

ISLAMIC BANKING: EXPANDING FINANCIAL DEPTH?

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By

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ABSTRACT

Recent studies suggest that the growth of financial sector depth and access can drive poverty reduction and economic growth, popularizing the idea that financial development can be used as a development tool. Combined with a growing awareness in the West of Islamic taboos against lending at interest and speculation and the rapid growth of global Islamic finance, Islamic-compliant banking is increasingly being seen as a potential key to unlocking growth and reducing poverty among the Islamic poor. Using 1990-2007 panel data across 26 Organization of Islamic Cooperation (OIC) states with majority Muslim populations, this paper examines the theoretical assumption that Islamic banking growth is due to increased participation in the financial system. The analysis finds evidence that growth of an existing Islamic banking sector within countries that possess one does have a positive effect on the rate of growth of financial depth, but produces more ambiguous findings when comparing states with Islamic banking sectors to those without such sectors. This may suggest that current Islamic banking growth is effective at expanding financial access and mobilizing new resources, but that there may be certain unobserved prerequisites such as human capital or information infrastructure that are necessary for both traditional and Islamic finance to be successful.

I dedicate this thesis to my amazing wife Elizabeth, without whose infinite patience, keen eye for punctuation and grammar mistakes, and unflagging willingness to listen to me talk through my model one more time I would still be writing now.

Also, for keeping me company as I spent Christmas Eve in a computer lab. She is a saint.

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INTRODUCTION

There is a growing consensus among development economists and policy makers that expanding access to credit and other financial instruments for capital mobilization and risk smoothing can play an important role in enabling the very poor to escape the poverty trap. A well-functioning financial system allows for: (1) reduced information transaction costs, (2) increased mobilization of savings for productive ends, (3) more efficient resource allocation that leads to higher productivity, and (4) risk sharing and consumption smoothing (Naceur, Cherif & Kandil 2010).

A challenge facing the creation of such a system in the Islamic world is that traditional forms of finance are considered to be immoral. The idea that the rapidly growing Islamic banking industry, which utilizes financial mechanisms that do not violate the tenets of *Sharia* (Islamic) law, can be used as a development tool by opening up the benefits of financial sector access to the religious populations of Islamic countries has garnered much support from development advocates, including the World Bank.¹ While Islamic banking has enjoyed rapid growth in some of these countries over the past two decades, it is not clear that this growth is evidence that Islamic banking has expanded the market for financial services to those who previously self-selected out. This paper aims to see if there is empirical evidence that Islamic banking has succeeded in mobilizing previously untapped market share.

¹ World Bank. "The World Bank and Islamic Development Bank Sign Memorandum of Understanding on Islamic Finance." Accessed May 3, 2013. <http://www.worldbank.org/en/news/press-release/2012/10/14/world-bank-islamic-development-bank-sign-memorandum-of-understanding-islamic-finance>.

BACKGROUND

The idea that Islamic finance can play a key role in alleviating poverty in Islamic states is the result of a body of recent empirical work that has suggested a causal connection between deep and efficient financial systems and improved gross domestic product (GDP) growth, absolute poverty, and income inequality (Honohan 2004; Benabou 1996; Beck, Demirguc-Kunt & Levine 2004). The recent interest in micro-finance as a development tool for addressing the structural impediments to efficiently providing affordable financial services to the very poor has been significantly legitimated and enhanced by this finance-as-growth literature. (Green, Kirkpatrick & Murinde 2006). While solving structural impediments is a necessary precondition for providing financial access, the analysis largely assumes that those who lack access to financial services would, if given both access to such services and an understanding of how to use them, make use of such services (Green, Kirkpatrick & Murinde 2006). However, removing economic impediments to efficiently supply a service will not increase consumption of that service if it is considered a “bad” rather than a “good.” The most efficient financial services have no ability to reduce poverty or increase growth in a population that is unwilling to use them for religious or cultural reasons, such as the belief in most Islamic countries that financial services violate commandments against speculation, gambling, and the use of interest.

Since well before the recent body of research on the effects of finance on growth and poverty, Islamic economists have sought mechanisms to provide the same risk and consumption smoothing, capital mobilizing, and allocative efficiency enhancing aspects of traditional Western finance to Islamic populations without using the mechanisms of traditional Western finance forbidden in the Qur’an. Since the mid-1980s, a growing number of financial products have been developed that are deemed *Sharia*-compliant by Islamic scholars, and have been turned into a booming industry in Islamic countries (Čihák & Hesse 2008) that is currently projected to grow

at 15 percent per year. Given the atypically low levels of financial depth observed in Islamic countries relative to non-Islamic peers with similar levels of GDP per capita, the consistent double digit rates of growth recorded by Islamic banking have meshed well with the growing awareness of the importance such products have for development and poverty efforts. The rapid growth rate of the sector is currently seen as evidence of this potential, with the assumption that a lack of religiously compliant financial access is the limiting factor in adoption by the public. (SESRIC 2012).

There is good reason to question the validity of this assumption on both historical and economic grounds. The transition of *usury* from a taboo to an accepted practice within Christianity took place over a thousand years. That this was a slow process is attested to by the need for repeated papal encyclicals affirming the essential moral nature of practitioners of finance during the early modern era. Religious taboos are bound up in culture, and cultural change occurs at a far slower rate than intellectual invention or theological jurisprudence. Given that the prohibitions on interest are far more explicitly laid out in the Qur'an than they are in the Bible, there is good reason to question if the growth of Islamic finance is due to a rapidly growing acceptance of its non-taboo status. Excluding Iran (where all forms of traditional Western finance are technically illegal), even in Islamic countries there exist traditional financial institutions much larger than their Islamic-compliant counterparts, largely catering to the secularized elites. Malaysia, one of the largest Islamic financial centers in the Islamic world, still has a traditional banking sector four times the size of its Islamic sector at the time of this writing (Economist 01/05/2013). If Islamic banking growth is a result of its adoption as a religious "luxury" version of traditional financial services by the cohort already participating in the

financial sector, the promotion of Islamic banking as an anti-poverty pro-growth development tool would be called into question.

LITERATURE REVIEW

The debate about financial depth has been until recently focused on assessing if economic and financial depth growth are related, rather than how they are related. This was largely settled by the watershed work of King and Levine (1993), whose paper "Finance and Growth: Schumpeter Might be Right" deploys a wide variety of control variables and time-lagged cross-country data to suggest that there is a strong and robust correlation between economic growth and a state's level of economic development. While they did not control for the direction of the causality, their findings were sufficient to change the debate to the question of how the two were related.

The results of this conversation have largely favored the view that financial growth can act as a driver for economic growth. A groundbreaking work by Ross Levine (1998) employs the differences between civil and common law documented by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (LLSV 1996) as an instrument to isolate unidirectional variation in economic growth caused by the resulting differences in financial systems between countries with the two different legal philosophies. Others, like Demirguc-Kunt and Maksimovic, (1998) use firm-level data to create predictions about maximum finance-constrained growth rates, and demonstrate that there is a strong correlation between firms exceeding these predicted growth rates and firms drawing on outside financing. A torrent of similar studies followed, often from the same teams of researchers seeking to refine and broaden their findings in the face of potential statistical biases and methodological criticism (e.g., LLSV published two papers - 1997, 1999 - expanding on the role of legal institutions in shaping the impact of finance on growth during the time they spent revising their 1996 paper).

The resolution of the causality question during the late 1990s tied in well with the work of Benabou (1996) and Honohan (2004), whose findings show that increased growth and

financial access are capable of reducing absolute poverty and relative inequality. Honohan in particular makes the case for finance-driven growth forcefully, asserting in his 2004 work that "the causal link between finance and growth is one of the most striking empirical macroeconomic relationships uncovered in the past decade." Unlike his predecessors, Honohan suggests that even when controlling for economic growth and the impact of finance on growth, increasing financial depth, access, and efficiency remain first-order causes of decreased headcount poverty and inequality. According to Honohan, access to finance is not just a means of growing the economic pie but also of redistributing it in favor of the poor.

As cultural economists have asserted since Weber in 1930, religion holds a great deal of importance in explaining how individuals perceive and evaluate incentives. Two recent studies by Stulz and Williamson (2002) and Barro and McCleary (2002) both highlight that religion can be used as a proxy for culture, and that culture in turn plays a strong role in shaping the institutional framework within which the growth of financial depth occurs. Stulz and Williamson point out that LLSV's creditor rights index, from which they draw their conclusions about common vs. civil law, are very strongly correlated with the divide between Protestant and Catholic countries - the former were almost universally common law, the latter, almost universally civil. While both teams focus on the impact of the split within Christendom, they both independently note that the picture is more complicated for Muslim countries, which score well in the presence of imposed or adopted Western legal systems (e.g., Turkey) but would be hard to evaluate if they rejected them (e.g. Iran, where lending at interest is officially a crime).

