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The topics of Islamic economics and finance research

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A B S T R A C T

We provide a comprehensive structuring of research on Islamic economics and finance into the core topics of the area, for the period 1979 to 2018. This is carried out through a probabilistic topic modeling approach that allows statistical learning of the connection between research articles as well as their shared topics. This approach, which blends machine learning and natural language processing, helps provide a comprehensive structure to the literature. Our topic modeling analysis is conducted on approximately 1500 articles, and suggests the Islamic economics and finance literature can be well-described by 11 topics. These topics cover economic, finance, and morality issues. Our research can be applied to provide a clear structure for ongoing research agendas in Islamic economics and finance as well as a framework for understanding research development in this area. We also note the differences between Islamic and conventional approaches to economics and finance research in order to highlight the inherent new contributions of this maturing area of research.

1. Introduction

Research in Islamic economics and finance has advanced considerably since the middle of the last decade. This reflects the practical growth of the area, with now about $1.7 trillion assets under management (EY, 2016). In terms of research our study identifies about 1500 research articles[1] in this domain published since 1979, with most being published in the last decade. This rapid growth in research presents challenges in terms of understanding the direction in which the research is expanding as well as for identifying coherent topics within the area. Our study therefore structures the corpus of articles in order to provide a clear understanding of the development of research in Islamic economics and finance. This serves to act as both a review of the Islamic economics and finance literature in addition to providing insights into the research questions of important sub-fields of the area.

By Islamic economics and finance, we refer to economic and finance practices that are informed by Islamic or Shari'ah laws and principles. This notably involves not charging interest (riba) but rather favoring the sharing of profits and losses (mudarabah and musharaka), as well as forbidding investing in particular types of businesses. There is also an emphasis on real investment rather than speculation by gambling (maisir), and generally excessive risk and uncertainty (gharar) is deemed incompatible with Islamic principles. An additional feature of Islamic economics and finance is that the major implementation of these principles is in developing countries as most Muslim-majority countries, where Islamic finance tends to be most practiced, are developing economies. This means there are associated issues related to this economic factor - for example, the research should ideally help with economic development and assisting

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[1] There are more research articles than this on the topic, but our study limits articles to those that match Elsevier Scopus journal quality criteria and are published in English.

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populations to rise out of poverty.

A number of Islamic finance products are well known, such as sukuk (Islamic financial certificates developed as an alternative to conventional bonds) and Islamic mutual funds. However, the aims of Islamic economics and finance scholars, practitioners, and policy makers, go well beyond developing a set of compatible financial products. We see this particularly in Islamic economics, which ultimately could be argued to be aiming to re-imagine the entire economic field in line with Islamic principles. This has created significant spread in the literature, with associated difficulties in understanding the directions of the various sub-topics. It is towards this structural issue that we address this study.

We adopt a novel approach for the purpose of structuring research articles - Latent Dirichlet Allocation topic modeling. This technique blends natural language processing of article content with probabilistic learning of the hidden (latent) topics that link groups of articles. Topic modeling is widely applied in the computer sciences to identify topics in large corpus of documents, but has only been applied in a limited manner in economics and finance research. Through this method, described in detail in the following section, we are able to identify 11 topics that comprise the current structure of Islamic economics and finance research. These are not claimed to be all topics of the area, but rather the most important topics that are deemed to best represent the structure of the research.

These 11 topics are structured in this study into three overall categories: Islamic economics, Islamic finance, and governance and morality. In Islamic economics we identify the key topics as being the economic philosophy and perspectives that Islamic economics should adopt, economic and monetary policy, and how economic policies fare under different economic conditions. Islamic finance is the largest category and covers the topics of Islamic banking, financial management, and risk management in line with Islamic principles. Also included are Islamic financial assets, and customer perception of Islamic finance services and products. The last category covers topics related to Islamic governance and morality. In this category we identify topics on the Islamic approach to corporate governance and social responsibility, as well as Shari'ah compliant contracting and legal enforcement, and principles and practice around philanthropic and inclusive finance approaches.

Our probabilistic topic modeling research approach can be distinguished from other research summary approaches, such as regular and systematic literature reviews and meta-analysis studies. We survey a much larger literature than a regular literature review which is limited by human cognitive capacity. Thus, past well-cited reviews of Islamic economics and finance have restricted themselves to reasonably limited topics (Abedifar et al., 2015; Aliyu et al., 2017; Chapra, 1992; Zaher & Kabir Hassan, 2001). Compared to a systematic literature review we limit the potential for researcher bias to influence the identification of research areas in that we as researchers do not select the important keywords, rather these are suggested by the topic modeling technique itself. In addition, we consider clusters of keywords as defining a topic, while single keywords to define a topic are more common in systematic literature reviews. Our approach is also distinct from meta-analysis approaches which combine data from past studies, we are instead concerned with combining studies based on keyword co-occurrence.

The contribution of this paper can therefore be summarized as providing a comprehensive structuring of the literature in Islamic economics and financing in a bias-free statistical learning approach. We also indirectly, through this approach, note the under-covered topics of the area. The application of the topic modeling technique to an economics and finance body of research is also a contribution as it demonstrates the potential for this technique to structure any significant body of research in an economics and finance discipline.

The remainder of this paper proceeds as follows. The next section introduces the technique of topic modeling given the novelty of the application to the field of economics. We also describe the data choices we make in article selection and the specific methodological decisions of our analysis. We then proceed to the discussion of the identified topics and the structure of research in Islamic economics and finance. This is spread over three sections of over-arching categories - Islamic economics, Islamic finance, and governance and morality. We conclude with a discussion of the core research topic trends and implications of the study.

Table 1
Summary of LDA process.

Step 1: Process documents
1.a: Remove non-words, including grammatical symbols, numbers, and other characters. *1.b*: Convert individual documents into a list of words. *1.c*: Remove low information words (common words that have low context value). *1.d*: Stem/lemmatize words to reduce to a common core. *1.e*: Combined documents into a document-term matrix (DTM) which is a count of term occurrence per document and across documents. *1.f*: Remove low-frequency and high-frequency terms, using subject expert input to determine appropriate cut-points.
Step 2: Implement LDA testing
2.a: Run LDA tests with appropriate package (e.g. R *topicmodels* or Python *gensim*) taking into account 2.b, 2.c, 2.d below. *2.b*: Specify expected number of topics (k) for corpus. *2.c*: Decide α and β Dirichlet prior values (it is usual to stick with package defaults). *2.d*: Specify random starting state to have a replicable topic model. It is usual to test a range of random starting states to avoid results being a local maxima.
Step 3: Interpret results
3.a: Choose between the topic models based on subject expert view of coherence of topic terms and matched documents. Can use Krippendorf's α as a statistical measure of topic coherency. *3.b*: At least two subject expert raters to blind-label topics from selected topic model. Discuss topics where raters disagree. *3.c*: Describe each topic based on topic label, topic terms, and topic matched documents.

Terminology as per Section 2. Table adapted from Aziz et al. (2021).

2. Topic modeling approach

Topic modeling is a statistical learning technique involving natural language processing. The technique allows probabilistic learning of shared unknown topics across a corpus of documents. There are a number of approaches that can be used for topic modeling such as Latent Semantic Indexing, Probabilistic Latent Semantic Analysis, and Latent Dirichlet Allocation. In this analysis we apply Latent Dirichlet Allocation (LDA) (Blei, 2012; Blei et al., 2003) as the currently most widely accepted technique for topic modeling.

LDA starts with an assumption that when a writer is writing a document they choose words that reflect the mixture of topics they wish to address in a document. Thus an article on the impact of Islamic insurance in the Malaysian insurance market, might consist of 50% words on Islamic insurance, 30% words on the Malaysian insurance market context, and 20% on measuring the market impact. LDA analysis would therefore aim to identify these three topics in the article in their respective proportions.

