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A comparison of the impact of the Basel standards upon Islamic and conventional bank risks in the Gulf state region

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Abstract

Purpose – This paper aims to provide a comparative study of the Islamic versus conventional banking sector risk by using market data generated from the sample of publicly listed Islamic and conventional banks in the Gulf Cooperation Council (GCC) region.

Design/methodology/approach – The authors introduce a market-based measure of bank stress and test this indicator against the Tier 1 Capital Ratio using Granger causality tests.

Findings – The authors find that the market-based measure is a leading indicator of banking stress when compared to the accounting-based Tier 1 ratio and thus is relevant to the Basel regulation's Pillar 3.

Research limitations/implications – This paper only looks at Islamic vs conventional banks in the Gulf region, and the authors would like to extend this analysis to a broader range of financial institutions, especially in the European and North American markets.

Social implications – Developing a measure that signals bank stress ahead of typically used measures can help regulators, bank management and investors identify oncoming problems and issues before these become too big to manage.

Originality/value – The results from this analysis provides insight into the offsetting impact from two drivers (beta and book-to-market ratio) of the cost of equity capital for the conventional vs Islamic banking sectors.

Keywords Basel, Beta, Islamic bank, Conventional bank, Fama French, Tier 1 Capital ratio

Paper type Research paper

1. Introduction

Two important business models are the merchant versus agent models of business. In the merchant model an entity assumes the risk of ownership of their goods and/or services provided which is not the case for the agent model. In the banking sector, the absence of interest for Islamic banks implies they largely embrace a merchant model of banking whereas for conventional banks, earning an interest differential from borrowing and lending activities largely embraces an agent model of banking. In an IMF study (Dridi and Hasan, 2010), it was observed that Islamic banks were more stable during the global financial crisis but were affected more when the crisis hit the real economy. This observation raises interesting questions with respect to the differences between these two banking business models and the objective of this paper is to empirically test for risk and growth differences.

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The merchant model of banking implies that the real economy is present in every financing and investing transaction which is the case for Islamic banking. For example, when financing an asset such as a house, the Islamic bank must own the asset before entering into a financing contract with the customer. This is the opposite to the conventional banking model of financing that is designed around earning the difference between wholesale and retail rates of interest. For the housing example the conventional bank only assumes ownership of the underlying assets if mortgage payments fail. The Islamic banking sector was observed to have fared much better than the conventional banks in the 2008 global financial crisis which can be hypothesized to be a result of this type of fundamental banking business model differences especially as they were observed to be affected more when the crisis hit the real economy. A second implication of the merchant model of banking is that it has significantly less impact on the growth of money supply, because growth is driven by the real economy as a opposed to money supply (M1, M2, M3). This results from the Islamic banking constraint against earning money on money, i.e. interest, in the Islamic model of banking. As a result, the two banking sectors again have different implications for growth driven from financial leverage. As a result, the Islamic banking sector should be relatively more sensitive to changes in real growth whereas the conventional banking is sensitive to changes in nominal growth. The objective of this paper is to examine some of the risk and growth implications identified above as resulting from the merchant versus agent models of banking that can be subjected to empirical analysis. For this purpose we adopt a market returns based approach to the above questions by applying insights from both the Capital Asset Pricing Model (CAPM) and the Fama and French (F&F) 3-factor empirical models. CAPM provides a measure of general market risk and the F&F book-to-market risk factor provides insight into differences in risk and growth implications associated with the two fundamentally different banking business models.

In addition, during the period of our study the Basel II and III banking regulation standards were evolving on two different levels over our sample period which need to be controlled for when interpreting our results. The Basel II standards were being implemented in the Gulf State region whilst the Basel III standard changes were being formally proposed and publicly disclosed. As a result, our tests of the Basel II standards are conducted using both the accounting and market data, whereas our tests of the Basel III standards are conducted using market data only. That is, for the latter we can observe at most the effects from expectation changes as the accounting reports are not affected. We conduct a controlled study of these questions using market data generated from the sample of publicly listed Islamic and conventional banks in the Gulf Cooperation Council (GCC) region for the important time interval covering pre and post the global financial crisis. We find that the results from F&F factor provides support for the risk hypotheses for these two banking subsectors. We also find that the evolving Basel standards impact both Islamic and conventional banks' general market and business model risk in opposing ways. That is, the Islamic banking sector exhibits higher general market risk but lower business strategy risk consistent with the implications from the merchant versus agent models of banking.