None of this injection of Islamic culture into the discussion of finance is new; it is simply new in the West. Islamic economists and *Sharia* jurists have recognized the benefits of financial access since well before King and Levine empirically demonstrated them, and have been

working since the 1960s to develop financial instruments that would perform the same role as Western finance without violating the Islamic taboo against *riba*, the receiving of interest, or *gharar*, the speculation on uncertainty. However, by tying the potential of Islamic financial instruments into the new wave of empirical support for finance as a means of growth promotion and poverty reduction, Islamic scholars such as Ahmed (2002) are now raising the profile of the Islamic finance movement in the eyes of the development community. Already having recorded a decade of double-digit growth, Ahmed argues that Islamic finance, with its mutual fund style risk pooling, can be even more accessible to the rural poor than traditional Western microfinance. Others such as Mousseau (2011) argue that Islamic finance as a tool for growth could help undermine recruitment efforts by extremist Islamic terrorist organizations.

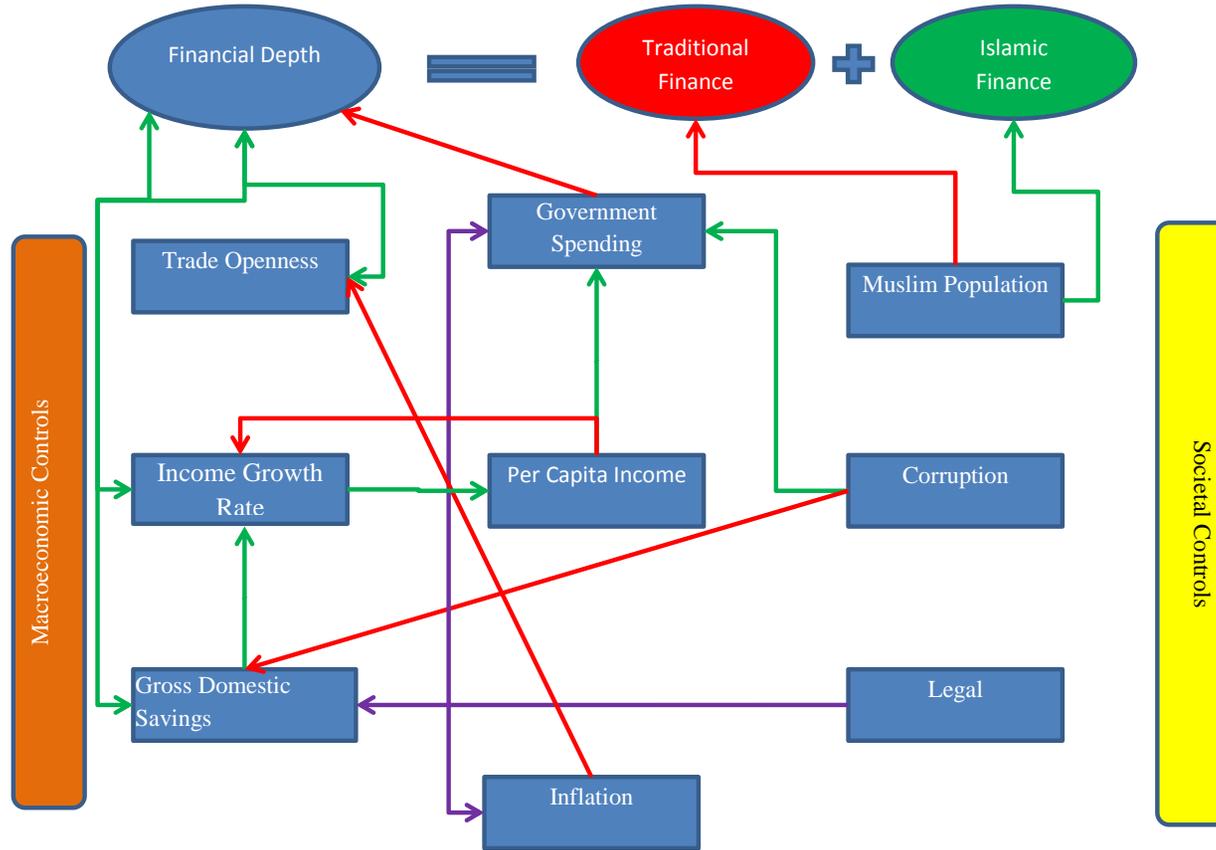
In 2008, authors Cihak and Hesse published an IMF working paper evaluating the potential for Islamic financial institutions to provide greater stability to the global financial market, though with mixed results (small Islamic banks were found to be more stable than their traditional counterparts, but large ones were less stable than either their large or small traditional partners). While the idea is not new, the IMF paper is one of the first papers to be published on the topic using empirical rather than theoretical analysis. This lack of empirical investigation, pointed out by Hassan in his 2008 survey of academic literature on Islamic banking and finance, is an outgrowth of the underreported and thus under-quantified days before Islamic finance started to gain attention in the West. Most data collection on Islamic finance and banking takes place within firms rather than at the government or international level, and what secondary data is gathered and aggregated is subject to different reporting standards and collection methodologies. The challenge for Islamic finance now, Hassan argues, is to cultivate such sources of data in the future.

CONCEPTUAL FRAMEWORK

Is the introduction of an Islamic banking sector an effective tool for inducing financial system participation by Muslim religious objectors? This paper addresses this question by examining the degree to which the introduction and growth of a *Sharia*-compliant banking sector in culturally and demographically Islamic states can be shown to have an impact on the rate of growth of financial depth in those states. If Islamic banking acts as a parallel market to traditional finance, its growth should increase the overall state-level growth rate of financial depth. If instead Islamic banking growth is the result of a transfer of assets within the larger banking sector rather than an expansion of that sector, it should not alter the growth rate of financial depth as a whole.

The conceptual framework used to generate the empirical models in this paper draws heavily on the work of Samy Ben Naceur, Mondher Cherif, and Magda Kandil (NCK 2010) in their IMF working paper "What Drives Financial Sector Development in the MENA Region?" which lays out three categories of sources for changes in financial depth: macroeconomic forces, political forces, and institutional forces. At a high level, these can be considered proxies for the overall incentives created by the economy, by direct government intervention in the economy, and by indirect institutional or cultural incentives, respectively. The expected direction of these forces on financial sector growth is mapped out in Figure 1, followed by an explanation of the theory behind each expected force and direction.

Figure 1: Concept Map



Macroeconomic

Real GDP Growth Per-Capita

Given a decreasing marginal propensity to consume as income increases, growing personal income creates both a larger amount of economic activity and a higher propensity to channel funds through financial intermediation. In addition, per-capita GDP growth serves as a proxy for current expectations about future investment prospects. Theory would therefore predict that higher levels of GDP per-capita growth should have a positive relationship with the growth of financial depth.

National Savings, Domestic Investment, and Capital Outflows

In neo-classical macroeconomic growth theory, all national income that is not consumed by either households or the government constitutes national savings. Savings can either be channeled into domestic investment (“domestic capital formation”) or investment abroad (“capital outflows”). While both of these flows create demand for and are facilitated by financial intermediaries, that demand is not necessarily for domestic financial intermediation. In states with major financial centers whose banking system has global reach, both have the potential to stimulate the size of the domestic banking sector. In states whose domestic financial sectors lack global reach, funds directed for investment abroad will likely be channeled through foreign financial intermediaries. According to the bi-annual GFC 7 survey of major financial centers, none of the states examined in this study possessed a top twenty global financial sector in 2010, making it likely that capital outflows will be handled by foreign institutions. When considered together, theory therefore predicts that the relationship between domestic investment and

financial depth will be positive, but that the relationship between financial depth growth and savings (holding investment constant) will be negative, since growth in savings less investment will represent funds channeled away from the domestic banking system.

Foreign Direct Investment

Foreign direct investment (FDI) is a measure of foreign capital that flows into a country for long-term investment. Conceptually, FDI is the opposite of capital outflows, and is generally expected to have a positive relationship with the growth of domestic financial depth. However, it is possible that greater foreign capital flows into a country could create relationships between the foreign financial firms channeling them and domestic business sector, so the direction of the relationship may vary from state to state.

Inflation and Price Stability

Inflation of a nation's currency has been shown to decrease the demand for and performance of financial intermediaries. (NCK 2010) Price instability creates uncertainty about the future and makes investment riskier and therefore less desirable. It also serves as a proxy for macroeconomic and potential political instability, as the root of inflation is often linked to either significant exogenous shocks to the economy or unsustainable government policies. As both of these forces increase the risk faced by investors, it is expected that inflation will have a negative relationship with the growth of financial intermediation.

Trade Volume

International trade requires greater accounting and financial intermediation than domestic trade. A business exporting or importing goods will need to deal with currency conversion, contract enforcement across multiple legal systems, and other complications that are handled cost-effectively through the banking sector. In addition to greater demand, domestic banks in less financially developed countries may also experience efficiency gains by being exposed to and working with international best practices and standards. While not necessarily increasing the available assets, such efficiency gains would be reflected in higher returns to investment, and thus greater financial depth growth. While some of this positive relationship between trade volume and domestic financial depth growth may be negated if foreign firms handle financial intermediation, it is nevertheless expected to be a positive relationship.

