centola and Macy (2007), the weak links are the key factor in accessing and spreading information. They allow the exploitation of the information owned by acquaintances over and above the information owned by friends. In other words, weak links allow access to information that may be different from that accessible via friends: since acquaintances tend are farer away from us vis a vis friends (in terms on opinions, ideas, and network that can feed their knowledge), the interaction with them that may happen in a mosque may allow to gain information and connections that, alternatively the entrepreneur would not be able to have (Granovetter, 2017). Thus, the weak links in the mosque may be helpful to find business opportunities, to connect to people and to access information about the reputation of other (business partners, customers, suppliers, etc), as well as to disseminate information about the entrepreneur and spread the entrepreneur's reputation (Suddaby and Greenwood, 2005). Secondly, Islamic finance, characterised by its adherence to Sharia-compliant principles, may play a supportive role in entrepreneurship (Soufani *et al.*,

2015). Profit-sharing mechanisms like *Mudharaba*/*Musharaka* and trade-based transactions like *Murabaha* provide alternative financial mechanisms that can facilitate entrepreneurs' access to financial resources and capital (Wijaya *et al.*, 2023b). Interestingly, empirical research indicates that Islamic banks in areas with higher religiosity provide greater financing and exhibit lower non-performing financing (Wijaya *et al.*, 2023b). Third, government policies are affected by the religiosity of the political elite. The implementation of development expenditure and SME cluster development (Tambunan, 2005) may significantly contribute to the growth of SMEs. Finally, both value-based trust and competence-based trust of SME owners work concurrently in facilitating business-to-business relationships in Indonesia (Wijaya *et al.*, 2023a).

So far, empirical research has produced a complex and somewhat inconclusive picture when it comes to assessing the impact of Islam on economic growth and entrepreneurial development. On one hand, empirical investigations suggest a negative association between Islam and economic growth. For instance, Barro and McCleary (2003) find a negative correlation between the share of the Muslim population and economic growth. Similarly, Guiso *et al*. (2003) identify negative associations between Islam and certain attitudes that promote entrepreneurial development, noting that Muslims have an obvious preference for reduced private ownership, exhibit strong opposition to competition, and demonstrate greater anti-market attitudes compared to adherents of other religions. Similarly, Muslims show the lowest tendency for entrepreneurship compared to adherents of other religions (Zelekha *et al.*, 2014). Another study found that Muslim populations exhibit a negative correlation with the number of new business ventures in a country, encompassing formal entrepreneurship (Ayob and Saiyed, 2020). A possible explanation is that many Muslims do not adhere to business practices suggested by Islamic teachings.

Conversely, other studies propose a more positive outlook on the relationship between Islam and entrepreneurship. Noland (2005) contends that Islamic beliefs are not inherently against entrepreneurship and growth. Evidence from India suggests a positive association between Islam and the decision to become an entrepreneur (Audretsch *et al.*, 2013). Likewise, Muslim minority citizens in Greece are found to be more inclined toward entrepreneurship compared to their Christian counterparts (Papageorgiou, 2012). Furthermore, research indicates that a higher degree of Islamic religiosity, as measured by the smaller gap between the number of *Fajr* prayers and *Maghrib* prayers in mosques, is positively linked to self-employment (Wijaya, 2019). Also, Islam has historically played a significant role in economic development. During the medieval period, the Islamic world served as a conduit for various products that contributed to Western economic development (Lewis and Churcill, 2009). The economic growth observed in regions under Muslim rule during the 7th century underscores the historical significance of Islam in promoting economic activity (Ali and Al-Owaihan, 2008; Kuran, 1997). Moreover, when examining specific regional contexts, the relationship between the share of the Muslim population and economic growth varies. Research conducted in India, Malaysia, and Ghana suggests that the share of the Muslim population is positively associated with growth in Ghana, negatively associated with growth in Malaysia, and exhibits no clear association in India (Noland, 2005).

The assessment of Islam's impact on socio-economic conditions, including economic growth and entrepreneurship, is far from straightforward, and the contemporary underdevelopment of socio-economic conditions in many Muslim-majority countries cannot be simplistically attributed to Islam alone. Instead, it is crucial to consider a complex interplay of historical, cultural, institutional, and geopolitical factors that shape the economic landscape in these regions. The conflicting empirical findings underscore the necessity of context-specific analyses and highlight the multifaceted nature of the relationship between religion and economic development.

In summary, a comprehensive analysis encompassing theological, philosophical, and historical perspectives does not point in a clear direction, suggesting the relevance of further exploration to identify which one among the three possible outcomes better explains the role of Islam in stimulating or antagonising entrepreneurship.

3. Variable description and methodology

3.1 Data

We perform our analysis in Indonesia, the country with the biggest Muslim population in the world, but also with a large heterogeneity in terms of different religions in different areas (Hefner, 2017). This country also experiences a high growth in Islamic religiosity (Wijaya *et al.*, 2023b). Moreover, Indonesia scores high in the growth of economic indicators (Noland, 2005). In general, there are 1.8 billion Muslims in the world (Christians are around 2.3 billion in the world), and according to Pew Research Centre, the gap between the number of Muslims and Christians will be much smaller by 2060. This implies that the interactions among people belonging to different religions will dramatically increase soon.

Indonesia provides a unique viewpoint on the role of religiosity in entrepreneurial activities. This is due to the Indonesian Council of Ulama (Majelis Ulama Indonesia – MUI) issuing *fatwas*, which are non-binding legal opinions or opinions provided by competent Islamic scholars (Ulama) on certain matters, including business transactions and economic activities. For example, *Fatwa* No. 146/DSN-MUI/XII/2021 fosters confidence in Muslim online sellers/buyers utilising e-commerce by ensuring compliance with *Sharia* (Islamic rules). Entrepreneurial activities grow because individuals often utilise e-commerce platforms to improve the efficiency, speed, cost-effectiveness, branding, and reach of their product sales (Jahanshahi *et al.*, 2013; Kuzic *et al.*, 2002; Warren, 2007).

We rely on the survey performed by Global Entrepreneurship Monitoring (GEM) in Indonesia, covering the period from 2013 to 2017. GEM has become the largest and most prominent cross-national research program examining the drivers of entrepreneurial activity (Koellinger, 2008). The dataset includes responses from 21,279 individuals across 23 provinces in Indonesia. Indonesia consists of 34 provinces and 17,508 islands. The 23 selected provinces encompass eight main islands: Sumatra, Kalimantan, Jawa, Sulawesi, Maluku, Bali, Nusa Tenggara, and Papua. The 23 selected provinces demonstrate diversity in terms of human development index (2017) (Jakarta: 79.6 and Papua: 59.05), GDP per capita (2017) (Jakarta: IDR 228 million and Nusa Tenggara Timur: IDR 17 million), unemployment rate (2017) (Banten: 9.28% and Bali: 1.48%), and the percentage of individuals who completed senior high school (2017) (Papua: 33.82% and Jakarta: 78.25%).

3.2 Variables

Our dependent variable is a dummy variable that identifies whether the person is involved in early-stage entrepreneurial activity (1) or not (0). The variable is from the individual-level survey performed by Global Entrepreneurship Monitoring's (GEM) representative from Indonesia for the period 2013–2017.

Previous studies on the relationship between Islam and entrepreneurship have often used poor proxies to assess the impact of religiosity and religion on entrepreneurial activities. For example, some studies have used a binary variable where 1 represents individuals who are Muslim and 0 represents those who are not (Audretsch *et al.*, 2013). Other studies have used a similar approach but with different religious groups, such as Orthodox Christians (Papageorgiou, 2012). Another approach has been to consider the proportion of different religious groups in the population of a country (Zelekha *et al.*, 2014). Needless to say, all these metrics are quite general since the presence, or the percentage of the Muslim population, cannot capture both cognitive and behavioural aspects of Muslims properly (Giacomin *et al.*, 2023). A Muslim (but this applies to any religion) may have faith in Allah (has *iman*) yet still engage in un-Islamic activities such as consuming alcoholic beverages and participating in gambling.