LDA is well technically described in Boyd-Graber et al. (2017) and therefore not repeated here, given these technical details are not a core focus of this study. We also provide a summary of the LDA process in Table 1 which details the steps we follow in our LDA process[2]

As can be seen from the table, the first step in LDA is identifying the words to be used from each document. There is considerable pre-processing involved to remove words that are unlikely to add meaning to the identification of shared topics across the documents. For our study this pre-processing is described in detail in the next sub-section. Once a suitable set of words have been identified per document, the topic modeling can start.

The modeling relies on Dirichlet distributions to learn the topics shared across a corpus of documents. Dirichlet distributions, a form of probabilistic distribution of distributions, allow an iterative allocation of potential topics to words and therefore documents. An inference algorithm is used to make the model tractable, with the most common choice being that of variational expectation-maximization inference (Blei et al., 2003). The number of potential topics that describe the corpus of documents is pre-specified by the researcher and then the LDA attempts to identify the set of words that are most coherently identified with a particular topic based on word co-occurrence. There is an initial assumption of reasonably equal allocation of a randomly chosen word to a randomly chosen topic, and the subsequent model iterations arrive at a confidence level on word co-occurrence that match to a particular topic. A common outcome is that, say, a set of ten words reasonably describes a topic. The researcher then interprets those words to assign a label that describes the topic. This is similar to Principal Component Analysis where the researcher must interpret the extracted factors. In turn, documents can then be defined as representing a mixture of certain topics based on the words used in the document.

Topic modeling is predominantly used in the computer sciences (for example to model social media discussions, Paul and Dredze (2014)), but has been recently applied in a range of business research contexts. Two papers by Piepenbrink and Gaur (Piepenbrink and Gaur, 2017, 2018) are similar in nature to the analysis of this paper, albeit applied to the domain of international business. Corbet et al. (2019) applies topic modeling to understand gold research topics in finance, and Aziz et al. (2021) explores how machine learning is applied in finance research through topic modeling. There are also practical applications of the techniques by researchers to non-research-manuscript contexts. A number of studies have used topic modeling to identify common topics across patents and also to identify patent novelty (Kaplan & Vakili, 2015; Venugopalan & Rai, 2015). An interesting recent study in the finance domain uses topic modeling to measure the extent to which stock analysts focus on topics raised in corporate calls in their subsequent analyst reports (Huang et al., 2017).

2.1. Corpus and pre-processing

Our analysis is based on identified research related to Islamic economics and finance from the Elsevier Scopus database. Our search strategy is based on a process of iteration and involves searching within only economics, econometrics, and finance journals for a range of possible Islamic economics and finance terms. The terms we include are: Islamic, gharar, hadith, halal, haram, ijara, maysir, mudarabah, musharaka, shariah, riba, sukuk, takaful, and zakat. We also include multiple spellings of these terms where reasonable e.g. Shari'ah or Sharia, due to the multiple use of these terms in practice. Only regular articles are retrieved (i.e. not editorials, reviews, or book reviews), and all articles are required to be published in English. Given research in these topics will also be published in Arabic among other languages, our study will thus underestimate the total volume of research in the area. However a multi-language topic analysis is not technically feasible or desirable as words need to be matched across documents.[3]

We retrieve 1495 articles in our search which covers the period 1979–2018, and the abstracts are obtained for each article. These abstracts form the documents for the LDA analysis. There is significant pre-processing of the abstracts required before the topic-modeling. We use the R packages *tm* and *quanteda* for pre-processing, which consists of the following steps. First each abstract is atomized into a collection of individual words,[4] the words are then converted to lowercase and digits and punctuation removed. Second, we remove 'stopwords' - words such as 'and', 'or', 'I', that provide no topic relevant information. Third, we apply Porter's stemming

[2] This table is closely adapted from Aziz et al. (2021), with the permission of the authors of that study, due to the overlap of authors between the two studies and the table being created for the same purpose in both studies.

[3] Some other potential biases with the choice of Elsevier Scopus as a search database include that the database has a bias towards European journals and the time lag for inclusion of new journals may exclude research published in emergent research areas. Mongeon and Paul-Hus (2016) discusses some of the bias issues with Scopus in more detail.

[4] An alternative choice to the use of single words (unigrams) would be to use bigrams (two consecutive words) or even trigrams (three consecutive words). This is fundamentally a researcher choice. As bigrams involve more of a researcher choice on what terms to retain, we decided on unigrams as a more objective perspective. A future study might consider bigrams to add additional context to the topics.

algorithm (Porter, 1980) to reduce words to their stem. For example, the words 'finance' and 'financing' might both be reduced to a common stem of 'financ'. This allows similar words to be grouped together and thereby measured for their relative importance in the overall word distribution.

The next step in the pre-processing is TF-IDF (Term Frequency - Inverse Document Frequency) term removal (Salton & Buckley, 1988). We calculate the percentage of occurrences of a particular word in a document compared to all words in that document ('term frequency'). The term frequency is then multiplied by the log of the number of documents in the entire corpus and divided by the number of documents that contain the particular word ('inverse document frequency'). After calculating this for all words in all documents we are interested in removing very high TF-IDF words as well as very low TF-IDF words.

High TF-IDF words are used so commonly across documents such that they are not useful in distinguishing between topics. For example, in our study 'Islam', 'finance', and 'study' might be used in most documents. We visually inspect the TF-IDF and choose to remove the top 10% of high TF-IDF words. This percentage is selected by inspecting between 5% and 15% high TF-IDF removal. In our analysis, 5% TF-IDF removal leaves some very common terms that would not be useful for topic distinction and 15% removes terms that seem quite distinct. As this is a researcher-driven task and therefore subject to researcher bias, we chose a rounded number (10%) of term removal rather than a more precise percentage. We also remove low TF-IDF terms. These have an opposite but nevertheless similar problem to high TF-IDF terms. Low TF-IDF terms are used too infrequently across documents to be able to distinguish between topics. Following prior practice (e.g. Piepenbrink and Gaur (2017, 2018), we remove low TF-IDF terms that do not appear in at least five documents in our dataset.

2.2. Topic identification

The pre-processing results in a large Document-Term-Matrix (DTM) which consists of columns of all abstracts and rows of all words. The cell values are a count of occurrence of a word in an abstract. We use the R package *topicmodels*[5] on the DTM to run the topic extraction (Hornik & Grün, 2011). We stick to default choices in the testing specification, including choosing the variational expectation-maximization algorithm for inference. We set the number of topics to be extracted at either 21, 24, 27, 30, 33, or 36. We also set 10 different random starting points among the documents for each topic extraction. These random starting seeds allow us to overcome the problem of the model finding local maxima. The starting seeds, while random, are fixed across the number of topics extracted, thus allowing comparability.

We therefore run 60 different topic models (six different number of topics extracted multiplied by 10 random seeds). After extraction we inspect the Krippendorff's α (Krippendorff, 1970) which is provided by our testing to find the set of topic distributions that are most distinct (that is, topic distributions with low Krippendorff's α). For our corpus this results in 36 topics being initially identified as the best distribution of topics across the corpus.

For each topic our model provides the words that best describe that topic. As is standard, we normally use the top ten words for a topic and seek to use these words to label the topic. For example, one of the topics extracted in this paper identified the top ten words as "sukuk, bond, issuer, investor, issuanc, firm, debt, yield, secur, reaction". This could quite easily be identified as a topic on sukuk. Other topics are less clear and require further analysis. The labeling is therefore based on the words, but also through inspecting articles that closely match the topic. Our topic modeling output also ranks each abstract in the database based on how closely the content matches with each topic. By inspecting the top-matched abstracts for a topic we can further understand the nature of that topic.