Political

Government Spending and Crowding Out

As the government increases its spending relative to the economic output of the country, the spending must be accompanied either by additional taxation (direct diversion of resources from the economy) or by additional borrowing. The former option will directly decrease private savings and therefore domestic capital formation, while the latter will decrease the total amount of loanable funds in the economy, increasing the rental price of money. In traditional economies, the rental price of money is measured by the interest rate, but not using interest as the basis for money rental transactions does not change the underlying supply and demand dynamics in Islamic economies. In both cases, an increase in the rental rate of money will make investment

more expensive and will increasingly divert funds to high-risk investment opportunities. In either case, an increase in government spending will crowd out private uses of funds.

Additionally, high government spending relative to GDP is frequently associated with economically unsustainable policies. This makes it a proxy for macroeconomic and potentially political risk. Taken together, the proxy and crowding out effects make the expected relationship between government spending and the growth of financial depth negative.

Political Risk: Property rights, corruption, and consistent rule of law

Finance in general depends on the routine, predictable, and consistent honoring and enforcement of property and contract laws. If government routinely fails to enforce contracts, it increases the risk faced by financial institutions when lending, as they may find themselves unable to recover their assets. Likewise, if the government has the power to selectively violate property laws, either for political reasons or through outright corruption, it can have a chilling effect by making all transactions and future returns less certain and creating an environment in which successful investments may be targeted for expropriation. Political risk is therefore expected to have a negative relationship with the growth of financial depth.

Institutional

Legal System Origin

As noted earlier, the direction of causality between financial growth and economic growth was established by using the legal system of origin to instrument for financial depth (Levine 1998). The work of LLSV (1996) suggests that legal systems based in common law

provide better and more consistent creditor and shareholder rights than those legal systems based in civil law. Likewise, civil law is subordinate to the state and acts to enforce changes to the status quo, while common law acts as a check on changes to the status quo through precedent. This allows institutional origin to act as an additional proxy for political risk with regard to government interference in contract law. We would therefore expect to observe a higher, fixed state level effect of common law on financial depth than civil law. However, the literature has not addressed if there is a second order effect that would cause there to be a difference between civil and common law in the *rate* of financial growth.

Islam

Not all countries' populations are equally Islamic, and therefore the degree to which self-selection can be expected to play a role in decreasing the rate of financial growth will depend on the portion of the population which identifies with the precepts of *Sharia*. The countries in this paper vary widely in this regard, from just over half identifying as Islamic to almost one hundred percent Islamic.

DATA DESCRIPTION

The dataset used in this paper covers 26 Organization of Islamic Cooperation (OIC) member states over the period of 1990-2007. The data was compiled from multiple sources (which are indicated in the description of each variable) and is recorded at the country-year level. These countries comprise the subset of OIC member states with majority Muslim populations for which reliable macroeconomic and financial data could be obtained for the given time period. This country selection process allows the study to focus on states where the impact of Islamic religion is both acknowledged at the state level and is widespread throughout the population.

Some countries were excluded because of missing data; several additional states were excluded because they did not independently exist for the full time period (e.g. Palestine) or were subject to considerable exogenous shocks (Iraq during the first and second Gulf Wars) that would create disturbances in the data. Kazakhstan and the Kyrgyz Republic were both included despite having been part of the USSR until 1991, as they a) previously existed as an autonomous republics within the USSR and b) all relevant data was available for them by 1993 and 1996, respectively.

The dataset is further broken down into two subsets. The first subset has country-year data for the size of the Islamic banking sector for the following 13 OIC states: Albania, Bangladesh, Bahrain, Arab Republic of Egypt, Indonesia, Islamic Republic of Iran, Jordan, Kuwait, Malaysia, Saudi Arabia, Sudan, Tunisia, and Turkey. The second subset contains all 26 OIC countries with sufficient data to construct the dependent and control variables, including the remaining thirteen states with no country-year Islamic banking sector data: Algeria, Burkina

Faso, The Gambia, Equatorial Guinea, Kazakhstan, Kyrgyz Republic, Morocco, Mali, Mauritania, Niger, Senegal, Syrian Arab Republic, and Chad.

Dependent Variable

This paper seeks to study the impact of Islamic banking on depth of the financial sector in OIC states. The concept of financial depth is multifaceted, dealing with both the size of a financial system as well as its capacity to mobilize financial resources. A sizable banking system that only gives out loans to a handful of state-owned enterprises would not be considered deep despite its size, whereas a small but highly efficient financial sector that optimally directed funds and pooled risks would be considered to display greater financial depth than its size alone would suggest. Various proxies for financial depth have been used in growth and finance literature, including the value of deposits per capita and liquid liabilities, a measure of the money supply that includes all forms of financial instruments (Levine & King 1993) While these proxies measure the size of the banking sector, according to Beck, Levine, and Loayza (Beck, Levine, & Loayza 2000) they fail to differentiate private and state activity in the banking sector. This paper is interested in the potential for Islamic Banking to mobilize funds for investment, as capital formation is the theoretical link through which financial intermediation creates economic growth. Therefore, the proxy for financial depth employed here is the measure of credit provided to the private sector by money banks (as opposed to other non-bank financial institutions such as pension funds), expressed relative to state GDP. The data for this variable was obtained from the World Bank Financial Development and Structure database series in which it is expressed as an integer percentage of GDP, and was transformed into a decimal expression of percent by

dividing by 100. Throughout the variable construction process, all percentage variables constructed as integers are transformed in this fashion.

Policy Variables of Interest

In order to deal with the lack of reliable time series data on Islamic bank development, two separate policy variables of interest from two different sources of data were generated for this paper. The first is a measure of the Islamic banking sector relative to the national economy as a whole, expressed as a ratio of total *Sharia*-compliant assets to national GDP. This data is taken from the annual reports issued by the Islamic Development Bank (IDB), and as such reflects only the aggregate assets of IDB-affiliated Islamic banks in each country. There are some issues with the integrity of the data that require either established assumptions or cleaning. First, it is unclear if banks that appear or disappear from the reports correspond to business events or if they are the result of the incomplete nature of the record. For the purposes of this study it is assumed that these institutions begin or cease to exist along with their records. Secondly, there are a number of outlier cases where institutions either appear with vastly disproportionate sums of assets and then disappear the next year or existing entities record similar temporary asset spikes. As a matter of data hygiene, anytime an institution displays a greater than 1000 percent deviation in asset size in one year that is not maintained into the next year, the value is recoded as missing data. Finally, it is unclear if the figures presented in each report are adjusted for inflation, and if so, against what baseline. Erring on the side of caution in the absence of information, all figures are treated as current USD and inflation has been included

as a control variable in the models. Despite these drawbacks, this dataset represents the most complete source of long-term panel data publicly available on Islamic bank size.

The second variable is a dummy variable for the existence of a sizable Islamic banking sector derived from the values in the IDB dataset and cross-referenced with the 2007 "Top 500 Islamic Financial Institutions" (TB 500) survey from *The Banker* magazine. Any country that possessed an Islamic banking sector (according to the IDB database) or an Islamic financial sector (according to the Top 500 survey) with assets equal to 10 percent of national GDP in 2007 is coded as having a sizable Islamic banking sector, while the remainder are coded as not possessing one. This is an assumption only partially substantiated by the data: both Iran and Sudan fail to report Islamic sector figures for large portions of the 1990-2007 period. Since both of these states were pioneers of Islamic Finance during the 1980s, this data omission is discounted as an artifact of data collection by the IDB, rather than an indication that a significant Islamic banking sector did not exist in these states during the panel time period. This reversal of the first variable of interest's assumption that institutions "live and die" with their records makes any causal statements drawn from this variable more subject to measurement error, but it also allows for a more generalized model to be constructed that includes OIC countries which are known not to have developed Islamic banking sectors.

Secondary Variables of Interest

This study includes an Islamic demographic variable to capture the effect of the presence of non-Islamic religious minorities on the growth of financial depth. These values are taken as raw data from the Pew Forum's *"The Future of the Global Muslim Population"* report (Pew

Forum 2011). As religious conversion is a slow process for which systematic yearly data is not available, it is assumed that the 1990 estimate accurately reflected the religious composition of each state from 1990-2007. The resulting variable is a state-fixed, time-invariant percentage.

Additional Control Variables

In order to capture the effect of macroeconomic conditions on the development of financial intermediaries, this paper includes a number of standard control variables.

The annual growth rate of per-capita GDP in United States dollars (USD) is included to control for general economic development. A one year lag of per-capita GDP in USD is included to control for the financial accelerator effect, the phenomenon by which shocks to economic growth affect financial transactions in later time periods by appreciating or depreciating the value of the assets used as collateral in financial market transactions. Both values are taken directly from the World Bank World Development Indicators (WDI) dataset.

Gross domestic saving and gross domestic capital formation in USD are included to jointly capture the effect of capital flows within and out of the economy. As previously mentioned, this construction means that the saving control variable will capture net capital outflows, but it may also pick up forms of investment such as real estate transactions that are not considered "capital formation." These variables come from the data series in the WDI dataset that gives the values as a percent of GDP.