We adhere to Durkheim's proposition that religion encompasses various significant dimensions, including religious ideas, religious practice, and religious actors. Religious actor encompasses both individuals, such as clergy, and formal organisational manifestations of religious communities, such as single groups, faith-based organisations (FBOs), religious

networks, or partnerships of multiple religious groups (Basedau *et al.*, 2018). Religious ideas encompass doctrines, written and formal norms, as well as values. Religious practice solely encompasses explicit religious actions, such as worship, doing pilgrimages (*hajj*), fasting, building mosques, and consuming halal food and drink (Basedau *et al.*, 2018). We construct one factor that includes both knowledge-based religiosity, which encompasses religious actors and religious concepts since they are strongly interlinked (actors disseminate ideas and concepts) by using data about Islamic schools, Islamic seminary schools, and mosques, to capture both intensities of Islamic teachings received by the Muslim; and religious practice by using *Hajj* applications and certified halal products at the province level to measure the intensity of religious practice of the Muslims (practice-based religiosity).

Islamic schools are religious actors whose target is to disseminate the religious ideas and morals/ethics of Islam, such as doctrines, norms, and values. In fact, alongside general subjects, students in the Islamic school will be taught the Arabic language, History of Islam, *Aqidah*/*Akhlaq*, *Quran* and *Sunnah*, and *Fiqh*. Areas with more Islamic schools face greater dissemination of Islamic teaching, so these areas should have a large proportion of the current population willing to conform to the Islamic teaching. In such a context, misbehaviour in business may be perceived as an attitude that does not conform to Islamic teaching, and it may be socially sanctioned with stigma, exclusion, and/or marginalisation from the business and social life. The data on the number of Islamic schools are obtained from the Central Agency on Statistics of Indonesia (BPS) (2013–2017).

Mosques promote religious ideas in a way similar (but more general) to the Islamic schools. Islamic teachings of hard work and self-reliance, as well as the success story of Prophet Muhammad as a businessman, are disseminated during prayer in the Mosque, indirectly shaping local social norms. We use the number of Mosques registered under the Indonesian Ministry of Religious Affairs (2013–2017).

An *Islamic seminary school* (*pesantren*) is a form of religious actor/organisation. This actor not only promotes religious ideas but also trains religious roles, i.e. *ulama* (preacher). The students can learn religious education, general education, vocational skills, and character development in a *pesantren* in Indonesia (Lukens-Bull, 2001). Lukens-Bull (2001) mentions that many *pesantren* provide skill training such as welding, carpentry, sewing, computer, and shopkeeping to help the students in the job market. These data are obtained from the Ministry of Religious Affairs (2013–2017).

Hajj (pilgrimage to the holy city of Mecca) is a form of religious practice for Muslims and one of the five pillars of Islam: Muslims should perform *hajj* at least once during their lifetime. Given that *hajj* can be financially expensive, Muslims need to work hard (or do extra work) to finance the trip. The fact that people need to work hard for *hajj* could shape their intention to perform entrepreneurial activities (see also Geertz (1956) for the explanation that *hajj* is one of the mechanisms in introducing modernisation of Islam in Indonesia). We use the number of applications made for the *hajj* in each province. The data about *hajj* applications are obtained from the Ministry of Religious Affairs (2013–2017).

Certified *halal* product is another representation of religious practices. The certification process at the provincial level is managed by a provincial halal authority. The companies that register their products at the provincial level are mainly small and medium enterprises, while the big companies need to certify their products with the national halal authority. These data are obtained from the halal authority of Indonesia under the body of the Indonesian Council of Ulama (LPPOM MUI) (2013–2017).

We also include control variables. We expect age (Age) will have a positive impact on the involvement in entrepreneurial activity since the experience of the respondent is positively associated with new business formation (Fritsch and Storey, 2014). The level of education (Education) affects competency in doing business, which is positively associated with business opportunities (Block *et al.*, 2012). Gender can either hinder or provide an advantage in doing business for Muslim women (Essers and Benschop, 2009). Access to the Internet (Internet) is one of the important sources of information that can support the establishment of

small businesses (Audretsch *et al.*, 2015). Foreign investment at the province level (Ln_Investment) not only creates supply-demand activities with local entrepreneurs (Barbosa and Eiriz, 2009) but also brings a new perspective on how a company should do business, and possibly also brings a new technology, which in turn affects the entrepreneurial activities. Non-performing loans at the province level in conventional banks (NPL) and Non-performing financing in Islamic banks (NPF) represent credit risk, which affects the supply of funds to the entrepreneur. Population density at the province level (Population_density) can support entrepreneurial activities since the denser the population, the higher the entrepreneurial opportunities that can be obtained. Regional gross domestic product per capita at the province level (Ln_GDP) provides a positive impact on entrepreneurial activities (Fritsch and Storey, 2014). Skilled construction worker at the provincial level (construction) represents the intensity of infrastructure development that supports entrepreneurial activities (Audretsch *et al.*, 2015). Also, the productivity of the construction industry has a positive relationship with economic development (Chia *et al.*, 2014), which in turn fosters entrepreneurial activities.

3.3 Methodology

We use probit regression, and the main independent variable, Islamic religiosity, is measured using one factor that incorporates knowledge-based religiosity (extracted relying on Islamic schools, Mosques, and Islamic seminaries) and practice-based religiosity (extracted relying on *Halal* products and *Hajj* applications). To further explore the role of individual variables, we also estimate the probit regression entering religiosity variables one by one. Appendix 1 shows our regression models.

Our analysis may suffer from reverse causality, since there may be a feedback loop between Islamic religiosity and entrepreneurial activities: early-stage entrepreneurial activities may affect both religious actors and religious practices via greater availability of funds for Islamic schools or mosques. To tackle it, we follow Hilary and Hui (2009) Reed (2015) by performing probit regression and selecting instrumental variables, i.e. lagged three years natural logarithm of Islamic school and lagged three years natural logarithm of Islamic seminary school.

In addition, our results may suggest spurious causality because of omitted variables. Thus, we perform instrumented probit regression by using two instrumental variables that can affect religiosity but do not affect in any way the entrepreneurial activity: the number of natural disasters lagged one year, and the number of houses being destroyed and damaged by natural disasters lagged one year at the provincial level. Natural disasters may act as shocks that increase religiosity and affect the opinion about religion in those who are not religious, since natural disasters challenge people's opinions about science reliability. Malinowski (1925) argues that "Religiosity is related to the desire to control those things that cannot be controlled given the level of technological sophistication of society (e.g. weather and disease), and it is also a way of dealing with fear and death" (Miller and Hoffmann, 1995, p. 65). In such a context, people tend to look at religion as something that can help them deal with the psychological consequences of the disaster, as well as help find closure for deaths. We performed a set of additional tests: the Anderson–Rubin (AR) statistic (Anderson and Rubin, 1949), the Kleibergen–Moreira Lagrange multiplier (LM) test (Moreira, 2003), and the conditional likelihood-ratio (CLR) test to check the presence of potentially weak instruments (Finlay and Magnusson, 2009).

4. Analysis

4.1 Descriptive statistics

Table 1 presents the descriptive statistics.