Four of the 36 initial topics were, through this labelling process, identified as having low coherency and meaning and were removed from the analysis. It is a common issue with topic modeling to have some topics that are essentially 'meaningless' as the method forces all documents in the database to match to one or more topics (Chang et al., 2009). For the remaining 32 topics we attempt to condense these down further based on idea overlap. We were concerned that a review of 32 topics would lead to an unwieldy research article. In addition this would not be a useful structure as there were some evident overlaps among the topics.

These topics are discussed in three broad sections covering the overall categories of Islamic economics, Islamic finance, and governance and morality. At the beginning of each section we provide a summary table of the relevant extracted topics that are discussed in that section. This includes the relevant original topics and their associated word clusters, as well as showing how we have further reduced down these topics. The purpose of the discussion of each topic is not intended to be a comprehensive review of that topic, but rather to highlight how research in that area tends to be focused and the types of research questions that are addressed. We also, where appropriate, note the key differences between the topic and how conventional economics or finance research might approach that topic. The references cited in each section have been primarily drawn from the top matched articles to the topic, as provided by our topic modeling. However, the content matching in the topic modeling does not screen for the research impact of an article, so to these top-matched articles we also add other higher-impact research when appropriate in order to provide a more complete picture of the topic.

3. Topics in Islamic economics

Three topics are identified in the category of Islamic economics: economic philosophy and perspectives, economic and monetary

[5] For readers unfamiliar with topic modeling and wishing to conduct such analysis, note that most statistical packages now have a topic modeling package. R packages are, at time of writing, best specified for academic purposes, due to a range of more complex LDA models being available. There are also LDA packages available for other popular software used for statistical analysis, including Python (gensim), Stata (ldagibbs), Matlab (Text Analytics Toolbox).

policy development, and the impact of economic conditions on Islamic economic policies. These three topics are condensed down from seven topics identified in the original topic modeling. Table 2 shows the topics.

3.1. Economic philosophy and history

In this opening Islamic economics topic, we identify a range of philosophical and other perspectives on what Islamic economics should be, and how it has developed. This sense-making and philosophical exploration shows an area aiming to understand the underlying meaning of Islamic economics as well as how it is different from conventional economics. As would be expected, religious interpretation is a core focus. For example, in Choudhury (2012), the author proposes a mathematical formulation of how current Islamic economics and finance research ignores the fundamental concept of the oneness of God and unity of divine knowledge (tawhid). Choudhury (2018) adopts an ontological and epistemological approach to model the development of monetary transmission systems in line with Islamic fundamental principles. As a practical impact, an argument is made that a gold standard or alternative 100-percent reserve money system along the lines of Irving Fisher would better suit the principles on which Islamic economics is based.

A number of studies focus on a historical perspective of the development of Islamic economics. Khan (2010), for example, charts the development of the area in a comprehensive manner and integrates a philosophical perspective on this development. These studies start from a perspective that economics started as a moral science but, over time, became somewhat detached from moral concerns to emulate natural science and adopt a positivist perspective assuming that people are utility maximizers. On the other hand, Islam promotes social preferences where individuals should be other-regarding and have preferences over social outcomes. Therefore, there should be differences in objectives between current economics and Islamic economics perspectives. Mansoor Khan (2008) gives an example of interest-free banking theory and practice in Pakistan which highlights some of the challenges of separating mainstream economics from Islamic economics. While Islamic economists had come forward with models of a financial system based on participatory modes of finance and widespread risk-sharing, Mansoor Khan argues that historically many scholars of Islamic law were more concerned with the replication of conventional instruments for risk-free fixed-return transactions. Their efforts moved Islamic economics practice closer to the conventional *status quo* and further away from an alternative system based on Islamic principles. To address this problem theoretically, a model has recently been proposed that replaces the utility maximizing agent with an Islamic social agent (Khan, 2018). As Islamic economics becomes further established, there should be a greater focus on the particular principles of the area, as opposed to the historical problems of replication of the approaches of conventional economics.

3.2. Economic and monetary policy

Economic development and policy is a core topic of Islamic economics especially given that most Islamic economies are developing rather than developed. On a fundamental level, Choudhury and Al-Sakran (2001) explain how the adoption of Islamic law theoretically affects a political economy.

Noland (2005), in a major cross-country study, shows that a country having a large Muslim population is positive for the economy, although the study does not particularly address why this might be the case. In contrast, Pryor (2007) does not find a new type of Islamic economic policy in the Muslim-majority countries they study and can find no relationship between Islam and economic performance. In a practical application, Leander (1996) proposed how Turkey missed the chance to adopt in the 1990's new economic policies that attached more importance to redistribution and social inclusion. The author argues that any attempt to change economic policy, perhaps in line with Islamic principles, faces the reality of conflict with business interests, such as was the case for Turkey.

Table 2
Topics of Islamic economics.

Topic	Combined label	Initial label	Top matched words
1	Economic philosophy and history	Islamic economics and epistemology	Monetary, ethic, real, money, moral, uniti, channel, transmiss, epistemology, learn
		History of Islamic economics	Instrument, pakistan, tool, paradigm, interestfre, john, western, debat, son
2	Economic and monetary policy	Political economy	Saudi, arabia, trade, polit, iran, oil, regim, energi, horizon, wavelet
		Gold and monetary policy	Foreign, price, gold, domest, exchang, hedg, currenc, money, inflat, suppli
		Deposits and monetary policy	Deposit, shock, depositor, correl, monetari, dual, disciplin, india, malaysian, vector
3	Economic conditions	Islamic finance and economic growth	Growth, oic, enterpris, integr, gdp, run, uae, presenc, resourc
		Economic policies and financial stability	Crisi, sharia, crise, turkey, question, subprim, answer, restrict, particip, rule

Table of topics labelled as Islamic economics as determined based on extraction of topics from an overall database of 1495 articles that match Islamic economics and finance terms in *Scopus*. 'Top matched words' are the stemmed words that best describe the topic, where a stemmed word is the word base rather than the complete word (Porter, 1980). 'Initial label' is the initial label assigned to a topic by the study researchers, and 'Combined label' is the label assigned to a set of initial topics by the study researchers. See Section 2 for further description on the methodology and explanation of choices made in the topic extraction.

An important application of this economic policy focus is on energy economics, given the importance of oil and related carbon products for many Muslim-majority countries. Yousef (2004) provides a historical perspective on the impact of oil on economic development of the Middle East and North Africa. Farzanegan and Parvari (2014) seek to understand current economic sensitivities to oil prices, in their case by exploring the impact of sanctions on oil prices. Another stream of research, such as Jawadi et al. (2018a), investigate how to apply trade openness to reduce economic dependence on oil and diversify an economy. An interesting paper by Apergis et al. (2014) notes some negative spillover effects from a large oil sector on other economic sectors. In specific they note the negative impact of oil production on agriculture value-added. They attribute these effects to the movement of labour from the agriculture sector to the oil sector.

Specifically on monetary policy, Solarin et al. (2018) examine the determinants of Islamic banking deposits in Malaysia as part of an investigation into banking system stability. They show how deposits are driven by what would be considered conventional economic factors such as industrial production and returns offered. Aysan et al. (2018) also shows that Islamic bank customers are quite sensitive to returns offered especially when national central bank rates change. A comprehensive exploration of monetary policy in Muslim-majority countries is provided in a book by Hossain (2015). The use of gold is another area of interest. This is for two reasons, first gold is a Shari'ah compliant commodity, and secondly there are some calls for gold backing of currencies to avoid the partially-speculative nature of fiat currencies with no underlying commodity wealth to support their value (Kayed & Hassan, 2011). Bayram et al. (2018) analyze the official currency reserves of four countries, Malaysia, Turkey, Saudi Arabia, and Pakistan, and argue for an increased emphasis on gold holdings to reduce volatility of reserves during times of financial volatility.