The rate of inflation and net final government consumption are included as proxies of price stability and government consumption, respectively. Inflation was taken from the WDI dataset series in which it was expressed as an annual percentage. Net final government

consumption in USD was taken from the WDI series that expressed it as a percentage of state GDP.

The variable for trade volume was constructed from the two WDI data series that record annual imports in USD as a percentage of GDP and exports in USD as a percentage of GDP. These variables were added together, to capture the total (rather than net) volume of trade related economic activity..

The variable for FDI was taken from the WDI Balance of Payments dataset series that expressed it in USD. It was transformed by being divided by the WDI series expressing state GDP in USD, creating a variable that expressed as a decimal percentage the size of FDI inflows relative to state GDP.

A series of dummy variables separating states into French civil law, British common law, and 20th century Socialist law systems has been included. These values are taken from the University of Gothenburg's Quality of Government (QoG) dataset, and are recoded from a categorical variable to a set of binary dummy variables that use French civil law as the reference category.

Political risk and rule of law is proxied by the Polity IV score for each country. The Polity IV index is an aggregate measure of the rule of law, freedom of participation, and restriction of the executive branch of government that is expressed as a sliding scale between authoritarianism and open democracy. The values used in this study are taken from the QoG and are rescaled from a zero centered index into a 0-10 range for ease of interpretation.

Lastly, a proxy for geographic location and natural resource endowment was included from the QoG database, as warmer climates tend to correlate with more working hours per day

and better agricultural production conditions during the year, but climates that are too close to the equator tend to have much lower GDP for reasons not yet fully explained. (Masters and McMillan 2000). A quadratic term for latitude was considered, as the relationship between latitude and longitude is not linear, but was rejected because of the constrained degrees of freedom of the model. It is coded as absolute value measure, from 0-1, of the distance of the state's capital in latitude from the equator.

ANALYTIC MODEL

This paper uses two different sets of models to explore as fully as possible the primary research question and hypothesis with the data available. The first model uses the available panel data reported by the Islamic Development Bank to test the impact of Islamic banking growth on the growth rate of financial depth within the set of reporting countries. The second model assumes that the lack of data indicating the existence of a meaningful Islamic banking sector indicates positive evidence that one does not exist, and uses that strong assumption to test the impact of Islamic banking across a larger group of OIC countries. This second model is intended as both a robustness check for the first model, as well as an attempt to examine the degree to which the results of the first model can be generalized.

Motivation

This paper employs panel data despite the scarcity of reliable time series data on Islamic banking because panel data offers several key advantages over cross-sectional data. The development of financial intermediaries, both Islamic and traditional, is driven by a number of exogenous forces that vary across time. By taking advantage of the time-series element of panel data, the average noise due to both cyclical (e.g. business cycle) shocks and unexpected "black swan" events (e.g. the invasion of Kuwait during the first Gulf War) is lessened, while the degree of freedom for including explanatory variables is increased. Examining multiple different countries rather than a single country over time also allows for the introduction of additional variation into the data as well as the possibility to control for country-specific effects that would otherwise bias the estimated coefficients, resulting in a higher degree of efficiency and accuracy.

Methodology - First Model

The first model used to test the null hypothesis is a linear dynamic panel-data model with a lag of the dependent variable used as an explanatory variable. The initial model is specified as follows:

$$y_{i,t} = \alpha_{i,t} + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \eta_i + \varepsilon_{i,t}$$

where y is the rate of change in the ratio of private credit to GDP, X is the ratio of Islamic bank assets to GDP, Z is the set of time-varying control variables, η_i is the unobserved fixed effect, ε is the error term, and i and t represent country and time.

As previously shown in the data section, there are strong reasons to believe that a number of country-level fixed effects exist within the sample group. The religious demographics and cultural behaviors that drive self-selection away from financial activity vary from country to country, but change very slowly over time. The form of legal system changes even more slowly, if at all, without the systematic revolutionary dismantling of the state. The geographic location of the state is entirely fixed. The inclusion of the fixed effect variable captures the impact that these factors have on the dependent variable and separates them from the error term.

Since finance is an industry based on reinvesting the returns of yesterday with regard to expectations about tomorrow, it is likely that this model will be subject to significant auto-correlation. According to the financial accelerator principle, when the market goes up, so do the value of assets. This generates additional collateral which can be borrowed against, traded, or

sold and reinvested. The process reverses itself when in decline: losses on investments reduce economic activity, which causes the value of assets to fall, prompting further curtailing of lending and additional deleveraging. A year with above average credit-to-GDP growth will likely be followed by another year of above average growth; likewise with below average growth. This autocorrelation violates the Gauss-Markov Theorem assumption that the error in two different time periods will be uncorrelated, and renders the model less than a best linear unbiased estimator. Since it is likely that this serial correlation will trend upward along with global growth, the positive autocorrelation will "understate the true variance of the OLS estimator." (Wooldridge 2009). This understatement will lead to smaller squared errors and higher t-scores, calling into question the validity of apparently statistically significant results.

In order to eliminate the serial correlation from the business cycle and the accelerator effect, I specify a new model that includes a lagged value of the dependent variable as an explanatory variable and a lagged value of the per-capita GDP growth rate.

$$y_{i,t} = \alpha(y_{i,t-1}) + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \eta_i + \varepsilon_{i,t}$$

There is the risk that the introduction of these lags may introduce additional autocorrelation into the model, as the fixed effects are equally correlated with the dependent variable in time period t and $t-1$. The Wooldridge test for first-order autocorrelation confirms that this is the case and rejects the null hypothesis that this dynamically specified model contains no first-order autocorrelation at the 99 percent level.

In order to remove this autocorrelation it is necessary to eliminate the country-fixed effects from the model by taking the first difference of both sides.

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'_1(X_{i,t} - X_{i,t-1}) + \beta'_2(Z_{i,t} - Z_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1})$$

This specification eliminates the fixed effects and the first order correlation in the independent and dependent variables, but introduces by construction new correlation between the error term and the lagged dependent variable (Levine, Loayza & Beck 2000). In order to deal with this persistent autocorrelation, I use the Arellano-Bond generalized method-of-moments estimator. Under the assumption that there is no correlation between the differences of the explanatory variables and the country-specific effect, the Arellano-Bond method states that additional lags of the independent variables can be used as instruments for the first difference equation. This method produces efficient estimators in the presence of first order autocorrelation, but not in the presence of second order autocorrelation (Arellano & Bond 1991). Surprisingly, the Arellano-Bond test for autocorrelation fails to reject the null hypothesis of autocorrelation at either the first or second level, possibly due to different coding implementation of the Wooldridge and Arellano-Bond tests.

In order for this Arellano-Bond test to produce efficient estimates it is necessary that "the lagged differences of the explanatory variables [be] uncorrelated with the residuals," as these lagged differences are used as exogenous instruments. (Levine, Loayza & Beck 2000). If there are more instruments than there are endogenous regressors, the Sargan test can be used to verify if such correlation exists. A post-estimation Sargan test rejects the null hypothesis as originally

specified, indicating that correlation remains. As this could be the result of second order autocorrelation that was not statistically verifiable with the Arellano-Bond test for autocorrelation, the model is retried using a second lag of the dependent variable. The Sargan test for this alternate specifications fails to reject the null hypothesis, indicating that the first differences are now valid instruments. As a result, the final model used for the Arellano-Bond test is specified as:

$$y_{i,t} = \alpha_1 y_{i,t-1} + \alpha_2 y_{i,t-2} + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \varepsilon_{i,t}$$

before first differences, and as:

$$y_{i,t} = \alpha_1 (y_{i,t-1} - y_{i,t-2}) + \alpha_2 (y_{i,t-2} - y_{i,t-3}) + \beta_1' (X_{i,t} - X_{i,t-1}) + \beta_2' (Z_{i,t} - Z_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1})$$

after first differences.

Methodology - Second Model

The lack of time series data on Islamic banking for many of the OIC countries prevents their inclusion in the first model. This means that the results of the first model may have limited external validity, as it is likely that there exist unobserved effects in common between the OIC states that 1) developed sizable and persistent Islamic banks and 2) had the ability and desire to collect and report statistics about those banks to the IDB. If this is the case, the observed effect of Islamic banking in the first model may not be an intrinsic characteristic effect of Islamic

banking, but the product of unobserved effects correlated with financial depth in general and Islamic banking.

In order to test the external validity of the first model, I specify a similar linear dynamic panel-data model:

$$y_{i,t} = \alpha(y_{i,t-1}) + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \beta_3 N_i + r_i + \varepsilon_{i,t}$$

where y is the rate of change in the ratio of private credit to GDP, X is a dummy variable indicating if an OIC country had developed an Islamic banking sector during the period of 1995-2007, Z is the set of time-varying control variables, N is a collection of non-time varying dummy variables, r is a country-level random effect, ε is the error term, and i and t represent country and time.