The respondents' age is obtained from the GEM individual-level data survey (i.e. we rely on the 21,279 answers provided by a sample of the Indonesia population to the GEM questionnaire), ranging from 18 to 64 with an average age of 36 years while the average education is at level 2.8 of the UN scale which means that the average education of the

Table 1. Descriptive statistics

Variable	Description	Source of data	Obs	Mean	Std. Dev.	Min	Max
Age	The current age of the respondents (in years)	GEM survey	21,279	36.57493	11.68451	18	64
Education	UN harmonized educational attainment	GEM survey	21,279	2.801306	1.113325	0	6
Gender	The gender of the respondent (0 = male, 1 = female)	GEM survey	21,279	0.50148	0.5000096	0	1
Internet	The percentage of people with age more than 10 years who access the internet in the last 3 months based on province within the service industry	BPS-Statistics Indonesia	21,279	37.9038	9.73345	17.88	62.77
Investment	Foreign direct investment realization by Province (million US $)	BPS-Statistics Indonesia	21,279	1636.203	1845.725	9.9	7124.9
Non-performing loan (NPL)	Percentage of non-performing loans to the total amount of loans in large conventional banks at a province level	Financial Service Authority of Indonesia	21,279	0.0255216	0.0101158	0.00499	0.072813
Non-performing financing (NPF)	Percentage of non-performing financing to the total amount of financing in large Islamic banks at the province level	Financial Service Authority of Indonesia	21,279	0.0401003	0.0199928	0.0071	0.106265
Population_density	Population density per sq. km by province	BPS-Statistics Indonesia	21,279	1460.05	3683.17	10	15,624
GDP	Per capita gross regional domestic product at current market prices by Province (thousand rupiahs)	BPS-Statistics Indonesia	21,279	50239.06	45443.6	12,379	228,004
Construction_worker	Skilled construction worker at a province level	BPS-Statistics Indonesia	21,279	10763.39	11946.93	18	68,942
Early-stage entrepreneurial activity	a dummy variable, either a respondent is involved or not in early-stage entrepreneurial activity (0 = No, 1 = Yes)	GEM survey	21,279	0.1664082	0.3724554	0	1
Islamic school	Sum of Islamic primary school, Islamic junior high school, and Islamic senior high school at the provincial level	BPS-Statistics Indonesia	21,279	2949.582	3437.476	87	12,855
Islamic seminary	Islamic seminary school (*pesantren*) by province	Ministry of Religious Affairs	21,279	1934.406	2750.434	5	9,167
Hajj	*Hajj* application by province	Ministry of Religious Affairs	21,279	29938.15	32910.23	1190	113,386

(*continued*)

Table 1. Continued

Variable	Description	Source of data	Obs	Mean	Std. Dev.	Min	Max
Mosque	The number of Mosque registered under the Ministry of Religious Affair at the provincial level	Ministry of Religious Affairs	21,279	13048.38	16212.82	149	48,135
Halal	The number of halal certified products at the provincial level	The Council of Indonesian Ulama (MUI)	21,279	1116.355	1815.544	0	6,402
Factor religiosity	Principal-component factor of: (1) sum of Islamic primary school, Islamic junior high school, and Islamic senior high school at the provincial level, (2) the number of Islamic seminary school (*pesantren*) by province, (3) the number of *Hajj* application by province, (4) the number of Mosque registered under Ministry of Religious Affair at the provincial level, (5) the number of halal certification at the provincial level		21,279	−8.15E−10	1	−0.80489	2.286529

Source(s): Authors' own work

respondents is secondary. The sample reports an equally distributed population between men and women. The Internet represents the percentage of people older than ten who accessed the Internet in the last three months. The mean of the internet users is 37.9%. Non-performing loans (NPL) range from a maximum of 7.3% down to 0.5%, with an average of 2.5% of NPL, which is quite low, while the average non-performing financing (NPF) in Islamic banks is 4%. The average foreign direct investment realisation by Province is US$ 1,636 million, while the average per-capita regional GDP is IDR 50 million (around US$ 3,460). The average number of skilled construction workers at the provincial level is 10,763.

Turning attention to the core variables, Islamic schools range from 87 to 12,855, while Islamic seminary schools range from 5 to 9,167. The range of the data is huge since in some provinces the Muslim population is well below 50%, such as Nusa Tenggara Timur (9.05% Muslim population of a total 4.9 million population), Bali (13.4% Muslim population of a total 4 million population), Papua (15.9% Muslim population of total around 3 million population), Sulawesi Utara (30.9% Muslim population of total 2.4 million population), and Maluku (50.6% Muslim population of total 1.7 million population). The incredibly high number of 12,855 Islamic schools can be found in Jawa Timur (96.4% Muslim population out of 39 million), where the biggest Islamic organisation in Indonesia, Nahdhatul Ulama, was founded in 1926 in Surabaya, Jawa Timur. Other Islamic religious proxies also have a huge range; for instance, the highest number of *hajj* applications is 113,386, and the smallest number of *hajj* applications is 1,190. Interestingly, a high number of Islam religious proxies can be found in some provinces which have high population numbers and at the same time have high Muslim share population, such as Jawa Barat (97% Muslim population out of 48 million population), Jawa Timur, and Jawa Tengah (96.7% Muslim population out of 34 million population).

4.2 Factor analysis

We use Islamic schools, Islamic seminary schools, Mosque (knowledge-based religiosity) and *Hajj* and *Halal* (practice-based religiosity) to measure religiosity. EFA was employed to reduce large amounts of data into smaller sets of latent constructs (Fabrigar *et al.*, 1999). Table 2 shows the factor analysis result. All Islamic religiosity items load into a single factor. The practice of Muslims in *ibadah*, including the consumption of halal food, beverages, pharmaceuticals, etc, is affected by the dissemination of knowledge from mosques, Islamic schools, and Islamic seminaries. Table 2 shows the factor analysis result. All Islamic religiosity items load into a single factor. The Bartlett test of sphericity is significant ($p < 0.01$), with a Kaiser-Meyer-Olkin (KMO) score of 0.789 and a Cronbach Alpha score of 0.70. All of the items show commonalities between 0.7228 and 0.9501, and the values are acceptable (Costello and Osborne, 2005). The factor explains 87.86% of the variance.

The correlation matrix between variables is shown in Table 3. All the Islamic religiosity proxies exhibit a positive and statistically significant relationship with TEA (Total Entrepreneurial Activity). Similarly, factor religiosity has a positive and significant connection with TEA. The correlations provide first support to the idea that Islam is

Table 2. Exploratory factor analysis: Islamic religiosity

Items	Factor 1	Uniqueness	Communalities
Halal	0.8502	0.2772	0.7228
Mosque	0.9747	0.0499	0.9501
Islamic school	0.9295	0.1359	0.8641
Hajj	0.9582	0.0818	0.9182
Islamic seminary	0.9684	0.0621	0.9379

Source(s): Authors' own work

Table 3. Correlation matrix

	Variables	1	2	3	4	5	6	7	8
1	TEA	1							
2	Age	−0.00169	1						
3	Education	0.0195**	−0.194***	1					
4	Gender	0.00182	−0.00869	−0.0733***	1				
5	Internet	0.0562***	0.00438	0.0149*	0.00547	1			
6	Construction worker	0.00819	0.0133	−0.00735	0.00206	−0.339***	1		
7	Ln Investment	0.00855	−0.00519	−0.0703***	−0.00421	−0.588***	0.463***	1	
8	NPL	−0.0445***	−0.0538***	0.0901***	−0.0105	0.0379***	0.0516***	0.0228**	1
9	NPF	−0.0110	−0.0268***	0.0439***	−0.00120	−0.0306***	0.0104	0.0974***	0.492***
10	Population density	−0.0375***	−0.00498	−0.0190**	−0.00296	−0.378***	0.0316***	0.348***	−0.139***
11	Ln GDP	−0.0473***	−0.0395***	0.0633***	−0.00853	−0.421***	0.0617***	0.377***	0.339***
12	Factor Religiosity	0.0192**	0.0597***	−0.0544***	0.00335	−0.352***	0.664***	0.531***	−0.0474***
13	Ln Islamic school	0.0342***	0.0592***	−0.0885***	0.00902	−0.195***	0.529***	0.404***	−0.143***
14	Ln Seminary	0.0192**	0.0510***	−0.0975***	0.00455	−0.261***	0.521***	0.382***	−0.109***
15	Ln Hajj	0.0180*	0.0555***	−0.0787***	0.00521	−0.317***	0.529***	0.463***	−0.0712***
16	Ln Mosque	0.0466***	0.0685***	−0.0717***	0.00661	−0.224***	0.554***	0.349***	0.00690
17	Ln Halal	0.0372***	0.0626***	−0.117***	0.00599	−0.489***	0.640***	0.570***	−0.153***