3.3. Economic conditions

This topic focuses on the impact of Islamic economics on growth and economic performance. Looking first at economic growth, we see conventional analysis from Anaman (2004) who analyzes the factors that have influenced long-run economic growth in Brunei, a country governed by Islamic legal principles. They show that the determinants of growth in Brunei are quite conventional with factors including export growth, capital investment, and budgetary surpluses. Smaoui and Nechi (2017) concentrate on a particular Islamic economics feature of economic growth - the impact of financing of government deficits and capital investment through the issuance of sukuk financial certificates. They show a strong relationship between sukuk issuance and economic growth across all sukuk-issuing countries spanning the period 1995–2015. The argument for this relationship is interesting, making the case that the issuance of sukuk reduces financial exclusion through providing a financial product that Islam-adherents can invest in line with their beliefs and thereby improving availability of financing for governments. The sukuk market is highly important for Islamic banks and other financial institutions which have to invest their clients' deposits in a Shari'ah compliant way. Bacha and Mirakhor (2018) build on this and propose practical sukuk-based funding structures for infrastructure spending that can support economic growth, while Rizvi and Arshad (2018) proposes instead funding economic growth through GDP-linked financial instruments as perhaps a purer form of sharing risk.

Given the particular susceptibility of developing countries to financial crisis, and the experience of the global financial crisis of the last decade, another body of research has focused on how robust Islamic economics is to handling economic crisis. Dewandaru et al. (2014) examine market co-movements in Islamic and mainstream equity markets across different regions. They find evidence of contagion during major crises, and while Islamic markets show reduced exposure to crisis because of the low leverage effect, their less diversified portfolio nature increases vulnerability. They also find incomplete market integration, with relatively higher fundamental integration for Islamic markets which may be attributable to their real sector allocation nature (see also Rizvi et al. (2015)). Berg and Kim (2014) suggest that there are features of Islamic investments that keep customers away from higher risk conventional investment products. Their model proposes that Islamic customers value and are willing to pay for the piety signalling nature of Islamic products that adhere to the prohibition of riba (interest) and gharar (speculation by gambling). These products are, as a result, lower risk, and as higher risk products are likely to perform poorly in times of financial crisis, there might be less susceptibility in Islamic economies to widespread impacts from financial turmoil. Bourkhis and Nabi (2013) find no difference between Islamic and conventional bank performance during the most recent global financial crisis, and interestingly argue that this is because Islamic banks are not adhering to the Islamic principles that would reduce their risk-taking.

4. Topics in Islamic finance

Islamic finance topics are the most developed across our three categories of topics covered in this study. This is because of a historic focus on Islamic principles applied to developing Islamic finance services, and also because of considerable government policy aimed at investment in, and development of, institutions such as Islamic banks. We identify a wide range of topics in this area. We start with the topic of Islamic banks,[6] and then examine two topics with a corporate perspective - approaches to financial management and to risk management. Lastly we look at a more consumer-centric form of Islamic finance: Islamic financial assets, and financial consumer behavior. Table 3 shows how these five topics were developed from 15 initial topics extracted from the topic modeling.

[6] We use the term 'Islamic banks' rather than 'Islamic Financial Institutions' (IFI) as that is the most common term used in the literature. This usage also reflects the reality that the vast majority of IFI are banks (Banker, 2018).

4.1. Islamic banking

A major area identified in the topic modeling is Islamic banking, given this is the central focus for the development of Islamic financial instruments and practice. One important aspect is the efficiency of Islamic banks. Beck et al. (2010) provide a well-cited overview of Islamic compared to conventional banking efficiency in a report written for the World Bank. Abdul-Majid and Hassan (2011) analyze the efficiency of a sample of Islamic and conventional banks using a stochastic frontier approach and focus on the impact of foreign-owned Islamic bank and Islamic banking subsidiaries on performance. Their results indicate that fully-fledged Islamic banks have higher input requirements. In addition, conventional banks with an Islamic bank subsidiary have relatively higher efficiency (see also Ahmad and Rahman (2012)). Sufian et al. (2014) provide further empirical evidence on the revenue efficiency and returns to scale in the Malaysian Islamic banking sector by using Data Envelopment Analysis. Their results are consistent with Abdul-Majid and Hassan (2011) in that they indicate that domestic Islamic banks exhibit lower revenue efficiency levels compared to their foreign bank peers. Srairi (2010) suggests the particular issue for Islamic banks is not so much in terms of profit efficiency, but rather the problem is controlling costs (see also Farook et al. (2012); Ghauri and Qambar (2012); Olson and Zoubi (2011, 2017)). An interesting study, partially related to the efficiency issue, is by Gheeraert (2014) who shows that Islamic banking development is generally positive for the development of the whole banking sector. That is, Islamic banks do not crowd out conventional banking or lower overall banking system efficiency, but rather they grow the overall sector through introducing new customers.

A natural focus of this topic is also on the competitiveness and performance of Islamic banks. González et al. (2017) test the relationship between competition and bank stability for 356 banks operating in the MENA countries during the period 2005–2012. They find that increasing competition is the key instability indicator for these banks. Jawadi et al. (2017) investigate the effect of the geographical environment on Islamic banking performance by using daily data on 12 Islamic banks in four regions (Africa, Asia, Europe, and the United States) from 2007 to 2016. They find a distinct East vs West divide for performance, with Western Islamic banks relatively under-performing. While they don't focus on why this might be the case, their research suggests the importance of considering environmental factors when assessing performance.

A particular topic within the overall topic of Islamic banking is on the determination of Islamic banking benchmark rates and lending performance. Azad et al. (2018) show the relationship between the Islamic Interbank Benchmark Rate (IIBR) and its conventional counterpart, the London interbank offer rate (LIBOR). They show what they call an 'Islamic premium' to the IIBR, and argue for a need

Table 3
Topics of Islamic finance.

Topic	Combined label	Initial label	Top matched words
1	Islamic banks	Islamic banking efficiency	Effici, scale, technic, cost, revenu, dea, stage, frontier, ineffici, foreign
		Islamic banking competitiveness	Region, indonesia, mena, competit, middl, east, north, asia, africa, loan
		Islamic banking profitability	Profit, ib, gcc, margin, ratio, cost, cbs, roa, roe, banks
		Impact of bank rates	Rate, causal, lend, optim, granger, pls, behavior, cointegr, decreas, function
		Islamic debt and lending	Debt, tax, cost, matur, earli, wealth, psia, sharehold, compani, holder
2	Risk management	Risk management practice	Risk, liquid, credit, ratio, exposur, stabil, basel, risktak, crisi, securit
		Risk management and financial stability	Credit, stabil, ratio, shariah, zscore, small, predict, incom, versus, uae
		Loan default and credit risk	Loan, default, arab, borrow, probabl, unit, lend, qard, hasan
3	Financial management	Financial decision-making	Firm, decis, leverag, dividend, unit, state, agenc, commerci, success, exchang
		Financial reporting and accounting	Account, standard, dimens, audit, aaoifi, weight, ethic, item, instrument, statement
4	Financial assets	Islamic stock market	Stock, index, volatil, portfolio, equiti, investor, dow, jone, us, price
		Islamic mutual funds	Fund, portfolio, investor, equiti, mutual, diversif, risk, strategi, benchmark, imf
		Sukuk	Sukuk, bond, issuer, investor, issuanc, firm, debt, yield, secur, reaction
5	Consumer behavior	Consumer satisfaction and service quality	Custom, servic, qualiti, percept, pakistan, awar, criteria, decis, satisfact, religi
		Consumer product acceptance	Consum, motiv, accept, attitud, innov, religi, maqasid, home, communiti, perceiv

Table of topics labelled as Islamic finance as determined based on extraction of topics from an overall database of 1495 articles that match Islamic economics and finance terms in *Scopus*. 'Top matched words' are the stemmed words that best describe the topic, where a stemmed word is the word base rather than the complete word (Porter, 1980). 'Initial label' is the initial label assigned to a topic by the study researchers, and 'Combined label' is the label assigned to a set of initial topics by the study researchers. See Section 2 for further description on the methodology and explanation of choices made in the topic extraction.

for greater convergence with LIBOR and similar benchmarks to improve the competitiveness of Islamic banks.