In this model, fixed effects are precluded, as the variable of interest is a fixed effect at the country level. The inclusion of a fixed effect would create collinearity between the variable of interest and the fixed effect, and would cause the model to fail. I therefore specify a random effects model, which is based on the assumption that it is therefore necessary to try and account for omitted variable bias by including additional country-level fixed effects. If we eliminate all country-level effects, we artificially constrain α to be the same for all observations, which will bias the coefficient that is correlated with the unobserved effect. In order to deal with this bias, I employ a random-effects model that partially pools information across countries to generate more efficient α_i estimates.

While potentially more efficient than fixed effects, random-effects will produce biased coefficient estimates if the independent variable of interest is correlated with α_i . This occurs whenever there is an omitted variable that is correlated with the variable of interest and the dependent variable, with the bias being greater the stronger the correlation. (Clark & Linzer 2012) A Hausman test fails to reject the null hypothesis that there is no correlation between the independent variables, indicating that any bias will likely be minor. It should be noted that this result was obtained while using robust clustered standard errors in order to control for heteroskedasticity, which can violate the asymptotic assumptions of the Hausman test under some circumstances.

Like the first model, this model is subject to autocorrelation. Unlike the first model, the nature of the independent variable of interest precludes all realistic remedies. Both first differences and the Arellano-Bond method eliminate state-fixed effects, which would remove the variable of interest from the model, while the low degree of freedom provided by the robust standard error precludes the inclusion of additional lagged variables. Any t-scores will therefore appear more statistically significant than they actually are, and coefficients may be biased. While less than desirable, bias to the coefficient value associated with having an Islamic banking sector is of little practical concern for the purposes of this test; coefficient sign and significance are more important for establishing external validity. Likewise, the upward bias of the t-score is only a concern if the results demonstrate statistical significance for the Islamic banking variable.

Robustness Checks

In order to account for outliers and missing data within the data set, both models are subjected to two robustness checks. The first removes Iran from the dataset, then reruns the model. The second reruns the model, but for the time period of 2000-2007.

Iran has the potential to create bias because traditional finance has been illegal in Iran since 1983. All finance in Iran is Islamic finance by definition, so the rate of change in aggregate private sector credit from banks does not capture any effect of Islamic bank growth on traditional bank market share. Growth in the size of the Islamic banking sector relative to GDP would be expected to mirror growth in the credit it provided. This correlation can be demonstrated by regressing the growth of financial depth on the growth of Islamic bank assets for just Iran, which yields an R-square value of 0.72 for the single-variable model. The model used in this study examines the rate of change of aggregate credit availability as a function of the size of the Islamic banking sectors, which would only reflect returns to scale of Islamic banking in the absence of a traditional financial sector, since a one unit change of Islamic assets would by definition result in a one unit change in aggregate assets. Assuming relatively constant returns to scale, the expected impact of an increase in Islamic bank assets in Iran on the rate of increase in aggregate bank assets would be zero, and the inclusion of Iran would therefore bias the overall coefficient on Islamic assets toward zero.

Running the models with a reduced timeframe serves as a specification check on the time period as well as a robustness check for the impact of missing data. Islamic banking is a young industry, and any time series with observations that come too heavily from a time period when

Islamic banking was just taking off risks biasing the observed effect of Islamic banking towards zero. Likewise, because both Islamic banking and World Bank statistical collection in OIC countries were less developed in the 1990s, a disproportionate amount of missing data comes from the first half of the dataset. For the first model, 80.4 percent of the missing values for financial depth and 90.7 percent of the missing values for Islamic banking assets occur between 1990-1999. This effect is less pronounced in the second model due to the use of an imputed Islamic banking dummy variable for observations, but the validity of such imputation becomes more tenuous the greater the time distance between the imputed observation and the data used to generate it.

RESULTS

The results of both the first model and the second model as originally specified fail to reject the null hypothesis that Islamic banking growth is not increasing the rate of growth of financial depth. However, the additional specification tests reveal a strong and statistically significant relationship between Islamic bank assets and the rate of growth of financial depth in the first model, though not in the second.

Table 1
First Model Estimation Results: 1990-2007
 Dependent Variable: Private Credit from Money Banks / GDP

Variables	OLS with Fixed Effects			Arellano-Bond		
	I	II	III	I	II	III
Dependent Lag 1	0.187*** (0.094)	0.264* (0.059)	0.180*** (0.094)	0.290* (0.102)	0.417* (0.059)	0.291* (0.105)
Dependent Lag 2				-0.205* (0.026)	-0.208* (0.079)	-0.210* (0.022)
Sharia Assets	0.016 (0.022)	-0.019 (0.049)	0.016 (0.024)	0.018 (0.016)	-0.011 (0.041)	0.022*** (0.013)
Per-Capita GDP Growth	-0.286*** (0.155)		-0.303*** (0.166)	-0.371*** (0.192)		-0.369*** (0.201)
Per-Capita GDP Growth Lag	0.301*** (0.155)		0.301*** (0.168)	0.301** (0.147)		0.287*** (0.152)
Investment	0.488* (0.141)		0.467* (0.099)	0.555* (0.100)		0.557* (0.102)
Saving	-0.213** (0.088)		-0.223*** (0.108)	-0.227* (0.053)		-0.241* (0.072)
Government Spending		0.138 (0.168)	-0.215 (0.271)		0.237 (0.207)	-0.007 (0.285)
Trade Volume		-0.104 (0.096)	-0.073 (0.059)		-0.034 (0.086)	0.009 (0.040)
FDI		0.186 (0.146)	0.032 (0.083)		0.119 (0.113)	-0.024 (0.051)
Inflation	-0.048* (0.013)		-0.050** (0.016)	-0.040 (0.034)		-0.052*** (0.029)
Political Risk		-0.003*** (0.002)	-0.000 (0.002)		-0.005*** (0.003)	-0.003 (0.002)
Constant	-0.053*** (0.026)	0.088 (0.098)	0.051 (0.091)	-0.062* (0.015)	0.021 (0.106)	-0.053 (0.080)
Observations	162	166	162	137	140	137
R-squared	0.419	0.172	0.446			

Robust standard errors in parentheses - * p<0.01, ** p<0.05, *** p<0.1

Sources: World Bank World Development Indicators, World Bank Balance of Payments Dataset, World Bank Financial Development and Structure Dataset, Islamic Development Bank Islamic Banks and Financial Institutions Industry Highlights (1990-2007), Quality of Government Institute Quality of Government Database.

Main Policy Variables

Model #1

The results of both the fixed-effects model and the Arellano-Bond model show a universally positive impact of Islamic banking growth on the growth rate of credit to the private sector. In the base models the impact of the change is small, amounting to roughly a 0.016 percent increase in the rate of financial depth growth for a 1 percent growth of Islamic banking assets relative to GDP in the base fixed-effects model, and a slightly higher 0.022 percent increase in the Arellano-Bond model. Only in the Arellano-Bond model can the null hypothesis that the actual impact is zero be rejected, and only at the ten percent level. Taken at face value these results would lend strength to the null hypothesis that Islamic bank growth is coming from sharing pre-existing market growth, but the specification tests tell a different story.

The impact of excluding the first 10 years of the time series roughly doubles the size of the coefficient on Islamic bank assets, demonstrating that the inclusion of the earlier observations was likely biasing the observed impact of the sector towards zero relative to the current impact of Islamic banking. While the magnitude becomes more meaningful, statistical significance actually decreases to the point where the coefficient on Islamic assets is just barely no longer statistically significant at the 10 percent level. The size of the shift in significance is not highly relevant, as it represents a change of less than 1 percent probability that the results are not equal to zero that just happens to push the coefficient over the line into formal statistical insignificance. While confirming that a shorter time-series may generate more robust results, that change by itself makes little difference in the weak findings of the base model.

The impact of removing Iran from the model is much more dramatic. The coefficient for Islamic banking assets jumps from 0.016 to 0.139 in the fixed-effects model, and from 0.022 to 0.114 in the Arellano-Bond model, an average increase of 667 percent. This is strong evidence that the inclusion of Iran biased the coefficient on Islamic banking assets toward zero. The combination of the two robustness checks results in an even more dramatic shift: the coefficients in both models increase by over 300 percent to almost identical values (0.478 for the fixed-effects model, 0.476 for the Arellano-Bond model), and become statistically significant at the 1 percent level in fixed-effects and the 5 percent level using the Arellano-Bond estimator.