	Variables	9	10	11	12	13	14	15	16	17
1	TEA									
2	Age									
3	Education									
4	Gender									
5	Internet									
6	Construction worker									
7	Ln Investment									
8	NPL									
9	NPF	1								

(*continued*)

Table 3. Continued

	Variables	9	10	11	12	13	14	15	16	17
10	Population density	−0.0658***	1							
11	Ln GDP	0.165***	0.683***	1						
12	Factor Religiosity	−0.0682***	−0.0569***	−0.231***	1					
13	Ln Islamic school	0.00429	−0.0727***	−0.266***	0.835***	1				
14	Ln Seminary	−0.131***	−0.148***	−0.350***	0.859***	0.880***	1			
15	Ln Hajj	−0.0829***	0.120***	−0.0996***	0.849***	0.940***	0.880***	1		
16	Ln Mosque	0.0183**	−0.0679***	−0.187***	0.829***	0.928***	0.819***	0.917***	1	
17	Ln Halal	−0.117***	0.109***	−0.0551***	0.852***	0.776***	0.812***	0.806***	0.789***	1

Note(s): *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Source(s): Authors' own work

supportive of entrepreneurship, but further research is required to determine the magnitude of the impact of Islamic religiosity on TEA.

4.3 Main results

Table 4 shows the regression results on the impact of factor religiosity on the involvement in early-stage entrepreneurial activity at the provincial level.

The first regression incorporates the variable factor of religiosity. There are no multicollinearity issues in model 1 (the VIF values ranging from 1.01 to 5.64), and the number of cases correctly predicted is 83.36%. Factor religiosity is positively associated with TEA and is significant at a 1% level. Our hypothesis is supported. Thus, there is a positive relationship between Islamic religiosity and early-stage entrepreneurial activity. The marginal effects analysis shows that a one-point increase in the Islamic religiosity factor will improve early-stage entrepreneurial activity by 1.4%. Our result confirms past research that found a positive relationship between Islam and entrepreneurship (Audretsch *et al.*, 2013; Papageorgiou, 2012; Rehan *et al.*, 2019; Wijaya, 2019). Our results differ from past studies (Ayob and Saiyed, 2020; Guiso *et al.*, 2003; Zelekha *et al.*, 2014), possibly because we employ a more comprehensive measurement of religiosity based on area. An alternative explanation relates to the fact that our study concentrates on Indonesia, where Islam is taught through the concept of *ikhtiyar*, followed by *tawakkal* in daily life. Consequently, it reduces the potential of

Table 4. Probit regression: The impact of factor religiosity on the involvement in early-stage entrepreneurial activity

Variables	Model 1
Age	−8.57e−05
	(0.000915)
Education	0.0441***
	(0.00950)
Gender	0.00186
	(0.0206)
Internet	0.0159***
	(0.00159)
Construction_Worker	−4.78e−07
	(1.23e−06)
Ln_Investment	0.0638***
	(0.0116)
NPL	−11.51***
	(1.590)
NPF	−0.308
	(0.602)
Population_density	−2.88e−05***
	(4.69e−06)
Ln_GDP	0.155***
	(0.0394)
Factor Religiosity	*0.0584***
	(0.0194)
Constant	−3.415***
	(0.395)
Observations	21,279

Note(s): Standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Model 1 is estimated using probit regression
Source(s): Authors' own work

confounding effects that may emerge from the significant variation in the interpretation of Islamic teachings across various nations.

Turning our attention to control variables, education is positively associated with early-stage entrepreneurial activity (significant at 1%) as well as the Internet. Ln Investment is also positively associated with the involvement in early-stage entrepreneurial activity (significant at 1%). NPL is negative and significant, and supports the view that high credit risk in certain areas reduces the supply of funds, which in turn hinders entrepreneurial activities. Ln_GDP is positively associated with involvement in early-stage entrepreneurial activity ($p < 0.01$).

Table 5 shows probit regression on the impact of Ln Islamic school, Ln Islamic seminary, Ln *Hajj*, Ln Mosque and Ln *Halal* on TEA. We enter the Islamic religiosity one by one to avoid the multicollinearity problem.

Table 5. Probit regression: the impact of Islamic religiosity proxies on the involvement in early-stage entrepreneurial activity

Variables	Model 2	Model 3	Model 4	Model 5	Model 6
Age	−7.59e−05	−2.50e−05	−0.000153	−0.000438	−0.000408
	(0.000914)	(0.000913)	(0.000914)	(0.000916)	(0.000934)
Education	0.0457***	0.0463***	0.0454***	0.0466***	0.0442***
	(0.00950)	(0.00949)	(0.00950)	(0.00952)	(0.00975)
Gender	0.00191	0.00240	0.00200	0.00144	0.00730
	(0.0207)	(0.0207)	(0.0207)	(0.0207)	(0.0210)
Internet	0.0152***	0.0166***	0.0163***	0.0171***	0.0214***
	(0.00154)	(0.00161)	(0.00157)	(0.00156)	(0.00169)
Construction_ Worker	−3.35e−07	1.02e−07	−4.19e−07	−2.72e−06**	−3.60e−06***
	(1.09e−06)	(1.07e−06)	(1.07e−06)	(1.11e−06)	(1.20e−06)
Ln_Investment	0.0619***	0.0633***	0.0598***	0.0568***	0.0360***
	(0.0109)	(0.0110)	(0.0108)	(0.0104)	(0.0113)
NPL	−10.30***	−11.63***	−12.01***	−12.98***	−12.95***
	(1.515)	(1.564)	(1.559)	(1.565)	(1.562)
NPF	−0.786	−0.112	−0.169	−0.512	2.107***
	(0.595)	(0.608)	(0.601)	(0.597)	(0.630)
Population_density	−2.71e−05***	−2.71e−05***	−3.20e−05***	−2.94e−05***	−2.79e−05***
	(4.56e−06)	(4.57e−06)	(4.71e−06)	(4.58e−06)	(4.75e−06)
Ln_GDP	0.142***	0.160***	0.159***	0.190***	0.173***
	(0.0338)	(0.0366)	(0.0342)	(0.0335)	(0.0351)
Ln_Islamic_school	0.0543***				
	(0.0115)				
Ln_Islamic_ seminary		0.0361***			
		(0.00888)			
Ln_*Hajj*			0.0666***		
			(0.0119)		
Ln_Mosque				0.0923***	
				(0.00983)	
Ln Halal					0.129***
					(0.0146)
Constant	−3.657***	−3.733***	−4.077***	−4.504***	−4.438***
	(0.383)	(0.409)	(0.408)	(0.382)	(0.413)
Observations	21,279	21,279	21,279	21,279	20,440

Note(s): Standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Models 2, 3, 4, 5, and 6 are estimated using probit regression
Source(s): Authors' own work

Ln_Islamic_school followed by Ln_Islamic_seminary, Ln *Hajj*, Ln_Mosque, and Ln *Halal* in Models 2, 3, 4, 5, and 6 are positive and significant at the 1% level. The marginal effects analysis shows that a one-point increase in the Ln_Islamic_school, Ln_Islamic_seminary, Ln *Hajj*, Ln_Mosque, and Ln *Halal* will improve early-stage entrepreneurial activity by 1.3%, 0.9%, 1.6%, 2.3%, and 3.2%, respectively. Again, these results support previous studies that document positive relationships between Islam and entrepreneurial activities (Audretsch *et al.*, 2013; Gümüsay, 2015; Lewis and Churcill, 2009; Papageorgiou, 2012; Rehan *et al.*, 2019; Wijaya, 2019). We use the natural logarithm of the variables because the distribution shows long left tails. Moreover, we expect a progressively decreasing role of these institutions as they become prevalent in the area, since they end up covering a population that already has access to religious institutions. This implies that there is a reduced impact in terms of allowing Muslims to access schools or mosques that otherwise are not accessible. Models 2, 3, 4, 5, and 6 do not present multicollinearity issues since the highest VIF scores for these models are 4.09, 4.73, 4.17, 3.99, and 3.83, respectively. Our results show in a very solid and consistent way a positive impact of all the different metrics we use to track the role of religiosity on early-stage entrepreneurial activity. We can argue that our econometric evidence provides the first indication of a positive relationship between Islam and entrepreneurship.