Aysan and Ozturk (2018) examine the lending patterns and growth rates of Turkish Islamic banking over business cycles and find that Islamic banks in Turkey exhibit pro-cyclical lending patterns. By contrast, Ibrahim (2016) does not find this effect in the Malaysian market when comparing domestic conventional and Islamic banks. They find that only conventional banks engage in pro-cyclical lending. This raises an issue as to whether the individual country findings are related to the efficiency of the local banking market. Alandejani et al. (2017) look at the overall implication of these performance measures for bank survival. They investigate the survival time of Islamic and conventional banks in the Gulf Cooperation Council countries, and find a greater failure rate for Islamic banks.

More technical Islamic banking issues are also addressed under this topic. This includes Khir (2016) who explores the legality of bilateral rebate in Islamic financial transactions as an alternative to the conventional mechanism in handling early settlement of debt, early termination of debt facilities, and early withdrawal of term deposits. It is argued that the conventional banking practice of imposing charges for e.g. early settlement does not have a Shari'ah basis. In another technical paper, Archer and Karim (2006) analyze issues around the profit-sharing that replaces the charging of interest in Islamic banking. They find a number of issues related to the fairness of this arrangement when assessed under Islamic principles. This is due to lack of bank sharing in losses and the use of management fees by the bank to disproportionately favour shareholders. There thus appears to be a number of active issues that need to be addressed in order to improve the performance of Islamic banks as well as ensure their adherence to Islamic principles.

4.2. Risk management

A post-financial crisis topic focus of Islamic finance is on risk management. This has some potentially crucial implications for the continued modernization and stability of Islamic banks and other Islamic financial institutions. Ghoul (2008) provides an overview of the key issues, particularly the issue that conventional derivatives are not normally acceptable in Islamic finance and these are a critical part of modern risk management. A number of alternative hedging derivatives are explored (bai-salam and bai-urbun Islamic derivative-like contracts) which can help with risk management. Perhaps as a result of these restrictions, Hussain and Al-Ajmi (2012) find that risk management practices in Islamic banks in Bahrain are found to be significantly different from their conventional counterparts in terms of risk management practice and even the understanding of risk. The level of risks faced by Islamic banks are found to be higher than those faced by conventional banks. Some limitations in risk management practice among Islamic banks are similarly found by Hassan (2009) for Brunei, but also positive practice examples. A number of studies have also developed risk management tools for Islamic banks. Al Zaabi (2011) implement a Z-score model to predict bankruptcy among Islamic banks in the UAE. Othman and Asutay (2018) develop an early warning model for Islamic banks in Malaysia to predict future financial performance.

A separate risk management focus is on managing credit risk in Islamic banking. This includes loan default, credit risk, and the repayment of qard hassan (interest-free benevolent loans). Baele et al. (2014) compare default rates on conventional and Islamic loans made in Pakistan using a dataset consisting of more than 150,000 loans. They find that the default on Islamic loans is half the default rate on conventional loans. A similar finding, but in a cross-country study, is shown by Abedifar et al. (2013). Two other interesting features of the findings of Baele et al. (2014) are lower defaults on Islamic loans during Ramadan and in particularly religious cities. A more behavioral approach is adopted by Bekele et al. (2016) who examine the human factors that lead to loan default under both Islamic and conventional banking. One finding, using data from a Saudi Arabian bank, is that Islamic banking borrowers tend to repay more of their overdue loans when their financial conditions improve. These behavioral aspects of risk management in Islamic banking seem like they offer future productive research avenues given some of the notable differences from conventional bank credit risk.

4.3. Financial management

This topic focuses on corporate finance and accounting issues. An interesting study is Naz et al. (2017) who distinguish between the importance of managerial financial styles of top officials in Shari'ah and non- Shari'ah companies, and how this helps managers make strategic financial plans. They examine the role of top managers in financial decision-making at Shari'ah-compliant firms in Pakistan and the UK and find differences in leverage, dividend policy, and working capital management. This distinction of financial management styles has also been explored by Al-Kayed (2017) who focus on factors that affect dividend payments for Saudi Arabian Islamic and conventional banks. They do not find any significant differences in practice. Quttainah et al. (2013) find less earnings management in Shari'ah compliant firms compared to conventional firms, showing positive performance on this particular measure. On a theoretical note of interest to financial management, Zaman et al. (2018) explore optimal debt-equity capital structures in line with Islamic principles.

On a more fundamental financial level, some studies address the need for new accounting practice and standards to incorporate Islamic principles. This is particularly advanced for accounting for financial institution performance. Pomeranz (1997) presents the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) which seek to promote Shari'ah standards for Islamic financial institutions in auditing, accounting and governance. Another early study by Harahap (2003) analyses the Bank Muamalat Indonesia's annual report from the perspective of AAOIFI and argues the reporting is insufficient in Islamic values disclosure due mainly to the limitations of AAOIFI. Vinnicombe (2010) explores compliance with AAOIFI in a systematic manner and find specific issues with compliance with zakat (religious tax and the 'third pillar' of Islam) reporting, although there is good adherence to the need to have Shari'ah supervisory boards. More recently, Mukhlisin et al. (2015) investigate, from the perspective of stakeholders, whether Shari'ah harmonization for financial reporting standards in Indonesia is effective and desirable. They find both practical and, in principle, difficulties with full Shari'ah harmonization.

4.4. Financial assets

Two financial assets receive particular attention from researchers - Islamic equity investment and sukuk. Equity investment in line with Islamic principles is a topic of recent and growing interest. A good ethical perspective on Islamic equity markets is provided by Naughton and Naughton (2000). Charfeddine et al. (2016) investigate the performance of ethical and conventional investments, with a focus on Islamic investment as a form of ethical investment. While they find that Islamic investments under-perform conventional investments they also find low correlation with conventional investments suggesting some diversification benefits. Majdoub and Mansour (2014) confirm the low correlation with regular stock markets and attribute this to the removal of interest-dependent businesses from Shari'ah compliant equity markets. Hammoudeh et al. (2014), applying a different testing approach, disagree that the assertion of low correlation with conventional markets, suggesting this may still be an open question.

Related to risk and return features of Islamic equities, Jawadi et al. (2018b) explore the risk of Islamic investments and find some short-run unique risks, but that longer-term risks are related to conventional risk factors. Shamsuddin (2014) demonstrates that Islamic equity indices are indeed 'immune' from interest rate risk as Shari'ah compliant investments should be. Ashraf (2016) does not find any difference in risk-return relationship and general performance based on a range of feasible Shari'ah investment screens.

With the rise in popularity of Islamic mutual funds, a sub-topic in this area analyses the performance of these funds. Makni et al. (2016) examines the performance of about 300 Islamic mutual funds in the largest scale study to date. Most of their findings echo those of conventional fund performance, including a negative long-run performance persistence relationship. Umar (2017) extends the existing literature by analyzing the performance of Islamic vs conventional equities in a strategic asset allocation framework. They find that Islamic investments are generally a poor idea due to missing out on conventional assets. In contrast, Reddy et al. (2017) finds out-performance for Islamic mutual funds in the UK which is the largest Western market for Islamic investment funds (see also Naqvi et al. (2018) for an analysis across more countries with less positive findings). Mansor et al. (2015) study the impact of fees on Islamic mutual fund performance. They find no significant fee-related performance differences compared to conventional mutual funds.