Second, we then extend our analysis of general market and banking model risk to risk associated with *instability* within the banking system. This extension continues a line of inquiry suggested by Haldane (2011), in a speech provided in his role of the Executive Director of the Bank of England. By comparing the Tier 1 capital ratio for both "crisis" and "non-crisis" banks, Haldane concluded that the traditional Tier 1 measure was a poor indicator of increasing bank stress. He then continued to explore the potential leading indicator properties of some common market-based accounting ratios. Haldane's observations assume additional importance under Basel III, given that it introduces discretionary capital requirements that depend upon having leading indicators.

In this paper, we formally test Haldane's observations using Granger causality tests and then extend and refine his suggestions by incorporating both market risk (i.e. volatility) and return information to refine the suggested leading indicator. The indicator proposed in this paper is entirely market-based and equally applicable to both Islamic and conventional banks. We first motivate this measure using the optimal leverage from growth theory, and then test it using our market data. For our sample the Sharpe Ratio is empirically equivalent to this theoretical measure and thus is preferred given it is arguably the most widely used performance measure by investors and its general properties are well understood. Our results support the Sharpe ratio as having the additional useful property, for financial institutions, of providing leading indicator information about bank stress for both Islamic and conventional banks.

The remainder of the paper is organized as follows. Section 2 develops the theory and major hypotheses. Section 3 describes our data, and Section 4 presents empirical analysis and discussion of our results. We wrap up with our conclusions in Section 5.

2. Theory and hypotheses

The banking regulatory environment since Basel II, and reinforced in Basel III, is designed around three interrelated pillars. Pillar I prescribes the minimum capital requirements covering standard risk categories such as credit, operational and market risk. Under the Basel III, the capital adequacy ratio is computed as Regulatory Capital divided by the Total Risk Weighted Assets for these three sources of risk and it is recommended that the Tier 1 capital adequacy ratio should be over 6 per cent. In addition there is a mandatory capital conservation buffer of 2.5 per cent and upto another 2.5 per cent discretionary counter-cyclical buffer during periods of high credit growth. Pillar 2 introduces the supervisory review of bank including the Internal Capital Adequacy Assessment Process ("ICAAP") which is designed to identify drivers of bank stress that are not being flagged by Pillar I. This Pillar allows for proactive actions to be taken to avoid capital adequacy constraint violations and ensure that the Bank has sufficient capital to cover relevant risks. Pillar 3 is designed to promote market discipline through public disclosures. The purpose of Pillar 3 is to complement both Pillars 1 and 2. For example the BIS summarizes this role as follows:

> The Committee aims to encourage market discipline by developing a set of disclosure requirements which will allow market participants to assess key pieces of information on the scope of application, capital, risk exposures, risk assessment processes, and hence the capital adequacy of the institution[1].

To empirically test differences between the two banking business models a "Pillar 3 approach" lends itself to conducting an empirical analysis using both accounting and market data. The results of this analysis are applied to draw some conclusions with respect to the two questions posed in the introduction regarding growth and business model differences between Islamic and conventional banking sectors. Observed differences between the two sectors have some immediate implications for risk. This is because even though both sectors end up engaging in some form of borrowing in the short term and lending in the longer term, they do so within the constraints imposed by their different business models. For the Islamic merchant model, there is an absence of *riba* or earning money on money. Instead the bank's revenue is directly associated with some underlying real asset or assets in terms of a cost plus, lease or equivalent contract. On the other hand, for the business model for conventional banking, the interest differential between borrowing wholesale and lending retail is the primary driver of transactions. That is, a conventional bank earns money on money in its role as an agent. This difference is hypothesized to result

in the Islamic banking sector being more stable than the conventional sector. For example, as observed by Hasan (2010), Islamic finance remained resilient and stable during the global crisis, although as he noted "some Islamic Banks did come to grief" as a result of the crisis.