4.4 Robustness check

We cannot rule out that our regressions suffer from spurious causality (omitted variable). To address this issue, we select 2 instrumental variables, namely the natural logarithm of the number of natural disasters lagged one year at the provincial level, and the natural logarithm of the number of houses being destroyed and damaged by natural disasters lagged one year at the provincial level. We use the natural logarithm since there is a decreasing effect of these events: the shock generated by a natural disaster depends on its intensity (e.g. the number of deaths or the number of houses destroyed) but at a diminishing pace so that the emotional effect of, say 100 deaths is not twice as the emotional effect of 50 deaths). In addition, by using the logs, we reduce the skew of the distribution by limiting the role of the extreme values on the right tail. We check for the exclusion criteria by performing a correlation analysis between Islamic religiosity and instrumental variables. There is a strong correlation between our factor religiosity with our instrumental variables (ranging from 0.65 to 0.79). In contrast, the correlation between the early-stage entrepreneurial activity dummy variable and our instrumental variables is very low and not significant (namely 0.02 and 0.04). Appendix 2 shows IV-probit regression on the impact of factor religiosity on TEA. Factor religiosity is positive and significant at the 1% level. Thus, providing similar results to the original regression (Table 4).

We run 2sls regression again in models 8, 9, 10, 11, and 12 (Appendix 3). We enter Islamic religiosity proxies into the models one by one, and we use the same instrumental variables, namely the natural logarithm of natural disasters lagged one year at the provincial level, and the natural logarithm of houses destroyed and damaged by natural disasters lagged one year at the provincial level. The findings indicate that all Islamic religiosity proxies are positive and significant at the 1% level. The findings are consistent with the initial regression (see Table 5).

Our model is also subjected to an endogeneity problem related to reverse causality since there may be a feedback loop between Islamic religiosity and entrepreneurial activities. Our regression suggests that Islamic religiosity is positively associated with early-stage entrepreneurial activities. Early-stage entrepreneurial activities may affect the quality and quantity of both religious actors and religious practices: a more entrepreneurial active area can enjoy greater economic growth, and this can, in turn, increase the resources available to the school and mosques so that there can be an increase in religiosity. We follow Hilary and Hui (2009) and Reed (2015) who suggest that the practice of replacing a suspected simultaneously determined explanatory variable with its lagged value is not effective in tackling simultaneity bias. They argue that it is better to use lagged values as an instrument in an instrumented

regression. In our case, we use the lag of the Islam religiosity variables in instrumental variable estimation. Thus, we re-estimate our model via 2sls by selecting the lagged 3 years natural logarithm of Islamic schools and the lagged 3 years natural logarithm of Islamic seminary schools as instrumental variables. Interestingly, the correlations between the lagged variables and non-lagged variables are strong (0.88–0.99). In contrast, the correlations between the involvement in early-stage entrepreneurial activity and lagged variables are very weak (0.02–0.04), suggesting that our instruments are good ones. Appendix 4 shows the results of IV-probit regression to tackle the reverse causality problem. Both Ln_Islamic _school and Ln_ Islamic_seminary are positive and significant ($p < 0.01$ and $p < 0.05$, respectively). Thus, it can be safely argued that our original results are robust to the reverse causality issues.

One remaining concern pertains to the potential incorrect rejection of null hypotheses in these IV-probit regressions due to the existence of weak instruments. In order to reject this hypothesis, we exploit CLR, AR, LM, and LM-J. In accordance with our specifications, it is observed that all four statistics, CLR, AR, LM and LM-J, provide evidence to reject the null hypothesis, which suggests that the coefficient of Islam religiosity's presence in TEA is equal to zero. All in all, regression outcomes confirm our previous results, and we can conclude that, as far as the role played by the Islamic religiosity is concerned, it is safe to argue that it impacts the early-stage entrepreneurial activities.

5. Discussion

The socio-economic landscape of Islamic nations is frequently characterised by developmental challenges, as evidenced by key indicators such as life expectancy: Member states of the Organisation of Islamic Cooperation (OIC) generally report figures significantly below the global average (Kuran, 2018); the gross domestic product (GDP) per capita of OIC member states lags substantially behind the global mean, amounting to merely a quarter of the GDP per capita recorded in OECD nations (Kuran, 2018). This evidence has led some scholars to posit that Islam exerts a detrimental influence on economic development, with particular reference to the alleged lack of support for private ownership within Islamic (Guiso *et al.*, 2003)law. The notion that Islam is incompatible with economic progress aligns with the arguments of Max Weber, who contended that the faith's theological structures obstruct the emergence of an inner-worldly asceticism conducive to material advancement. Weber's argument rests on constraints imposed by territorial expansion, warrior asceticism, and the influence of Sufi mysticism (Sukidi, 2006; Turner, 1974). Our empirical findings challenge these perspectives, arguing instead that the relationship between Islam and economic development is mediated by three critical factors.

Firstly, the figure of Prophet Muhammad exemplifies the positive role of entrepreneurship (Elfakhani and Ahmed, 2013; Uddin, 2003), thereby legitimising entrepreneurial activity within an Islamic cultural framework (Ali and Al-Owaihan, 2008). This conceptualisation is reinforced by religious institutions, such as Islamic schools and seminaries, which integrate the subject of *Tarikh* (History) within their curricula, highlighting Prophet Muhammad's commercial acumen. Furthermore, the pedagogical approach encompasses attributes essential for fostering entrepreneurial success, encapsulated within the moral and behavioural dimensions of the *Akhlaq* (behaviour and moral values) curriculum. Students are inculcated with key virtues, including *Amanah* (trustworthiness), *Siddiq* (honesty), and *Fatonah* (intellectual acumen). The narrative of Prophet Muhammad's entrepreneurial expertise is disseminated in the mosque, where weekly Friday (*Jumah*) congregational prayers provide an opportunity for preachers to present various aspects of his life.

The confluence of entrepreneurship and religious conviction is further supported by the case of Ahmad Dahlan, the founder of Muhammadiyah, one of Indonesia's foremost Muslim organisations. Dahlan's contributions extend beyond institutional achievements to include entrepreneurial ventures rooted in principles of honesty and integrity (Sukidi, 2006), attesting to the symbiotic relationship between Islamic faith and economic enterprise within the

Indonesian context. In sum, the presence of entrepreneurial role models within the Islamic tradition influences the economic preferences of its adherents, increasing the propensity of individuals within the faith to pursue self-employment (Audretsch *et al.*, 2013).

Secondly, the concept of *ikhtiyar*, which emphasises diligence and industrious effort—a core tenet of entrepreneurship—is reinforced by *tawakkal*, or trust in divine providence. Religious institutions, including Islamic schools, seminaries, and mosques, play a pivotal role in propagating this paradigm, which remains central to Islamic thought. This principle is particularly evident in the context of pilgrimage to Mecca (*Hajj*). Given the significant financial costs associated with undertaking the *Hajj*, Indonesian Muslims are encouraged to engage in financial planning and make a persistent effort to meet these expenses. This interplay between sacred aspiration and economic exertion underscores the enduring link between faith and financial activity within Indonesian Islam.

The theological emphasis on human agency in shaping one's destiny is supported by the Quranic verse 13:11: "Verily! Allah will not change the condition of a people unless there is a change of what is in themselves." This passage underscores the religious significance of individual effort and responsibility, reinforcing the value of diligence as an integral Islamic principle. Interpretations of Islamic teachings in Indonesia are nuanced, shaped by the nation's diverse cultural heritage, regional traditions, and ethnic compositions. The two largest Islamic organisations in Indonesia—Muhammadiyah and Nahdlatul Ulama (NU)—play a substantial role in shaping religious discourse and propagating the concept of *ikhtiyar-tawakkal* throughout the country (Wanandi, 2002).