The second financial product is sukuk, which is a well-established debt funding and investment market and therefore quite amenable to empirical investigation. This is examined from both the issuer and customer perspective. From the issuer side, Mohamed et al. (2015) provide evidence that sukuk can offer some particular benefits to corporate issuers compared to conventional bonds due to overcoming problems with information asymmetry (see also Klein and Weill (2016); Halim et al. (2017)). Arundina et al. (2015) provide an interesting example of the growing maturity of the sukuk market by showing that repayment ratings can be well-predicted from corporate fundamentals, suggesting the efficiency of capital raising through this market. On the investors side, Godlewski et al. (2013) find a negative stock price reaction to the announcement of a new sukuk offering which is different to announcements of conventional bonds. This negative reaction is also seen in Ahmed et al. (2018). Klein et al. (2018) propose that this negative reaction is due to poor firm investment decisions from the proceeds of sukuk. A further note on pricing is from Reboredo and Naifar (2017) who show that sukuk price movements are influenced by both the movement in conventional bond markets as well as economic performance. This confirms similar pricing and trading approaches by investors to sukuk as to conventional bonds.

4.5. Consumer behavior

Given the newness of Islamic financial products and the necessity for consumer acceptance of these products an identified topic focuses on customer perceptions of these products. This covers both a general motivation for using Islamic products as well as specific perception of particular products.

Amin and Isa (2008) examine the relationship between service quality perception and customers' satisfaction in Malaysian Islamic banking. They use a SERVQUAL service quality perception model to show high satisfaction with Islamic banking. Rehman and Masood (2012) determine the customer selection criteria for choosing Islamic banks over conventional banks in Pakistan. While religiousness is a major factor, some conventional factors such as location convenience are also major drivers. Estiri et al. (2011) arrive at a similar conclusion for Iranian Islamic banking, but also find that the value proposition of the product offering is of key importance. Ringim (2014) takes a different perspective and interview Muslim customers of conventional banks to determine their perception of Islamic banking. While they find a generally positive perception of the offerings they argue for greater public education on the potential benefits. Pepinsky (2013) examines the socioeconomic origins of consumer demand for Islamic financial products in Indonesia. In contrast to studies mentioned above they do not find extent of religiosity as a major driver of demand.

Regarding specific Islamic financial products, Al-Salem (2009) studies the approach to financial product innovation in Islamic financial institutions, and find some limitations to the extent of innovation. Amin et al. (2014) examine the factors influencing the consumer acceptance on Islamic home financing products among clients of Indonesian Islamic banks. They find a strong role for demographics in influencing demand. For sukuk perception an interesting view is proposed by Godlewski et al. (2016) who show that the reputation of the scholar who certifies a sukuk as compliant matters for customer demand. An alternative, more economic, perspective to the customer demand view argues that demand for such products is largely just based on supply of these products, as explored in Hesse et al. (2008).

5. Topics in Islamic governance and morality

The last category from the topic modeling covers topics related to the impact of Islamic perspectives of governance and morality on economic and financial behavior. To some extent this category has run through all our topics, as Islamic economics and finance is innately about incorporating an Islamic perspective on morality in conventional economics and finance. The topics in this category, however, are explicitly about this perspective. We cover three combined topics overall: corporate governance including corporate social responsibility, contracting and legal enforcement, and philanthropic and inclusive finance. These three topics are condensed from 10 initial topics suggested by the topic modeling, and the combination approach and topic keywords can be seen in Table 4.

5.1. Corporate governance

The first topic concerns the influence and impact of Islamic principles on corporate governance. Abu-Tapanjeh (2009) provides a useful overview of the relationship between Islamic principles and generally accepted corporate governance approaches. In a more theoretical piece, Safieddine (2009) shows how Islamic corporate governance can be interpreted in an agency theory perspective on corporate governance. A particular agency theory challenge in Islamic financial institutions is the responsibility of management to maximise shareholder wealth, as per normal agency theory, but also to do so in a manner that is Shari'ah compliant. Thus, the agency problem is more complex in Islamic institutions. Research in this topic particularly focuses on the effects of corporate governance on performance of financial companies through the influence of Shari'ah Supervision Boards (SBB). The purpose of the SBB is to review all products and services offered by the institution to ensure their compliance with Shari'ah principles. Mollah and Zaman (2015) investigate the effect of SBB and board structure on the performance of Islamic banks. They find that SBBs are able to have a positive impact on performance when they have a supervisory role. The same effect, however, is not present when the board only has an advisory role. Thus the positive impact requires giving the supervision board sufficient authority to impact the organization. Garas (2012) explores the performance of SBBs in more detail and identifies a number of critical potential conflicts of interest that should be addressed in any firm adopting such a structure. This includes the importance of the SSB having an executive position, board remuneration, and the relation between the SSB members and the Board of Directors. Farag et al. (2018) is more positive about how SBB can reduce principal-agent issues, especially through how the SBB is designed. A broader study by Bukair and Abdul Rahman (2015) also shows that regular non-Islamic governance issues also affect the corporate governance of Islamic banks.

A further interest in the literature is on corporate social responsibility (CSR). Haniffa and Hudaib (2007) explore the difference between what Islamic banks should do for CSR in line with Islamic principles, and what they actually do. They find some key failings in their study of seven Islamic banks. The main failings are in terms of charitable giving and commitment to society, as well as information disclosure. A similar finding is shown in Hassan and Harahap (2010). Mallin et al. (2014) survey Islamic banks on their general CSR strategy and see if this connects to financial performance. They find good adherence to CSR in general as well as the CSR elements of the principles and standards of the AAOIFI. This is found to be positively connected to financial performance. Ahmed (2016) takes a different approach and examines stakeholder expectations of Islamic bank CSR and finds a lack of clarity among stakeholders as to what type of CSR they expect. This suggests the need for greater dialogue between Islamic organizations and stakeholders as to their expectations.

Related to this idea are a series of studies on the extent to which Islamic institutions are Shari'ah compliant. This is relevant from a CSR perspective, as there are a number of facets of Shari'ah compliance that can be evaluated on a CSR perspective (such as charitable giving and lending). The topic is also important from a morality perspective, as it measures the extent to which companies are following

Table 4
Topics of Islamic governance and morality.

Topic	Combined label	Initial label	Top matched words
1	Corporate governance	Corporate Social Responsibility	Disclosur, csr, corpor, loss, earn, provis, loan, uae, index, distress
		Corporate governance	Govern, board, compani, corpor, independ, supervisori, member, list, ssb, cg
		Corporate Shari'ah compliance	Sharia, ah, ifi, complianc, compliant, shari'a, scholar, audit, screen, fatwa
		Corporate Shari'ah influence	Shariah, compliant, complianc, screen, card, law, scholar, sbs, window
2	Contracting and legal enforcement	Islamic contracts	Contract, musharakah, profit, hous, partnership, equiti, sale, mudarabah, home, gharar
		Shari'ah law dispute and resolution	Law, legal, shari'ah, contract, disput, rule, ibf, court, parti, resolut
3	Philanthropic and inclusive finance	Waqf	Waqf, cash, land, properti, smes, fund, halal, enterpris, micro, govern
		Microfinance	Microfin, bangladesh, sustain, poverti, poor, agricultur, rural, mfis, allevi, incom
		Zakat and financial inclusion	Zakat, fund, scheme, save, client, inclus, microfin, plan, poor, pension
		Takaful	Insur, taka, uk, particip, alloc, llc, premium

Table of topics labelled as Islamic governance and morality as determined based on extraction of topics from an overall database of 1495 articles that match Islamic economics and finance terms in *Scopus*. 'Top matched words' are the stemmed words that best describe the topic, where a stemmed word is the word base rather than the complete word (Porter, 1980). 'Initial label' is the initial label assigned to a topic by the study researchers, and 'Combined label' is the label assigned to a set of initial topics by the study researchers. See Section 2 for further description on the methodology and explanation of choices made in the topic extraction.

the core principles of morality as measured through Shari'ah compliance. Two studies by Ullah and colleagues are particularly relevant. Ullah et al. (2014) investigate the role of Shari'ah departments in Islamic financial institutions and find some difficulties faced by these departments in implementing policy. They propose a framework for the management of such departments. Ullah et al. (2018) build on their prior study by investigating these difficulties faced by Shari'ah departments in more detail. They argue that there exists a fundamental conflict between Shari'ah departments and managers that are motivated to sell more products and services. Their study highlights this in practice with a series of case studies developed from a grounded theory perspective. Ayedh and Echchabi (2015) also note some of these tensions in their study of Yemeni banks. Two further studies, by Derigs and Marzban (2008) and Kasi and Muhammad (2018), take an alternative perspective of showing how, in practice, Shari'ah screening results in different investment compared to regular investment. These studies thus highlight the practical impact of Shari'ah compliance on how business is conducted.