Table 2
First Model Estimation Results - Iran Sensitivity Test: 2000-2007
 Dependent Variable: Private Credit from Money Banks / GDP

Variables	OLS with Fixed-Effects		Arellano-Bond	
	Normal	Test	Normal	Test
Dependent Lag 1	0.254*** (0.139)	0.205 (0.160)	0.147 (0.166)	0.141 (0.148)
Dependent Lag 2			-0.268* (0.026)	-0.206* (0.055)
Sharia Assets	0.025 (0.025)	0.478* (0.145)	0.033 (0.021)	0.476** (0.219)
Per-Capita GDP Growth	-0.467** (0.163)	-0.469** (0.179)	-0.196** (0.093)	-0.221*** (0.113)
Per-Capita GDP Growth Lag	0.385 (0.260)	0.341 (0.256)	0.408** (0.207)	0.354*** (0.188)
Investment	0.217 (0.248)	0.284 (0.191)	0.461** (0.229)	0.540* (0.207)
Saving	-0.331* (0.079)	-0.416* (0.102)	-0.112 (0.099)	-0.146 (0.100)
Government Spend	-0.416*** (0.218)	-0.864** (0.308)	0.190 (0.317)	-0.061 (0.334)
Trade Volume	-0.019 (0.059)	-0.080 (0.067)	-0.002 (0.065)	-0.042 (0.063)
FDI	0.025 (0.156)	-0.046 (0.155)	0.014 (0.207)	-0.063 (0.185)
Inflation	-0.006 (0.052)	-0.002 (0.057)	-0.020 (0.046)	-0.021 (0.042)
Political Risk	-0.001 (0.003)	0.004 (0.003)	-0.001 (0.004)	0.005 (0.004)
Constant	0.109 (0.074)	0.171*** (0.089)	-0.107 (0.098)	-0.101 (0.097)
Observations	94	86	89	82
R-squared	0.343	0.417		

Robust standard errors in parentheses: * p<0.01, ** p<0.05, *** p<0.1

Sources: World Bank World Development Indicators, World Bank Balance of Payments Dataset, World Bank Financial Development and Structure Dataset, Islamic Development Bank Islamic Banks and Financial Institutions Industry Highlights (1990-2007), Quality of Government Institute Quality of Government Database.

Model #2

The results of the random-effects OLS model closely parallel that of the base model, but do not respond in the same manner to the robustness and specification checks. While the observed effect of having an Islamic banking sector on financial depth is positive, that effect is both extremely small and statistically insignificant. Neither the magnitude of the effect nor the significance change in a meaningful way with the removal of Iran from the sample, and the restricting of the sample to the period of 2000-2007 actually decreases the size of the coefficient on Islamic finance.

Table 3
Second Model Estimation Results: 1990-2007
 Dependent Variable: Private Credit from Money Banks / GDP

Variables	OLS with Random Effects		
	I	II	III
Dependent Variable Lag	0.418* (0.061)	0.413* (0.060)	0.394* (0.055)
Islamic Banking Sector	0.005 (0.004)	0.010* (0.004)	0.005 (0.004)
Per-Capita GDP Growth	-0.073 (0.048)		-0.093** (0.046)
Per-Capita GDP Growth Lag	0.270* (0.101)		0.251** (0.104)
Investment	0.072*** (0.041)		0.082*** (0.045)
Saving	-0.023 (0.016)		-0.025*** (0.013)
Government Spending	0.014 (0.049)		-0.001 (0.052)
Trade Volume	-0.000 (0.005)		-0.001 (0.004)
FDI	-0.043** (0.021)		-0.035 (0.029)
Inflation	-0.013** (0.006)		-0.020* (0.007)
Political Risk		0.000 (0.000)	0.001 (0.000)
Common Law		-0.002 (0.004)	0.007 (0.005)
Socialist Law		0.005 (0.006)	-0.004 (0.007)
Muslim Population		-0.000 (0.000)	-0.000*** (0.000)
Latitude		0.029* (0.009)	0.048* (0.018)
Constant	-0.014 (0.010)	0.002 (0.008)	-0.017 (0.012)
Observations	359	379	359
R-squared	0.257	0.145	0.264

Robust standard errors in parentheses: * p<0.01, ** p<0.05, *** p<0.1

Sources: World Bank World Development Indicators, World Bank Balance of Payments Dataset, World Bank Financial Development and Structure Dataset, Islamic Development Bank Islamic Banks and Financial Institutions Industry Highlights (1990-2007), Quality of Government Institute Quality of Government Database, The Pew Forum on Religion & Public Life "The Future of the Global Muslim Population" Report.

Table 4
Second Model Estimation Results - Iran Sensitivity Test: 2000-2007
 Dependent Variable: Private Credit from Money Banks / GDP

VARIABLES	Base			Test		
	I	II	III	I	II	III
Dependent Variable Lag	0.415* (0.128)	0.377* (0.111)	0.343** (0.133)	0.418* (0.130)	0.378* (0.113)	0.346** (0.137)
Islamic Banking Sector	-0.003 (0.005)	0.003 (0.004)	0.003 (0.004)	-0.003 (0.005)	0.002 (0.005)	0.004 (0.005)
Per-Capita GDP Growth	-0.158*** (0.087)		-0.214** (0.099)	-0.158*** (0.088)		-0.218** (0.103)
Per-Capita GDP Growth Lag	0.226** (0.098)		0.170** (0.079)	0.223** (0.099)		0.165** (0.079)
Investment	0.101* (0.030)		0.089** (0.038)	0.101* (0.037)		0.097** (0.046)
Saving	-0.026 (0.018)		-0.024 (0.017)	-0.026 (0.018)		-0.023 (0.017)
Government Spending	0.056 (0.052)		0.005 (0.061)	0.055 (0.053)		0.006 (0.062)
Trade Volume	-0.008 (0.010)		-0.009 (0.007)	-0.008 (0.010)		-0.010 (0.007)
FDI	-0.067*** (0.040)		-0.032 (0.048)	-0.068*** (0.039)		-0.034 (0.049)
Inflation	0.021 (0.022)		-0.001 (0.027)	0.020 (0.024)		0.001 (0.033)
Political Risk		0.000 (0.001)	-0.000 (0.001)		0.000 (0.001)	-0.000 (0.001)
Common Law		-0.009*** (0.004)	-0.002 (0.006)		-0.008*** (0.004)	-0.003 (0.007)
Socialist Law		0.002 (0.008)	0.006 (0.010)		0.002 (0.008)	0.007 (0.011)
Muslim Population		-0.000 (0.000)	-0.000 (0.000)		-0.000 (0.000)	-0.000 (0.000)
Latitude		0.050** (0.023)	0.051*** (0.027)		0.050** (0.023)	0.050*** (0.029)
Constant	-0.013 (0.011)	0.001 (0.009)	-0.009 (0.022)	-0.013 (0.013)	0.001 (0.009)	-0.011 (0.023)
Observations	183	196	183	175	188	175
R-Squared	0.147	0.082	0.165	0.147	0.084	0.164

Robust standard errors in parentheses: * p<0.01, ** p<0.05, *** p<0.1

Sources: World Bank World Development Indicators, World Bank Balance of Payments Dataset, World Bank Financial Development and Structure Dataset, Islamic Development Bank Islamic Banks and Financial Institutions Industry Highlights (1990-2007), Quality of Government Institute Quality of Government Database, The Pew Forum on Religion & Public Life "The Future of the Global Muslim Population" Report.

Other Variables of Interest

The coefficient on the variable measuring the portion of the population who follow Islam in the second model is of some interest, as it is both negative and significant at the 10 percent level in the overall panel. This significance should be viewed skeptically, in light of the probability that it is assuredly being biased upward by the uncorrected autocorrelation present in the model. That said, it is the extremely small magnitude of the sign that is interesting: a 50 percent increase in Islam within a country would correspond with only a two-thirds of one percentage point decrease in the rate of financial depth growth. According to the model results, this decrease could be offset by increasing the share of GDP going to gross capital formation by less than one tenth of one percentage point. This may be a byproduct of low variation in religious diversity across the sample, with an average of 84.5 percent of the population following Islam, with a standard deviation of 17.0 percent.

Control Variables

The clear drivers of financial growth in both models, other than previous financial growth, are per-capita GDP growth and gross domestic capital formation. Both are significant at least at the ten percent level in both base models, and have large positive coefficients across the random-effects, fixed-effects, and Arellano-Bond models. Model 1 indicates that a one percentage point increase in gross domestic capital formation would result in approximately a one-half percentage point increase in private sector credit.

Conversely, it appears that net capital outflows are one of the largest drags upon the growth of the financial sector in OIC countries. In all base models the coefficient on gross

national savings is significant at the ten percent level (and significant at the one percent model with Arellano-Bond) and strongly negative. This indicates that there are financial resources available for savings significantly above those that are being invested domestically, and that they are being channeled abroad or into goods that do not count as capital formation domestically. While there is no way to disaggregate the two with the current data in this paper, savings being used in the latter manner may be a form of informal Islamic banking, with observant Muslims buying real-estate and tradable commodities as appreciating stores of wealth.

DISCUSSION AND POLICY IMPLICATIONS

The empirical findings of this study appear to support the *rejection* of the null hypothesis that Islamic banking growth does not increase the rate of growth of banking depth. That is, as a proxy for the additional inclusion and resource mobilization role that links financial development to poverty reduction and economic growth, the observed correlation between the rate of growth of financial depth and the growth of Islamic banking assets provides empirical evidence that promoting Islamic banking can serve as a development tool. The results are only unambiguous with certain specification constraints and only for a select group of OIC states; they should be understood to be contingent and open to interpretation rather than definitive.