Thirdly, Islam places a strong emphasis on avoiding unemployment, fostering self-reliance, and promoting industriousness (Abeng, 1997; Ali and Al-Owaihan, 2008; Arslan, 2001; Bayat, 1992; Gümüsay, 2015). These values are embedded within the broader entrepreneurial ethos and are reinforced by religious actors (Kayed and Hassan, 2010; Lukens-Bull, 2001) as well as religious rituals such as the *Hajj*, which shape individual attitudes towards economic enterprise (Abdullah, 1994; Geertz, 1956). Moreover, through daily prayers, mosques foster an environment conducive to knowledge dissemination, the exchange of innovative business ideas, and collaborative ventures among co-religionists. Additionally, Islamic seminaries play an instrumental role in nurturing entrepreneurial competencies. Students engage not only in academic study but also in managing businesses affiliated with the seminaries, thereby acquiring practical entrepreneurial skills (Lukens-Bull, 2001). Consequently, graduates from these institutions develop a robust foundation in entrepreneurship, enhancing their prospects for economic success.

Fourthly, and this is a more general point, when religion is based on the participation in events such as prayer in the mosque, this allows for the extension of the network of people the entrepreneur interacts with. In other words, the mosque also serves as a locus for entrepreneurial networking (Carswell and Rolland, 2004; Kayed and Hassan, 2010), allowing participants to establish contacts with new business partners, access information about opportunities, but also gather information about customers, suppliers, etc, that may turn out to be very relevant (Centola, 2018; Granovetter, 2017). In addition, the fact that the information is gathered/disseminated in a particular context where the ethical and moral dimension plays an important role, the entrepreneurs can count on a "certification" and "legitimisation" process so that the information may be considered reliable (Suddaby *et al.*, 2017; Suddaby and Greenwood, 2005).

In conclusion, our empirical findings indicate that the values inherent in Islamic doctrine closely align with the fundamental principles of entrepreneurship. Within the Indonesian context, religious institutions—particularly mosques and Islamic seminaries—serve as dynamic conduits for the transmission of these values and the cultivation of entrepreneurial skills. Our findings extend existing literature about the drivers of entrepreneurial activities in the Islamic world, such as gender (Costa and Pita, 2021), general entrepreneurial self-efficacy (Ukil *et al.*, 2024), the bureaucratic system and the existence of entrepreneurial milieus (Touzani *et al.*, 2015).

6. Conclusion

Our work focuses on the role of Islamic religiosity as a stimulus for early-stage entrepreneurial activity. In so doing, we fill a gap in current literature about the impact of Islamic religiosity on self-employment and entrepreneurship.

The empirical evidence we obtain by using data from 21,279 interviews performed by Global Entrepreneurship Monitor in Indonesia exploring early-stage entrepreneurial activity suggests that Islam supports people's interest and exploration of entrepreneurial opportunities and the possibility of starting a new business. Past research on religiosity (Audretsch *et al.*, 2013; Papageorgiou, 2012; Zelekha *et al.*, 2014) tends to use quite poor proxies to measure religion that cannot capture the commitment of a person to Islamic teaching, since they are characterised by a possible mismatch between cognitive and behavioural aspects in practising religion. We think that the poor quality can be the reason for the inconclusive results. We use alternative variables that better catch the three dimensions of religion proposed by Durkheim, i.e. religious ideas, religious actors that catch knowledge-based religiosity (measured through Islamic schools, Islamic seminaries and mosques that aim at spreading religious ideas), and religious practice (measured through *Hajj* and *Halal*) that catch the role of Islamic beliefs in daily life). We argue that since in Islam the belief in *Tawhid*, prophecy, Quran, and divine decree is central, five times daily prayers (*salat*) are not comparable to general religious practices, Islamic religiosity is often tied to communal obligations, and hence, the Islamic religiosity metrics are better than the general religiosity metrics.

Our results show that the Islamic religiosity items load into a single factor since they are inextricably linked and have a positive effect on early-stage entrepreneurial activity. Thus, we conclude that Islam indeed has an effect on the propensity of the population to engage in early-stage entrepreneurial activities. Our econometric results are particularly solid since (1) we reduce to the minimum any additional confounding effects by testing the role of Islam in the country with the largest Muslim population in the world; (2) we address endogeneity concerns by retesting the models.

We justify our results via three arguments: (1) the level of legitimation of entrepreneurship (see Etzioni, 1987) within the Islamic culture is high (Ali and Al-Owaihan, 2008). Also, Islamic schools and Islamic seminaries teach history as well as prayer in the mosque during Friday (*Jumah*) to explore the success story of the Prophet Muhammad as a businessman. Role models may encourage entrepreneurial activities so that followers are more likely to choose self-employment (Audretsch *et al.*, 2013); (2) Islam, especially in Indonesia, points out the implementation of *ikhtiyar* (to keep trying and do the hard work) and then followed by *tawakkal*. This paradigm is delivered by religious actors such as Islamic schools, an Islamic seminary, and mosques to Muslim people and is also reinforced by *Hajj*, which is costly to practice and thus indirectly pushes for the hard work to cover the *Hajj* expenses; 3() the spirit of avoiding unemployment, self-reliance, and hard work are highly valued in Islam (Abeng, 1997; Ali and Al-Owaihan, 2008; Arslan, 2001; Bayat, 1992; Gümüsay, 2015) and stressed by religious actors (Kayed and Hassan, 2010; Lukens-Bull, 2001), and religious practices (Abdullah, 1994; Geertz, 1956). In addition, we argue that religion in general and Islam in particular may facilitate the establishment of weak links that, in turn, may support the dissemination of information and the legitimisation of the economic players (Centola, 2018; Centola and Macy, 2007; Granovetter, 2017).

Our results contribute to the research on the role of religion in entrepreneurship and, more specifically, the role of Islam in entrepreneurial propensity. It provides evidence that the cognitive dimension of Islam (i.e. people following Islamic ideas), as instilled through active participation/involvement in Islamic actors (such as Islamic schools, Islamic seminaries, and mosques), indeed affects the propensity of the population to engage in early-stage entrepreneurial activities. Moreover, we explain that the impact of Islam on early-stage entrepreneurial activities occurs because some typical Islamic values, practices, and beliefs (leading to religiously driven moral/ethical judgements, as well as role models in Islamic history) have an important effect on influencing individuals' entrepreneurial-related decision-making process.

All in all, we assert that despite previous research suggesting that Islam does not promote self-employment, economic development, and entrepreneurship (Sukidi, 2006; Turner, 1974) and Weber's argument that the lack of a predestination concept in Islam impedes socio-economic activities in the Islamic world, Islam in Indonesia demonstrates a strong positive relationship with involvement in early-stage entrepreneurial activities, indicating that Islam cannot be said inimical to entrepreneurial activities (Audretsch *et al*., 2013; Dana, 2009; Elfakhani and Ahmed, 2013; Gümüsay, 2015; Papageorgiou, 2012; Ramadani *et al*., 2015; Rehan *et al*., 2019; Sidek *et al*., 2018; Wijaya, 2019). Moreover, given the positive relationship between knowledge-based religiosity (Islamic schools, seminaries, and mosques in a region) and religious practices (*Hajj* and *Halal*) with early-stage entrepreneurial activities, our results suggest that the community and government in Islamic countries should also consider the support of religious actors and the quality of their facilities as a way to promote entrepreneurship and support economic growth. Furthermore, policymakers and religious actors, including Islamic schools, seminaries, mosques, and Islamic organisations, need to facilitate networking events and collaborations among entrepreneurs and utilise technology and online platforms to promote values that support entrepreneurial activities. All in all, our results suggest that religion is not the opium of entrepreneurship because, rather than numbing economic initiative, it can actively inspire and support entrepreneurial behaviour. In contrast to Marx's view of religion as a tool of pacification, Islam, especially in the Indonesian context, encourages values such as hard work (*ikhtiyar*), trust in divine providence (*tawakkal*), and economic self-reliance. Religious institutions like mosques and Islamic schools foster entrepreneurial skills, offer networking opportunities, and shape moral norms that legitimise business activity. The Prophet Muhammad, as a successful trader, serves as a powerful role model for Muslim entrepreneurs. Empirical evidence confirms that Islamic religiosity positively correlates with early-stage entrepreneurship. Thus, religion—far from being a narcotic—is a catalyst for productive engagement in the economic sphere.