5.2. Contracting and legal enforcement

A short, but important topic, is on the impact of Islamic principles on contracting in finance. Ismail and Tohirin (2010) provide an overall review of Islamic law as it impacts on finance. One aspect of this focuses on how courts, based on Shari'ah law, have arrived at decisions related to Islamic banking. Both Markom et al. (2013) and Muneeza (2017) concentrate on the case of Malaysia. Both papers highlight some of the difficulties on adjudicating on Islamic banking cases particularly due to the need to balance civil law with Islamic principles. One specific need is better contracts that clearly define the aspects of a contract that might be contrary to Shari'ah law. Hikmany and Oseni (2016) highlight the case of Tanzania, and apart from a natural call for the country to learn from more advanced Islamic banking jurisdictions such as Malaysia, argues for a need for better court-level dispute resolution mechanisms. Lastly, Oseni and Hassan (2015) focus specifically on legal enforcement of sukuk contracts. They argue for the need for arbitration panels to overcome the default role of United Kingdom common law in governing these contracts.

A separate but important contracting topic is on the ability of Islamic finance institutes to undertake derivatives contracts which are vital for modern financial risk management. Ebrahim and Rahman (2005) argue that normal futures contracting is permissible in Islamic finance, and there is no need for specialist futures contracts as long as the underlying commodity is not forbidden by Islam and considered as ribawi commodities (gold, silver, dates, wheat, salt, and barley). They argue that futures contracts are permissible due to being a quasi-equity claim. However, as noted in Section 4.2 of this study and particularly in the research of Ghoul (2008) this is a very much debated topic and something which is the area will have to firmly address given the importance of futures contracting for modern financial institutions.

5.3. Philanthropic and inclusive finance

The last topic we identify is termed philanthropic and inclusive finance. This covers a number of areas. One is charitable donations to society (waqf) and charitable giving in general (zakat), the second is microfinance, and the third is Takaful insurance. Zakat and microfinance are often combined in terms of discussion in the financial literature. We don't cover the other main form of inclusive finance, qard hassan (benevolent lending without stipulated benefits to the lender), in this section, as the topic modeling identified this as a credit risk topic and it is therefore incorporated in Section 4.2 in the discussion of Islamic loan repayment risks and risk management. Qard hassan in practice however has many crossovers with microfinance, even though this is not widely explored in the current literature. Takaful is a somewhat separate topic to the others, except in sharing an inclusive finance basis.

Waqf is a voluntary, permanent, irrevocable and inalienable charitable endowment. Once a property becomes waqf, it cannot get gifted, inherited, or sold since it belongs to God and should be remain intact. Thus waqf creates quite a unique asset that is a potential economic resource in countries where it is popular. Ahmed (2007), in a World Bank report, explores the use of cash waqf to support microfinance initiatives among the poor in society. Mohieldin et al. (2011), in a later World Bank report note progress in some countries towards achieving this goal. In a different focus, Shabbir (2018) studies waqf lands in Malaysia and finds poor classification of this land, thus limiting the potential to understand the impact of the asset. They accordingly attempt to categorize the lands according to primary use. Ambrose et al. (2018) propose an approach to the use of waqf property and resources as a public good as well as a government revenue source.

Because of the developing market nature of many Islamic-majority countries, a natural additional focus is on the potential impact of microfinance on poverty alleviation. As noted above, waqf is one potential source of microfinance funding with a charitable intention, however the main focus in this sub-topic is on the benefits of Islamic microfinance rather than the source of funding. In this literature microfinance is interpreted with an Islamic perspective. Islamic microfinance institutions have used diverse models and tools as they seek to provide financial and non-financial support the poorest populations. Bhuiyan (2013) investigates microfinance in Bangladesh. A contrast is made between Grameen Bank (a conventional lender that is viewed as the pioneer of microfinance) and Islami Bank (an Islamic finance lender also operating in the microfinance market). While not particularly concentrating on the Islamic aspect of the difference it is found that Islami Bank is more effective at reducing poverty through their lending. Obaidullah (2015) focuses on Islamic microfinance for the purposes of enhancing agricultural projects. It is found that lending that also offers technical advice, sales and purchasing information, is significantly more effective compared to pure lending.

Hassan (2015) extends the conversation beyond simply microfinance to also argue for the need for zakat to be considered as part of a support system for those in need. It is argued that there are limitations on a financial inclusion model that solely relies on microfinance solutions. Zakat, the third pillar of Islam, is expected charitable giving by Islam-adherents and is traditionally 1/40th of a person's savings and non-personal assets per year. Ahmed and Salleh (2016) builds on the inclusion of zakat and proposes a society-level financial inclusion model that includes zakat as well as waqf. They attempt to integrate these traditional Islamic finance aspects with modern approaches to financial planning such as improving financial literacy. This highlights some of the reasonably unique resources that are available to building both an philanthropic and inclusive approach to financing in Muslim-majority countries.

A last topic is takaful. Wahab et al. (2007) define the essence and principles of the system of takaful, the differences from traditional insurance, and the activities of Islamic insurance institutions. This work highlights that takaful can perhaps be best viewed as what might be considered traditional mutual insurance - with the aim of sharing the catastrophe of individual loss between a group of people. Most research on the topic however tends not to focus on the inclusive principles of takaful, but rather with comparing the performance to conventional insurance. For example, Kader et al. (2010) explores the financial performance of this insurance market and find the organizational structure of the insurance firm significantly affects performance. In Kader et al. (2014) it is argued that there is no particular performance difference between takaful insurance firms and conventional insurance firms. Khan (2015) analyses the power of incentives offered to takaful sales agents in mitigating problems associated with the relationship between policyholders and Islamic insurance products. The focus is on ensuring the effective operation of the insurance market for all stakeholders.

6. Discussion and conclusions

Our study is the first study to apply topic modeling to systematically identify the key topics of research within the discipline of Islamic economics and finance. We initially identify 36 sub-topics of the area from an analysis of 1495 research articles and propose, through topic combination (as well as the elimination of four non-discipline topics), that 11 topics well-describe the overall corpus of research.

These 11 topics, derived from 32 sub-topics, show the scale and scope of Islamic economics and finance research. They also show a certain maturity to the area, with no topic explicitly arguing the basic fundamental case for the importance of Islamic economic and finance research, but rather the topics are focused on solutions to practical issues. These practical issues cross the spectrum of possible economic and finance concerns - the impact on developing effective economic policies, on financial asset performance, on the practice of corporate social responsibility - to name but a few areas of interest.