From an accounting risk perspective there are several differences that have risk implications. First, one source of revenue for an Islamic Bank are their "Profit Sharing Investment Accounts" (PSIA) which have positive regulatory capital implications. This is because the risk of loss arising from PSIA investments is borne by parties other than the bank. As a result, this revenue source does not attract a regulatory capital charge. Similarly, in the case of Unrestricted PSIA, only some proportion of this is borne by the bank which again is reflected in its risk weighted asset calculations. These adjustments reflect the assumption that the Islamic Banking model has lower risk than conventional banking, because risk is shared with depositors. However, as observed by Harzi (2012): "Islamic banks may have a credit risk higher than conventional banks" because investments are generally held until maturity and Islamic banks do not have the same financial instruments available to them for managing market and other types of financial risks. This can imply that the Islamic banking model is riskier than the conventional model. Finally, there are also accounting risk differences under fair value accounting. These arise because by holding the underlying asset to maturity implies that the financial contracts are largely classified as "held-to-maturity" and thereby avoid being marked to market relative to the set of fair value classifications; held to maturity, for trading and available for sale. This should reduce accounting risks associated with Islamic banking relative to conventional banking. Finally, the Basel III proposals will focus increased attention to a bank's trading book. Here conventional banks usually have larger trading books because they are managing risks and taking positions often using derivatives. So bottom line it is a difficult task to unravel the effects of the Basel regulations upon Islamic versus conventional banks given these different potential drivers. As a result, in this paper, we seek empirical answers to our questions by extracting information directly from the observed market behavior. Our tests are formally framed in the hypothesis Section 2.1.

2.1 Major hypotheses

This paper focuses upon two sets of hypotheses:

(1) risk and growth; and

(2) signaling bank stress.

To test the first set of hypotheses, we apply the F&F three-factor model (Fama and French, 1993). The three factors in this model are size, book-to-market and market risk (Beta). In particular for *H1* and *H2*, we focus on the book-to-market ratio. This is an important risk factor in the F&F model, and was demonstrated to be a significant predictor of returns (Fama and French, 1988). In an updated result reported in the Bodie *et al.* (2013, 10th Edition) Investments text from 1926-2011 the top decile of book-to-market stocks had an average annual return of 16.87 per cent versus 10.92 per cent for the bottom decile of US stocks. In addition, these results are obtained after controlling for general market risk. Given financial markets provide a positive tradeoff between risk and return, and under the assumption of market efficiency, F&F interpret this as a risk factor, as summarized in Table I.

That is, stocks with a high book-to-market ratio (and higher returns) are commonly referred to as value stocks and growth stocks have low book-to-market ratios (and lower returns). Applied to banking the "value stock" sub group has higher risk and higher expected returns in an efficient market.

Now by applying the F&F risk factor to our data, we can immediately draw conclusions regarding the expected impact of Basel II and III upon growth by observing the market behavior before and after the financial crisis and especially after Basel II started to be implemented and details associated with Basel III were announced the market. We can test the following hypothesis by using the F&F's risk factor, Book value of Equity to Market Capitalization stated in its null form:

H1. Basel equally affects growth of Islamic and conventional banks.

Next we can apply the CAPM to test Islamic versus conventional banks relative to systematic risk as described from the CAPM theory. Under the CAPM, there are two sources of risk — diversifiable and non-diversifiable or systematic risk. Diversifiable risk can be freely eliminated by forming a portfolio and therefore the market does not pay investors for assuming this type of risk. For the case of non-diversifiable risk, investors must be rewarded for assuming this source of risk. That is, an entity must pay another entity to assume the risk. In practice this is achieved using derivative markets and there are significant differences between the two banking sectors relative to opportunities for using derivatives. That is, conventional banks have more opportunity to manage systematic sources of risk than do Islamic banks and therefore have more readily available opportunities for reducing their market risk. By looking at Beta for each banking sub group, we can test for differences between Islamic and conventional banks in relation to systematic or market risk. Again, stated in the null form, *H2* provides this test:

H2. Market risk, β, is the same for both Islamic and conventional banks.

The second pair of hypotheses involving extending the reach of market pillar 3 for detecting and signaling bank stress.