In addition, given the strong link between Islamic seminaries and early-stage entrepreneurial activity, Indonesia should consider integrating these institutions into SME training programs. Seminaries already impart vocational and moral education aligned with Islamic values, fostering trust, diligence, and self-reliance. Leveraging their existing infrastructure and community legitimacy can enhance the reach and effectiveness of entrepreneurship initiatives, especially in Muslim-majority regions.

However, our research also has some limitations. Even if we focus voluntarily on a single country, this limits the generalisability of our intriguing findings. Future research may expand the analysis by replicating it in different countries. This approach can be particularly interesting if implemented in the Gulf region, where there is intense entrepreneurial activity along with different levels of religiosity (e.g. Saudi Arabia vs Dubai vs Qatar). Moreover, we do not distinguish between the different schools of thought in Islam. Differences in teaching can affect the propensity of people to engage in entrepreneurial activities. Thus, it can be interesting to explore whether different Islamic traditions and teachings (e.g. Shia vs Sunni) can have a different impact on early-stage entrepreneurship. Finally, our focus is on early-stage entrepreneurial activity. Entrepreneurship is a more complex and articulated phenomenon, and it can be important and very interesting to explore whether Islam is also supportive of the later stages of entrepreneurial activity. Questions such as "Is Islam supportive of new start-ups, for instance, instilling moral and ethical values in business relationships that facilitate the survival of new ventures?" or "Is the management style, as instilled by Islamic teaching, supportive of the long-term success of new ventures?" remain open and deserve investigation.

Our work opens several avenues for future studies to emerge. First, qualitative research, such as ethnographic work or in-depth interviews, could explore how mosques function as informal entrepreneurial hubs, facilitating knowledge exchange and trust-building through religious gatherings. Second, comparative studies across Muslim-majority countries could examine whether the positive impact of Islamic religiosity on entrepreneurship holds in regions with different interpretations of Islam (e.g. Sunni vs. Shia contexts). Third, future

research could investigate the role of female entrepreneurship within Islamic frameworks, particularly how gender norms intersect with religious values to influence entrepreneurial outcomes. Fourth, longitudinal studies could assess whether religiosity continues to influence not just early-stage entrepreneurship but long-term venture survival and growth. Finally, there is scope to examine how digital religious communities (e.g. online sermons or Islamic fintech platforms) replicate or transform the role traditionally played by physical institutions like mosques or pesantren in entrepreneurial ecosystems.

Notwithstanding the limitations of the data and the context, our study indicates that Islam (more precisely, the cognitive dimension of Islam) may play a more important role in early-stage entrepreneurial activity than has heretofore been acknowledged by a large body of research.

Appendix 1

Table A1. Regression models

Model	Specification
Model 1	$Y_i = \beta_1 + \beta_2\, Age + \beta_3\, Education + \beta_4\, Gender + \beta_5\, Internet + \beta_6\, Construction\ worker + \beta_7\, Ln\ Investment + \beta_8\, NPL + \beta_9\, NPF + \beta_{10}\, Population\ density + \beta_{11}\, Ln\ GDP + \beta_{12}\, Factor\ religiosity + U_i$
Model 2	$Y_i = \beta_1 + \beta_2\, Age + \beta_3\, Education + \beta_4\, Gender + \beta_5\, Internet + \beta_6\, Construction\ worker + \beta_7\, Ln\ Investment + \beta_8\, NPL + \beta_9\, NPF + \beta_{10}\, Population\ density + \beta_{11}\, Ln\ GDP + \beta_{12}\, Ln\ Islamic\ schools + U_i$
Model 3	$Y_i = \beta_1 + \beta_2\, Age + \beta_3\, Education + \beta_4\, Gender + \beta_5\, Internet + \beta_6\, Construction\ worker + \beta_7\, Ln\ Investment + \beta_8\, NPL + \beta_9\, NPF + \beta_{10}\, Population\ density + \beta_{11}\, Ln\ GDP + \beta_{12}\, Ln\ Islamic\ seminary + U_i$
Model 4	$Y_i = \beta_1 + \beta_2\, Age + \beta_3\, Education + \beta_4\, Gender + \beta_5\, Internet + \beta_6\, Construction\ worker + \beta_7\, Ln\ Investment + \beta_8\, NPL + \beta_9\, NPF + \beta_{10}\, Population\ density + \beta_{11}\, Ln\ GDP + \beta_{12}\, Ln\ Hajj + U_i$
Model 5	$Y_i = \beta_1 + \beta_2\, Age + \beta_3\, Education + \beta_4\, Gender + \beta_5\, Internet + \beta_6\, Construction\ worker + \beta_7\, Ln\ Investment + \beta_8\, NPL + \beta_9\, NPF + \beta_{10}\, Population\ density + \beta_{11}\, Ln\ GDP + \beta_{12}\, Ln\ Mosque + U_i$
Model 6	$Y_i = \beta_1 + \beta_2\, Age + \beta_3\, Education + \beta_4\, Gender + \beta_5\, Internet + \beta_6\, Construction\ worker + \beta_7\, Ln\ Investment + \beta_8\, NPL + \beta_9\, NPF + \beta_{10}\, Population\ density + \beta_{11}\, Ln\ GDP + \beta_{12}\, Ln\ Halal + U_i$

Source(s): Authors' own work

Appendix 2

Table A2. IVprobit regression: Factor religiosity and TEA (omitted variable bias)

Variables	Model 7
Age	−0.000383
	(0.000919)
Education	0.0423***
	(0.00951)
Gender	0.00124
	(0.0206)
Internet	0.0175***
	(0.00165)
Construction worker	−3.19e−06**
	(1.44e−06)

(*continued*)

Table A2. Continued

Variables	Model 7
Ln Investment	0.0410***
	(0.0133)
NPL	−13.37***
	(1.672)
NPF	0.0316
	(0.609)
Population density	−3.40e−05***
	(4.92e−06)
Ln GDP	0.252***
	(0.0477)
Factor Religiosity	*0.135***
	(0.0288)
Constant	−4.259***
	(0.460)
Observations	21,279
Sargan (*p*-value)	0.0031
CLR (*p*-value)	0.0000
AR (*p*-value)	0.0000
LM (*p*-value)	0.0000
LM-J (*p*-value)	<0.05

Note(s): Standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Dependent variable: a dummy variable, either a respondent is involved or not in early-stage entrepreneurial activity (0 = No, 1 = Yes). Independent variables: The current age of the respondents (in years) (Age), UN harmonized educational attainment (Education), The gender of the respondent (0 = male, 1 = female) (Gender), The percentage people with age more than 10 years who access internet in the last 3 month based on province within service industry (Internet), Skilled construction worker at province level (Construction worker), Natural logarithm foreign direct investment realization by Province (million US$) (Ln Investment), Percentage non-performing loan to total amount of loan in large conventional banks at province level (NPL), Percentage non-performing financing to total amount of financing in large Islamic banks at province level (NPF), Population density per sq.km by province (Population density), Natural logarithm per capita gross regional domestic product at current market prices by Province (thousand rupiahs) (Ln GDP),), Principal-component factor of: (1) sum of Islamic primary school, Islamic junior high school, and Islamic senior high school at the provincial level, (2) the number of Islamic seminary school (*pesantren*) by province, (3) the number of *Hajj* application by province, (4) the number of Mosque registered under Ministry of Religious Affair at the provincial level, (5) the number of halal certification at the provincial level (Factor Religiosity). Model 7 is estimated using IV-probit regression. Instrumental variables: (1) lagged 1 year natural logarithm of the number of natural disasters by province, and (2) lagged 1 year natural logarithm of the number of houses destroyed/damaged by natural disaster. The *p*−values for the CLR and AR are against the null hypothesis that the coefficient of the endogenous variable, i.e. lagged one year natural logarithm of natural disaster events and lagged one year natural logarithm of houses being destroyed and damaged by natural disasters, is zero