The results from the first model appear to strongly reject the null hypothesis: in the countries that already possess Islamic financial institutions, the growth of those institutions appears to correlated with the mobilizing of additional resources into the financial system. This is not the same as saying that the growth of those institutions is causing the additional mobilization of those resources into the financial system. This study does not control for the direction of the causality nor does it control for time-varying effects across states. It may be the case that new inventions or innovations within or proximate to the financial sector in these countries are driving a portion of the increased depth by making financial transactions more efficient. It is worth noting that the time period of the study roughly corresponds to the lifespan of the internet, and that the highly significant results obtained for the 2000-2007 period roughly correspond to time period in which the Internet became a vehicle for mass commerce and banking. If online banking was adopted in the countries under study during this period, the increase in financial depth that correlates with the growth of Islamic banking may be spurious

and instead reflect underlying technological innovations which decrease the barriers to entry for smaller banks while also increasing the efficiency of credit allocation. The investigation of the potential for year-fixed effects is a possible avenue for future research by Islamic banking scholars and should be kept in mind by Islamic-banking-as-development advocates trying to expand Islamic banking to areas with human capital and infrastructure issues that could constrain the use of modern e-banking methods.

Despite these results, the discrepancy between the results of the first model and the second model call into question the degree to which it is uniquely Islamic banking that drives financial depth growth in OIC countries. Given the results of the first model, which are derived from more robust methods and accurate data, it seems unlikely that there is genuinely no effect of Islamic banking on the growth rate of financial depth. While the different results may be due to model-misspecification or omitted variable bias, it seems likely that differences between the states included in both models and those included in only the second model may be the root cause. If successful traditional and Islamic banking sector growth are both predicated on a common set of unobserved factors that the first model states possess but the exclusively second model states do not, then a dummy variable for Islamic banking would serve as a perfect proxy for the existence of these factors, but previous credit rate growth would serve as a much more accurate predictor of their effect due to being coded as a continuous variable. Given such an assumption, the amount of variation that would be explained by the Islamic banking dummy but not by the lag of previous credit rate growth would be very low. Among the states coded as having a meaningful Islamic banking sector, the average rate of private sector credit growth per year was 1.20 percent of GDP, whereas among those coded as not possessing a meaningful

Islamic banking sector, the rate was only 0.17 percent of GDP. Given this wide discrepancy, it may very well be that the first model group of states is qualitatively different than the second model group of states with regard to unobserved determinants of both traditional and Islamic sector growth. As the lagged dependent variable is both strongly statistically significant and of a highly meaningful magnitude in the second model, such an explanation for the absence of a meaningful coefficient for Islamic finance cannot be ruled out. If this is the case, simply introducing Islamic banking into a state is unlikely to produce either a healthy banking sector or achieve development goals.

Similarly, it should be noted that nothing in the models employed here would account for the possibility that the observed effect of Islamic banking growth on financial depth in the first model states is caused not by the nature of Islamic finance, but by particular changes in state-specific laws regulating and restricting financial activity. If OIC countries are easing existing restrictions or regulations on banking, but only doing so for Islamic banking, then the results observed could be an effect from partial and asymmetrical deregulation. The political and governmental proxies used in this study are too high level to detect such changes, and the fixed-effects model would not pick up a time-varying effect. If this is the case, then it would indicate that Islamic finance is overcoming religious objections, not among the people who wish to participate in finance, but among those who control its access. Focusing solely on Islamic finance as a development tool in this case would risk creating an institutionalized double standard within the financial market, one which might effectively prevent the full development potential of free and voluntary participation in both forms of finance from being realized. In the absence of further, higher resolution studies of individual states or groups of states that are

capable of modeling the effect of individual policy changes, development advocates should consider the potential for market structure path dependence to develop as a result of intervening on behalf of one particular way of providing financial services.

Setting aside these potential limitations for future investigation, the results of this study indicate that the spread and development of Islamic finance may benefit from breadth in the form of a cross-state approach. As previously noted, capital outflows are highly negatively correlated with financial depth. To a degree, the choice of proxy (domestic private credit from money banks) for financial depth makes this definitional, as money sent abroad cannot be lent out domestically. However, the impact of this outflow would be lessened if the flows were being handled by domestic banks, as it would stimulate growth in both the available capital of domestic banks and their capacity and expertise. There is great potential for a regional financial hub to emerge within the non-Asian segment of the Islamic finance community and for domestic Islamic banks to emerge as international players within the Islamic world. However, in order for this to happen, standardization of the legal definitions and treatment of Islamic finance must become more standardized across states.

As demonstrated by the limited data availability on Islamic banking assets throughout the timeframe of this study, accounting data on Islamic banks is very poor and it is largely non-standardized, raising information transaction and generation costs for investors and making it difficult for policy analysts to create and use aggregated macroeconomic information above the firm level. Policy makers and Islamic banking professionals should work together to encourage the mandatory adoption of the Accounting and Auditing Organization for Islamic Financial Institutions standards both for firms and for data collection by the central banks of OIC member

states. As of its 2007 publication of the world's Top 500 Islamic Financial Institutions, *The Banker* magazine reported that only Bahrain, Sudan, and Jordan had "fully embraced" these standards (TB 500). Such standardized accounting and information collection practices are the mechanical prerequisite for standardized and enforceable international laws and regulations.

Lastly, it should be noted that the sensitivity analysis demonstrates that, assuming there is a genuine causal link between Islamic banking development and financial depth, it takes a great deal of time to start seeing results. Only by excluding the first decade of development does this study show a strong and significant correlation between Islamic banking growth and financial depth. This does not mean that there was no such link during the 1990-1999 period, but rather that the impact was too small to be measured at the country-year level. Since the time horizon of most development projects is not measured in decades, it may be advisable for development activists to focus on cultivating the space in which Islamic banking can grow through education programs, lobbying for regulatory and legal reforms, and working to put in place the physical and human capital necessary for entrepreneurs to pursue their own *Sharia*-compliant enterprises.

CONCLUSION

By suggesting a link between Islamic banking and the rate of growth of financial depth in OIC countries, this study has added empirical support to the theory that Islamic banking can be used as a pro-growth, anti-poverty tool. OIC countries with a majority Muslim population that have reported year-over-year data to the Islamic Development Bank show higher rates of financial depth growth the larger the size of their Islamic banking sector relative to their GDP. However, this study has also demonstrated that insufficient data exists to generalize the findings about countries that have already developed an Islamic financial sector to those that have not. This study finds no evidence that simply having an Islamic sector increases the rate of financial depth growth when compared across a larger section of OIC countries.

While these findings are robust for OIC countries that already possess an Islamic banking sector, they are unable to establish a link between simply having a sector and the aggregate rate of financial depth growth across all OIC countries. It is likely that this is the result of the functional form specification required by the limitations of the data available rather than a finding-of-no-finding, and may indicate that the presence of other unexamined qualities or capabilities of a state are necessary prerequisites for both traditional and Islamic banking growth. The sensitivity of the results to specification is reason for policymakers to carefully consider the context and assumptions behind any initiative to expand Islamic banking outside of those states in which it already exists, as the results presently observed may not be transferable to other states by simply replicating the institutional form of Islamic banks as they currently exist.

APPENDIX

Table 5
First Model Estimation Results: 2000-2007
 Dependent Variable: Private Credit from Money Banks / GDP

Variables	OLS Estimator with Fixed Effects			Arellano-Bond Estimator		
	I	II	III	I	II	III
Dependent Lag 1	0.245*** (0.127)	0.233 (0.190)	0.254*** (0.139)	0.161 (0.159)	0.129 (0.182)	0.147 (0.166)
Dependent Lag 2				-0.270* (0.019)	-0.353* (0.045)	-0.268* (0.026)
Sharia Assets	0.014 (0.023)	0.045 (0.048)	0.025 (0.025)	0.046 (0.035)	0.033 (0.032)	0.033 (0.021)
Per-Capita GDP Growth	-0.438** (0.185)		-0.467** (0.163)	-0.168*** (0.095)		-0.196** (0.093)
Per-Capita GDP Growth Lag	0.434*** (0.219)		0.385 (0.260)	0.407** (0.201)		0.408** (0.207)
Investment	0.141 (0.231)		0.217 (0.248)	0.385** (0.192)		0.461** (0.229)
Savings	-0.271** (0.096)		-0.331* (0.079)	-0.127** (0.062)		-0.112 (0.099)
Government Spend		-0.237 (0.199)	-0.416*** (0.218)		0.175 (0.172)	0.190 (0.317)
Trade Volume		-0.024 (0.063)	-0.019 (0.059)		0.018 (0.065)	-0.002 (0.065)
FDI		0.164 (0.186)	0.025 (0.156)		0.232 (0.198)	0.014 (0.207)
Inflation	-0.001 (0.045)		-0.006 (0.052)	-0.076 (0.072)		-0.020 (0.046)
Political Risk		-0.001 (0.003)	-0.001 (0.003)		0.000 (0.004)	-0.001 (0.004)
Constant	0.034 (0.064)	0.052 (0.069)	0.109 (0.074)	-0.063 (0.049)	-0.045 (0.070)	-0.107 (0.098)
Observations	94	95	94	89	90	89
R-squared	0.321	0.090	0.343			

Robust standard errors in parentheses: * p<0.01, ** p<0.05, *** p<0.1

Sources: World Bank World Development Indicators, World Bank Balance of Payments Dataset, World Bank Financial Development and Structure Dataset, Islamic Development Bank Islamic Banks and Financial Institutions Industry Highlights (1990-2007), Quality of Government Institute Quality of Government Database.