2.2 Pillar 3 and leading indicators of bank stress

The reported Tier 1 capital adequacy ratio has been criticized by Haldane (2011) because it provided a poor indicator of bank stress before and during the 2008 global crisis. This is an important criticism because Basel III contains provisions for requiring increased discretionary capital in times of developing stress. Haldane recommends that banking supervisors adopt a more active role in strengthening the market discipline pillar by identifying leading indicators of bank stress. To support his position he provides evidence from three common market-based accounting ratios, market-based capital ratio, market-based leverage ratio and Tobin's Q (market-based equity ratio) split up by crisis versus non-crisis banks. The three ratios are all related by the underlying fundamental accounting equation, Assets equals Liabilities plus Owners' Equity, and this was reinforced by the similarities presented in Haldane's Charts 6-8, which plotted the respective measures for his sample of banks. As a result, in our results section we focus on two of these ratios because the third is implied from the accounting equation. We then extend Haldane's insights by

Table I.
The book-to-market factor

	High book-to-market	Low book-to-market
Returns	Higher	Lower
Risk	Higher	Lower
Type of firm	Value	Growth

approaching the problem from the perspective of leverage in the capital markets by incorporating both risk and return.

Leverage is an important driver of growth, risk and returns. The optimal growth theory literature when applied from a Pillar 3 perspective, identifies leverage bounds that an investor can safely take in the capital markets subject to avoiding financial ruin. That is, from an investor's perspective the objective is to avoid being "bailed out" which technically is referred to as avoiding a -100 per cent drawdown. One important lesson reinforced from the global financial crisis was that if financial leverage gets too high then financial ruin is imminent at some point in time over the long run. For example, Northern Rocks leverage was believed to have been well above 40 prior to its collapse (Shin, 2008). As a result, in this paper we draw important insights from optimal growth theory to identify a performance indicator relevant to a Pillar 3 approach to predicting bank stress. That is, we identify a performance measure that is predicted to be a *leading indicator* of banking stress. In addition, the proposed measure under Pillar 3 is operationally well defined entirely from observable market data and therefore not subject to managerial flexibility that is available when fair value accounting is applicable.

It is well documented that optimal growth theory (MacLean *et al.*, 2010) has derived the optimal leverage ratio when an investor's objective is to maximize the geometric average growth subject to avoiding a -100 per cent drawdown. That is, it is assumed that the investor is maximizing the value of their position over the long run subject to no bailouts! The optimal leverage ratio that results from this analysis, assuming normally distributed returns, is given by the surprisingly simple formula:

$$f = \frac{\mu}{\sigma^2} \tag{1}$$

In equation (1), f is the leverage, μ is the one-period excess over the risk free rate return and σ is the volatility of one period returns. The Sharpe ratio is easily constructed from equation (1) above by substituting volatility for variance in equation (1):

$$SR = \frac{\mu}{\sigma} \tag{2}$$

Here, SR is Sharpe ratio and μ is the excess over the risk free rate expected return. As a result, in terms of extracting trends and leading indicator information we can use either equation (1) or equation (2), and so equation (2) is applied given that it is the most widely applied performance measure in finance.

2.3 Applying optimal leverage as a market based pillar 3 indicator

The potential advantages of the optimal leverage and/or Sharpe Ratio indicator over the leading indicator measures suggested by Haldane, is timely information incorporating both risk and return. Because this is a completely market-based measure, it serves to complement nicely the accounting-based measures from Pillar 1. From a practical perspective, the optimal market leverage ratio is unbounded from above and below and its properties are well known because of its wide spread use by investors. This leading indicator lends itself to deriving an acceptable statistical range analysis in the same way the Value-at-Risk (VaR) has been applied. In addition, unlike VaR both upper and lower bounds are useful. Exceeding the statistically specified upper bound provides timely information about the potential of excessive exuberance in the financial institution's stock price. Exceeding the

lower bound provides information about bank stress. So combined this entirely market-based measure provides a rich source of potential information to the banking supervisor.

Stated in alternative forms our hypotheses are:

H3. There is no difference between the optimal leverage ratio (Sharpe ratio) of Islamic and conventional banks.

Finally, we test two important measures, the Sharpe ratio and the Tier 1 capital ratio for their potential to provide leading indicator information relevant to predicting bank stress. Stated in their null form this final pair of hypotheses is:

H4 and H5. The Sharpe ratio (Tier 1 capital, for *H5*) provides no leading indicator information relevant to predicting bank stress.