Source(s): Authors' own work

Appendix 3

Table A3. IVprobit regressions: Islamic religiosity proxies and TEA (omitted variable bias)

Variables	Model 8	Model 9	Model 10	Model 11	Model 12
Age	−0.000239	−0.000183	−0.000227	−0.000282	−0.000405
	(0.000915)	(0.000914)	(0.000916)	(0.000919)	(0.000938)
Education	0.0460***	0.0472***	0.0454***	0.0462***	0.0442***
	(0.00949)	(0.00949)	(0.00950)	(0.00952)	(0.00983)
Gender	0.00145	0.00226	0.00183	0.00162	0.00731
	(0.0206)	(0.0206)	(0.0207)	(0.0207)	(0.0211)
Internet	0.0157***	0.0186***	0.0167***	0.0165***	0.0214***
	(0.00155)	(0.00173)	(0.00160)	(0.00159)	(0.00194)
Construction_Worker	−1.91e−06	−1.61e−06	−1.01e−06	−1.54e−06	−3.57e−06**
	(1.23e−06)	(1.20e−06)	(1.15e−06)	(1.24e−06)	(1.58e−06)
Ln_Investment	0.0462***	0.0430***	0.0537***	0.0630***	0.0362***
	(0.0123)	(0.0128)	(0.0117)	(0.0108)	(0.0132)
NPL	−10.46***	−13.22***	−12.49***	−12.30***	−12.94***
	(1.512)	(1.641)	(1.596)	(1.600)	(1.571)
NPF	−0.887	0.421	−0.0425	−0.522	2.103***
	(0.595)	(0.630)	(0.607)	(0.597)	(0.646)
Population_density	−2.89e−05***	−2.94e−05***	−3.40e−05***	−2.79e−05***	−2.79e−05***
	(4.62e−06)	(4.63e−06)	(4.93e−06)	(4.62e−06)	(4.97e−06)
Ln_GDP	0.188***	0.243***	0.179***	0.162***	0.172***
	(0.0377)	(0.0451)	(0.0374)	(0.0360)	(0.0417)
Ln_Islamic_school	0.0967***				
	(0.0192)				
Ln_Islamic_seminary		0.0757***			
		(0.0154)			
Ln_*Hajj*			0.0850***		
			(0.0179)		
Ln_Mosque				0.0690***	
				(0.0148)	
Ln Halal					0.128***
					(0.0277)
Constant	−4.335***	−4.754***	−4.430***	−4.061***	−4.428***
	(0.454)	(0.521)	(0.481)	(0.436)	(0.550)
Observations	21,279	21,279	21,279	21,279	20,440
CLR (*p*-value)	0.0000	0.0000	0.0000	0.0000	0.0000
AR (*p*-value)	0.0000	0.0000	0.0000	0.0000	0.0000
LM (*p*-value)	0.0000	0.0000	0.0000	0.0000	0.0000
LM-J (*p*-value)	<0.05	<0.05	<0.05	<0.05	<0.05
Sargan (*p*-value)	0.018	0.0099	0.0057	0.0021	0.878

Note(s): Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Dependent variable: a dummy variable, either a respondent is involved or not in early-stage entrepreneurial activity (0 = No, 1 = Yes). Independent variables: The current age of the respondents (in years) (Age), UN harmonized educational attainment (Education), The gender of the respondent (0 = male, 1 = female) (Gender), The percentage people with age more than 10 years who access internet in the last 3 month based on province within service industry (Internet), Skilled construction worker at province level (Construction worker), Natural logarithm foreign direct investment realization by Province (million US$) (Ln Investment), Percentage non-performing loan to total amount of loan in large conventional banks at province level (NPL), Percentage non-performing financing to total amount of financing in large Islamic banks at province level (NPF), Population density per sq.km by province (Population density), Natural logarithm per capita gross regional domestic product at current market prices by Province (thousand rupiahs) (Ln GDP), Natural logarithm sum of Islamic primary school, Islamic junior high school, and Islamic senior high school at the provincial level (Ln Islamic school), Natural logarithm of the number of Islamic seminary school (*pesantren*) by province (Ln Islamic seminary), Natural logarithm of the number of *Hajj* application by province (Ln *Hajj*), Natural logarithm of the number of Mosque registered under Ministry of Religious Affair at the provincial level (Ln Mosque), Natural logarithm of the number of halal certification at the provincial level (Ln Halal)

Models 8, 9, 10, 11, and 12 are estimated using IVprobit regression. Instrumental variables: (1) lagged 1 year natural logarithm of the number of natural disasters by province, and (2) lagged 1 year natural logarithm of the number of houses destroyed/damaged by natural disaster

The *p*−values for the CLR and AR are against the null hypothesis that the coefficient of the endogenous variable, i.e. lagged one year natural logarithm of natural disaster events and lagged one year natural logarithm of houses being destroyed and damaged by natural disasters, is zero

Source(s): Authors' own work

Appendix 4

Table A4. IVprobit regression (reverse causality)

Variables	Model 13	Model 14
Age	−7.57e−05	5.40e−05
	(0.000913)	(0.000914)
Education	0.0461***	0.0460***
	(0.00949)	(0.00948)
Gender	0.00229	0.00247
	(0.0206)	(0.0206)
Internet	0.0158***	0.0158***
	(0.00155)	(0.00161)
Construction_Worker	−3.11e−07	6.87e−07
	(1.08e−06)	(1.07e−06)
Ln_Investment	0.0554***	0.0699***
	(0.0108)	(0.0110)
NPL	−10.55***	−11.17***
	(1.531)	(1.559)
NPF	−0.630	−0.238
	(0.596)	(0.604)
Population_density	−2.58e−05***	−2.65e−05***
	(4.57e−06)	(4.59e−06)
Ln_GDP	0.151***	0.125***
	(0.0339)	(0.0367)
Ln_Islamic_school	0.0673***	
	(0.0117)	
Ln_Islamic_seminary		0.0231**
		(0.00899)
Constant	−3.830***	−3.316***
	(0.385)	(0.411)
Observations	21,279	21,279

Note(s): Standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Dependent variable: a dummy variable, either a respondent is involved or not in early-stage entrepreneurial activity (0 = No, 1 = Yes). Independent variables: The current age of the respondents (in years) (Age), UN harmonized educational attainment (Education), The gender of the respondent (0 = male, 1 = female) (Gender), The percentage people with age more than 10 years who access internet in the last 3 month based on province within service industry (Internet), Skilled construction worker at province level (Construction worker), Natural logarithm foreign direct investment realization by Province (million US$) (Ln Investment), Percentage non-performing loan to total amount of loan in large conventional banks at province level (NPL), Percentage non-performing financing to total amount of financing in large Islamic banks at province level (NPF), Population density per sq.km by province (Population density), Natural logarithm per capita gross regional domestic product at current market prices by Province (thousand rupiahs) (Ln GDP), Natural logarithm sum of Islamic primary school, Islamic junior high school, and Islamic senior high school at province level (Ln Islamic school), Natural logarithm Islamic seminary school (pesantren) by province (Ln Islamic seminary). Model 13 and 14 are estimated using ivprobit regression
Source(s): Authors' own work

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Islam and early-stage entrepreneurial activity in Indonesia: religion is not the opium of entrepreneurship

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