Table 6
First Model Estimation Results - Iran Sensitivity Test: 1990-2007
 Dependent Variable: Private Credit from Money Banks / GDP

Variables	OLS with Fixed-Effects		Arellano-Bond	
	Normal	Test	Normal	Test
Dependent Lag 1	0.180*** (0.094)	0.180*** (0.091)	0.291* (0.105)	0.288* (0.100)
Dependent Lag 2			-0.210* (0.022)	-0.202* (0.029)
Sharia Assets	0.016 (0.024)	0.139 (0.095)	0.022*** (0.013)	0.114*** (0.067)
Per-Capita GDP Growth	-0.303*** (0.166)	-0.334*** (0.177)	-0.369*** (0.201)	-0.394*** (0.202)
Per-Capita GDP Growth Lag	0.301*** (0.168)	0.278 (0.167)	0.287*** (0.152)	0.261 (0.161)
Investment	0.467* (0.099)	0.525* (0.108)	0.557* (0.102)	0.601* (0.107)
Saving	-0.223*** (0.108)	-0.241** (0.108)	-0.241* (0.072)	-0.258* (0.076)
Government Spending	-0.215 (0.271)	-0.281 (0.274)	-0.007 (0.285)	-0.079 (0.295)
Trade Volume	-0.073 (0.059)	-0.080 (0.057)	0.009 (0.040)	0.002 (0.038)
FDI	0.032 (0.083)	0.021 (0.076)	-0.024 (0.051)	-0.037 (0.049)
Inflation	-0.050** (0.016)	-0.052** (0.018)	-0.052*** (0.029)	-0.052*** (0.028)
Political Risk	-0.000 (0.002)	0.001 (0.001)	-0.003 (0.002)	-0.002 (0.003)
Constant	0.051 (0.091)	0.047 (0.096)	-0.053 (0.080)	-0.048 (0.080)
Observations	162	154	137	130
R-squared	0.446	0.456		

Robust standard errors in parentheses: * p<0.01, ** p<0.05, *** p<0.1

Sources: World Bank World Development Indicators, World Bank Balance of Payments Dataset, World Bank Financial Development and Structure Dataset, Islamic Development Bank Islamic Banks and Financial Institutions Industry Highlights (1990-2007), Quality of Government Institute Quality of Government Database.

Table 7
Second Model Estimation Results: 2000-2007
 Dependent Variable: Private Credit from Money Banks / GDP

Variables	OLS with Random Effects		
	I	II	III
Dependent Variable Lag	0.415* (0.128)	0.377* (0.111)	0.343** (0.133)
Islamic Banking Sector	-0.003 (0.005)	0.003 (0.004)	0.003 (0.004)
Per-Capita GDP Growth	-0.158*** (0.087)		-0.214** (0.099)
Per-Capita GDP Growth Lag	0.226** (0.098)		0.170** (0.079)
Investment	0.101* (0.030)		0.089** (0.038)
Saving	-0.026 (0.018)		-0.024 (0.017)
Government Spending	0.056 (0.052)		0.005 (0.061)
Trade Volume	-0.008 (0.010)		-0.009 (0.007)
FDI	-0.067*** (0.040)		-0.032 (0.048)
Inflation	0.021 (0.022)		-0.001 (0.027)
Political Risk		0.000 (0.001)	-0.000 (0.001)
Common Law		-0.009*** (0.004)	-0.002 (0.006)
Socialist Law		0.002 (0.008)	0.006 (0.010)
Muslim Population		-0.000 (0.000)	-0.000 (0.000)
Latitude		0.050** (0.023)	0.051*** (0.027)
Constant	-0.013 (0.011)	0.001 (0.009)	-0.009 (0.022)
Observations	183	196	183
R-Squared	0.147	0.082	0.165

Robust standard errors in parentheses: * p<0.01, ** p<0.05, *** p<0.1

Sources: World Bank World Development Indicators, World Bank Balance of Payments Dataset, World Bank Financial Development and Structure Dataset, Islamic Development Bank Islamic Banks and Financial Institutions Industry Highlights (1990-2007), Quality of Government Institute Quality of Government Database, The Pew Forum on Religion & Public Life "The Future of the Global Muslim Population" Report

Table 8
Second Model Estimation Results - Iran Sensitivity Test: 1990-2007
 Dependent Variable: Private Credit from Money Banks / GDP

VARIABLES	Base			Test		
	I	II	III	I	II	III
Dependent Variable Lag	0.418* (0.061)	0.413* (0.060)	0.394* (0.055)	0.419* (0.064)	0.412* (0.062)	0.395* (0.058)
Islamic Banking Sector	0.005 (0.004)	0.010* (0.004)	0.005 (0.004)	0.006 (0.005)	0.012* (0.004)	0.007 (0.005)
Per-Capita GDP Growth	-0.073 (0.048)		-0.093** (0.046)	-0.078 (0.050)		-0.101** (0.048)
Per-Capita GDP Growth Lag	0.270* (0.101)		0.251** (0.104)	0.268* (0.102)		0.248** (0.104)
Investment	0.072*** (0.041)		0.082*** (0.045)	0.078*** (0.046)		0.088*** (0.049)
Saving	-0.023 (0.016)		-0.025*** (0.013)	-0.022 (0.016)		-0.024*** (0.013)
Government Spending	0.014 (0.049)		-0.001 (0.052)	0.014 (0.049)		-0.005 (0.052)
Trade Volume	-0.000 (0.005)		-0.001 (0.004)	-0.001 (0.006)		-0.002 (0.005)
FDI	-0.043** (0.021)		-0.035 (0.029)	-0.045*** (0.023)		-0.036 (0.030)
Inflation	-0.013** (0.006)		-0.020* (0.007)	-0.013** (0.006)		-0.020* (0.008)
Political Risk		0.000 (0.000)	0.001 (0.000)		0.000 (0.000)	0.001 (0.000)
Common Law		-0.002 (0.004)	0.007 (0.005)		-0.003 (0.003)	0.006 (0.005)
Socialist Law		0.005 (0.006)	-0.004 (0.007)		0.005 (0.006)	-0.004 (0.007)
Muslim Population		-0.000 (0.000)	-0.000*** (0.000)		-0.000 (0.000)	-0.000*** (0.000)
Latitude		0.029* (0.009)	0.048* (0.018)		0.030* (0.009)	0.049* (0.018)
Constant	-0.014 (0.010)	0.002 (0.008)	-0.017 (0.012)	-0.014 (0.010)	0.002 (0.008)	-0.017 (0.012)
Observations	359	379	359	344	363	344
R-Squared	0.257	0.145	0.264	0.259	0.146	0.266

Robust standard errors in parentheses: * p<0.01, ** p<0.05, *** p<0.1

Sources: World Bank World Development Indicators, World Bank Balance of Payments Dataset, World Bank Financial Development and Structure Dataset, Islamic Development Bank Islamic Banks and Financial Institutions Industry Highlights (1990-2007), Quality of Government Institute Quality of Government Database, The Pew Forum on Religion & Public Life "The Future of the Global Muslim Population" Report.

Table 9

Descriptive Statistics for Time Varying Variables: Correlations

Variables	1	2	3	4	5	6	7	8	9	10
1. Credit	-									
2. Sharia	0.042	-								
3. Δ Cap GDP	-0.086	0.017	-							
4. Investment	0.295	0.184	0.289	-						
5. Saving	-0.099	0.232	-0.023	0.132	-					
6. Government	0.109	0.189	-0.229	-0.181	0.001	-				
7. Trade	0.015	0.019	-0.019	0.221	0.263	0.297	-			
8. FDI	0.109	-0.007	0.161	0.099	-0.220	0.067	0.385	-		
9. Inflation	-0.080	-0.098	-0.171	-0.027	-0.067	-0.263	-0.323	-0.179	-	
10. Politics	-0.059	-0.193	0.167	0.251	-0.171	-0.617	-0.091	-0.075	0.431	-

Table 10

Descriptive Statistics for Time Varying Variables: Summary Statistics

Statistics	Credit	Sharia	Δ GDP	Investment	Saving	Gov	Trade	FDI	Inflation	Politics
Mean	0.005	0.120	0.0257	0.234	0.180	0.150	0.782	0.034	0.151	3.934
Min	-0.201	0.000	-0.275	-0.238	-0.718	0.023	0.111	-0.053	-0.090	0.000
Max	0.196	1.311	0.658	1.136	0.869	0.762	2.752	1.452	18.774	9.500
sd	0.041	0.207	0.068	0.108	0.182	0.072	0.436	0.092	0.887	2.730

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