H4 and *H5* are ultimately tested by conducting a Granger causality analysis of Bank Returns, Sharpe Ratios and Tier 1 capital ratios. This reveals directionality of the causality and whether the evidence is consistent with being a leading indicator. However, before conducting the Granger tests we need to first establish that the each variable is stationary. To establish this we apply the Augmented Dickey-Fuller test to determine whether levels or differences are used in the Granger test. Once the appropriate measurements have been determined we conduct a Vector Auto-regression to test the Granger causality hypothesis.

In the next section, we first present our data, followed by our results from testing all hypotheses.

3. Data

Our study focuses on the listed conventional and Islamic banks in the GCC countries, with the exception of Oman. While we did not have data on the financial institutions in Oman, our analysis covers 47 banks (33 conventional and 14 Islamic) and we do not believe that our results would change significantly due to this omission. We examine the behavior of each subset (Islamic and conventional) weighted by size given this sample size, to avoid biasing the results if a small bank generates an extreme measure.

Using Bloomberg and Thomson Reuters Eikon, we draw daily data on share price and Beta and quarterly reported key financial numbers for the purpose of our analysis, spanning January 2002 to January 2015. The data were further checked for change of measurement unit and other issues that may occur. Our share returns and returns volatility are based on 200-day moving average for daily returns and are time aligned to ensure consistency for comparison.

While we have data for individual countries, given our sample size, we focus on the key differences between conventional and Islamic banks. Our key risk and return market data statistics for the banks are presented in Table II.

4. Results

4.1 Book-to-Market

Using the F&F Book-to-Market Value of Equity as a proxy measure for risk and growth, we map the ratio for conventional and Islamic banks in Figure 1. The two subsets of banks, Islamic and conventional are formed by controlling for size in the weights. This also serves as a control against the effects of outliers arising from small banks which can skew the data. It is evident from the chart that while conventional and Islamic banks have moved in tandem for the most part, the first quarter of 2009 marked a pronounced separation between

Table II.
Key descriptive statistics

Year	Ret (Conv)	Ret (Islamic)	Beta (Conv)	Beta (Islamic)	Volatility Conventional	Islamic	T-Statistic Returns	Probability	T-Statistic Beta	Probability
Pre 2008	0.0006	0.0006	0.6953	0.8107	0.0743	0.0979	−0.3856	0.6998	−39.9929	0.0000
2008-2010	−0.0006	−0.0006	0.8618	1.0171	0.0960	0.1158	0.0451	0.9640	−42.9966	0.0000
2010-2012	0.0002	0.0002	1.0092	0.9959	0.0644	0.0742	−0.0700	0.9442	4.4374	0.0000
2012-Current	0.0008	0.0010	0.8537	0.9334	0.0737	0.0960	−0.3592	0.7195	−27.3894	0.0000

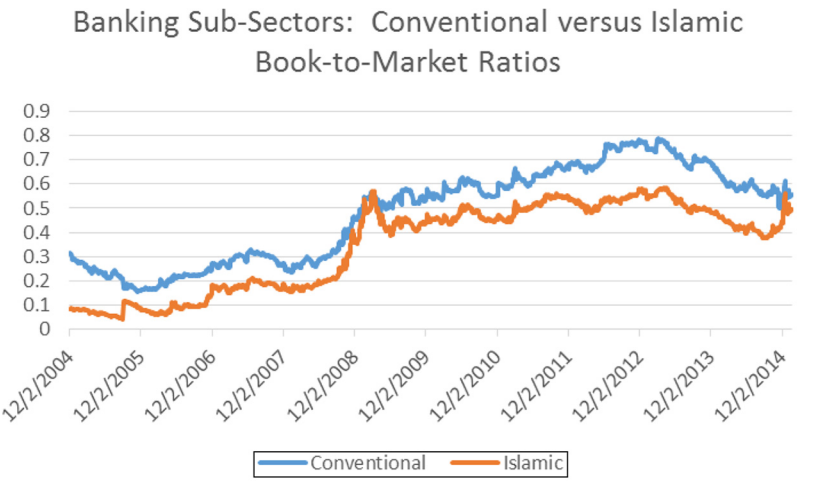

Figure 1.
Book-to-market value of equity – Islamic vs conventional banks

the two as the Book-to-Market ratio for conventional banks became higher than that for Islamic banks.