There is still considerable debate within these topics as to best practice. Ibrahim and Alam (2018) raise this issue of lack of standardization as critical in a recent special issue on the state of Islamic finance and economics. In our study we identified fundamental debates such as whether Shari'ah Supervision Boards are actually effective in their role and whether Islamic banks fully adhere to Islamic principles. These suggest fluidity in terms of advice that the research can give to industry and practitioners and are a natural feature of a rapidly developing discipline. Further work within each topic will allow a reasonable core of consensus to emerge and this will be of benefit to practitioners.

In Fig. 1 we see some of those changes in topic popularity. This figure charts the proportions of articles related to each topic over time. Reading the chart from left to right we see that Islamic bank research was, and still is, the largest topic of the area. However, the other topics show significant changes over the time period. Most notable is the growth of the philanthropic and inclusive finance topic, which, as we discussed, reflects the heart of modern Islamic finance. The original early focus on defining Islamic economics has faded away and is now the lowest popularity topic amongst the topics identified. This type of analysis is important in terms of understanding how topics can change, and also enforcing the idea that topics do change.

A noteworthy feature of the research is that it is largely grounded in a discussion of developing country economic issues. This is

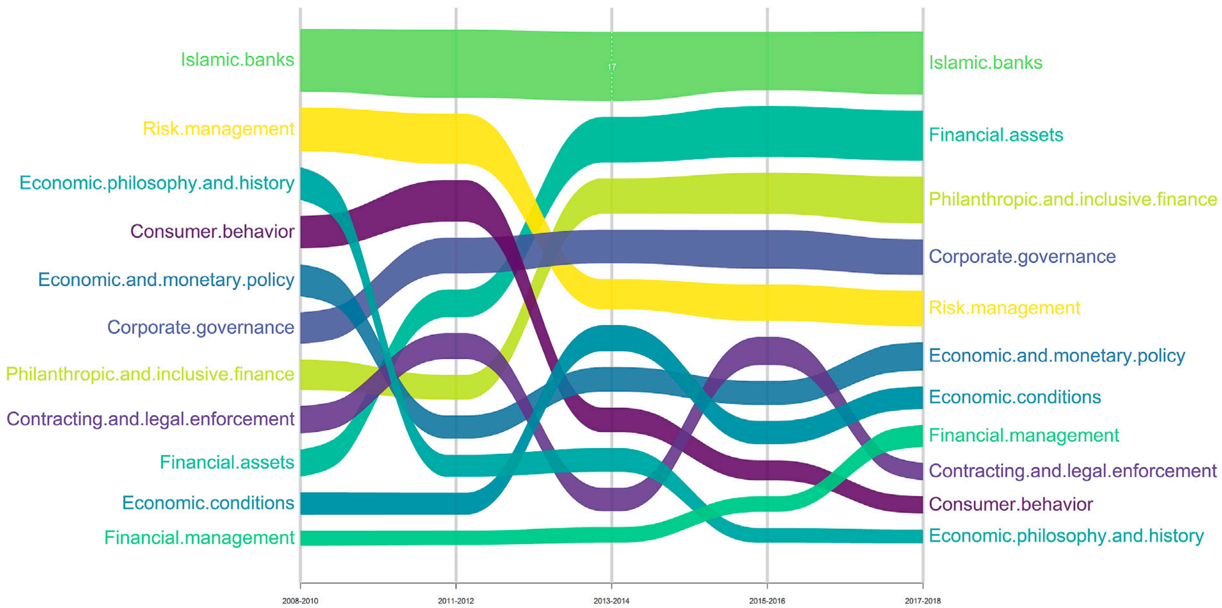

Fig. 1. Change in topic proportions over time.

driven by most Muslim-majority countries being classified as developing economies. This offers, therefore, a novel morality-driven perspective on how to address the growth and poverty problems that are more present in these countries compared to developed economies. Interesting approaches are being considered for these problems. For example, the integration of zakat and waqf in the microfinance development model is a very particular Islamic approach to philanthropic and inclusive finance. With this strength in mind, there is also scope to address more the significant growth of Islamic finance in major Western developed countries. The needs of Islamic finance customers and potential customers in these countries will be quite different, and future research can fruitfully concentrate on this aspect more.

There are also some potential problems with the literature that will need to be addressed. The most pressing issue is an evident lack of data available to support empirical studies. This is usually because of the novelty of Islamic financial products meaning there is less of a time period over which to study performance. Another reason is probably the lack of data sharing between Islamic banks and researchers to assess financial product performance. The growth of, for example, the takaful industry would benefit if data were available to show some of the benefits for the participant and society in practice. Similarly, although a more advanced research topic, it is necessary to have more empirical studies on the performance of Islamic equity investments. Both takaful and Islamic equity indices, as well as other products such as sukuk, are in reality competing against conventional finance products. Some of the research reviewed in this study highlighted that potential customers are very much swayed by issues such as performance in choosing between conventional and Islamic financial products.

Another problem we suggest is with the development of Islamic economics which lags significantly behind the development of Islamic finance. In much the same way as capitalist economics underpins conventional finance, there is a need for stronger focus on the development of Islamic economics. This will support the development of Islamic finance and provide a greater purpose to it's aims and ambitions, as well as help address the particular developing country economic issues that are important in many Muslim-majority countries. This may involve greater funding by academic funding institutions to hire additional Islamic economists.

A more researcher-centric problem is in the research impact of Islamic economics and finance research. The vast majority of research is published in academic journals that tend to have low academic impact when measured by popular journal quality ranking systems such as the UK Academic Journal Guide or the Journal Citation Reports. This is a common issue with newly developed research areas and is not an absolute problem in itself, however it does suggest that researchers are having difficulty publishing their research in higher impact journals. This can have an impact on the basic acceptability of the body of research as well as how it is broadcast to a wide audience. It may be that journals need to be more open to this body of research - through recognizing the benefits it can bring to developing economies as well as for the insights into values, cultures, and behaviors and the influence of these on economic and financial behavior.

Before concluding, we also acknowledge limitations in our research approach and study. The primary limitation is that while probabilistic topic modeling aims to remove researcher bias in topic selection, it does so at a cost of limiting expert input in topic selection. Nuance can be removed from the selection of topics. One important such nuance is the debate over how to implement Islamic finance and economic policy between the various legal schools (madhhab). For example, there might be considerable debate on interpretation and validity between the quite liberal Hanafi School and the quite literal Hanbali School (Seniawski, 2000). This is absent from our topic evaluation as it is not an overt discussion in most published research in the field. More generally we do not intend, in defining our topics, to suggest a permanence to these topics or that there is widespread agreement on certain products and policies. As noted in the introduction, most research on Islamic economics and finance has been published in just the last decade, so this is a field that is still developing and the very structure itself is subject to considerable debate and future change. Our research also has the limitation that it concentrates on the topics that are present, rather than highlighting the topics that are not present. That is, what topics are under-researched in an area. Highlighting what is missing is a common goal of systematic literature reviews, while this is not something that topic modeling is suitable for. We therefore do not suggest that topic modeling is a complete replacement for systematic reviews.

In conclusion, we structure the core topics of Islamic economics and finance research and demonstrate it to be a vibrant area of research attempting to reach across the spectrum of economics and finance. The explicit aim of integrating morality in the practice of economics and finance is quite novel in modern economics and is of wider benefit outside of just Islamic perspectives on morality, given the needs of all societies. The structure provided in this paper of Islamic economics and finance research will undoubtedly continue to evolve as research develops further, but we propose this structure as a useful starting point for charting the development of the research agenda and for new researchers interested in growing the area further.

CRediT roles

Ezzedine Ghlamallah: Conceptualization; Methodology; Writing.
Christos Alexakis: Conceptualization; Methodology; Writing.
Michael Dowling: Conceptualization; Methodology; Writing.
Anke Piepenbrink: Conceptualization; Methodology; Formal analysis; Visualization.

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