This change in the behavior of the book-to-market ratio in 2009 is immediately following the Global financial crisis and coincides with continuing implementation of Basel II running into the proposed responses to the crisis with the Basel III regulatory framework published by the Basel Committee on Banking Supervision in December 2010 (revised June 2011). As a result, in Table II, we segment the behavior represented in Figure 1 into the categories of Pre 2008, 2008-2010, 2010-2012, and post 2012. In this way, we can observe the behavior over the time of the active Basel III period of announcements (2010-2012) to see whether any systematic differences in risk occurred.

Table II supports the implication that the risk separation between conventional and Islamic actually widened during this period of time. That is, in each segment there is a highly significant difference between the risk associated with each banking model, whereby conventional has higher risk than Islamic. However, the gap widened further in statistical significance over this period of time covering 2010-2012 as evident by the already large T-Statistics increasing from 13.9 for 2008-2010 to 62 for 2010-2012. We see from Table III, we can reject the first hypothesis given a T-stat of 62.1 ($p < 0.000$), and conclude that the difference between the two is significant.

Referring to Table II, consistent with the interpretation of the F&F factor, a firm with a high book-to-market ratio is expected to yield a higher return, given its higher risk level. Empirically this has also been linked to growth by classifying firms into the growth versus

Table III.
T-Test of Fama-French book-to-market ratio

	Mean		Variance			
Year	Conventional	Islamic	Conventional	Islamic	T-Statistic	Probability
Pre 2008	0.2750	0.1733	0.0060	0.0047	42.7270	0.000
2008-2010	0.4999	0.3863	0.0276	0.0156	13.9297	0.000
2010-2012	0.6714	0.5087	0.0026	0.0016	62.1444	0.000
2012-Current	0.7060	0.5147	0.0095	0.0039	48.5332	0.000

value stock dichotomy. It is observed that the separation became more pronounced over the time period covered by the Global crisis. This also coincides with the time period for which Basel II was being implemented and Basel III regulations have been announced.

In summary, *H1* is rejected. Islamic relative to conventional banks are being valued as growth stocks. This raises the interesting question regarding what the driver of this is? This is interesting because the numerator and denominator of the F&F factor for banks have different economic implications. As a result, we will further decompose the F&F factor into its primitive elements to observe the main drivers for rejecting *H1*, in Table II.

4.1.1 Decomposition of the book-to-market risk factor. The F&F factor comprises of two components, the Book Value of Equity and the Market Capitalization. Combined they create the factor. The numerator, Book Value of Equity, is directly impacted by the Basel Standards for a bank whereas the denominator reflects market expectations. Combined the ratio makes up the F&F risk factor. As a result, we are interested in the numerator to make inferences about the impact from regulation and accounting measurements and the denominator to capture market expectations.

4.1.1.1 Accounting fundamentals versus market expectations. The Basel II standards impact the capital tier ratios over the time period covered. Similar, the time period also covers before and after announcements have been made about regulatory changes to Basel II, in the form of Basel III. As a result, any Basel III impact is solely reflected in the denominator of the F&F Book value of equity factor, via its impact upon the market capitalization. The implementation of Basel II during this same period can have immediate accounting implications that are reflected in the numerator of the F&F factor. As a result, combined the F&F factor is sensitive to both of these two potential drivers that can be un-entangled by decomposing the F&F factor into its numerator, book value to equity (BVE) and its denominator market capitalization. Consider first the behavior of the BE in Figure 2. A significant shift occurred post the 2008 Global Crisis. The impact of Basel II via the capital tier requirements led to the conventional banks having to adjust more aggressively their Book Value of Equity. Recall conventional banking operate under the agent model where

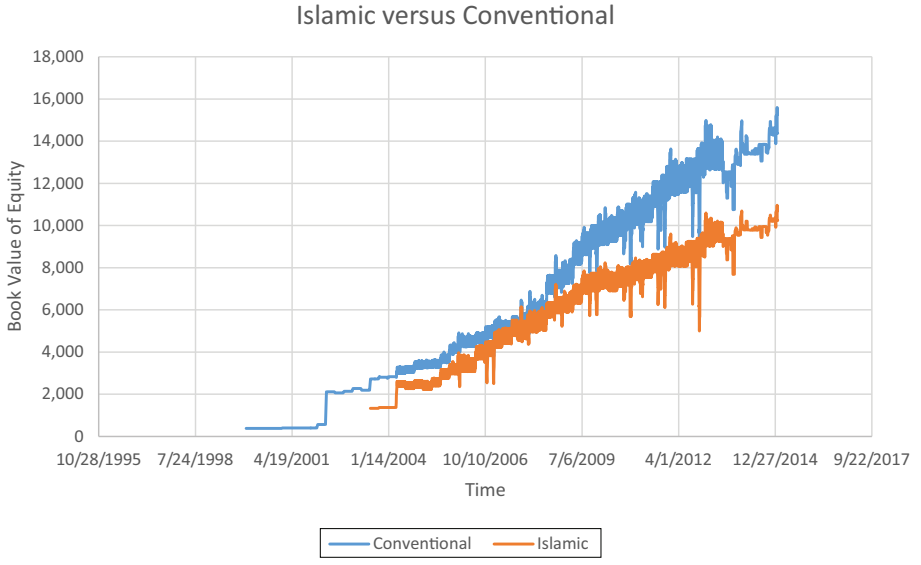

Figure 2.
Book value of equity – Islamic vs conventional banks

their primary objective is to earn the spread resulting from borrowing wholesale and lending retail. Islamic Banking on the other hand, requires real economy involvement under its merchant type of business model. This is more costly to adjust because it requires spot market transactions in the underlying asset. As a result, any adjustments to capital adequacy risk, and thus leverage, are expected to impact conventional banking more than Islamic banking. Figures 2 and 3 combined reinforce these observations because a major driver of the observed difference is the BVE ratio.

It is clear from Figures 2 and 3 that there has been no systematic impact upon Market Capital as a result of the 2010 announcements regarding the Basel III details. It is also clear from the above analysis that the most recent observation that the F&F factor is moving closer together in Figure 1, that this is driven purely from market price effects as opposed to Book Value of Equity effects. The latter reflects the impact of Basel standards whereas the former reflects current market expectations which are not likely to be associated with any new Basel III requirements. This is because there have been no recent announcements that are likely to have an impact upon Islamic versus conventional banks.

In Section 4.1, we have considered operating risk, and now in Section 2, we focus upon general market risk differences and test *H2*.

4.2 Beta

Beta is a measure of *systematic market risk* popularized by the Capital Asset Pricing Model (CAPM) theory. The F&F model expands upon the CAPM model of expected returns by adding firm size (which is used as a control variable in this current paper) and the book-to-market risk factor described in the previous section. That is, market risk is treated as a separate driver of expected returns to the Book-to-Market factor discussed in Section 4.1, and which was related to growth. The third F&F factor, firm size, in this paper we are not explicitly considering and instead we control for size. As a result, both Book-to-Market and Beta for Islamic versus conventional banks is size adjusted (Figure 4).

Overall the market risk associated with Islamic Banks is larger than the market risk associated with conventional banks. We observe from the chart that while the beta for the

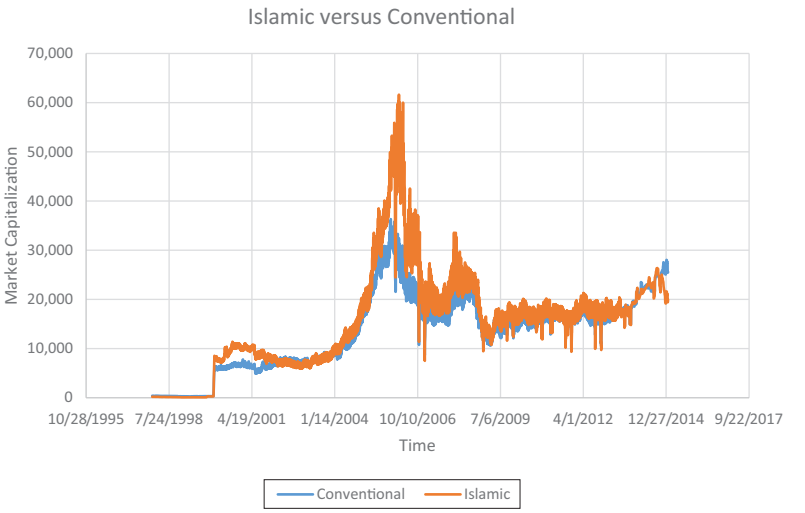

Figure 3.
Market value – Islamic vs conventional banks

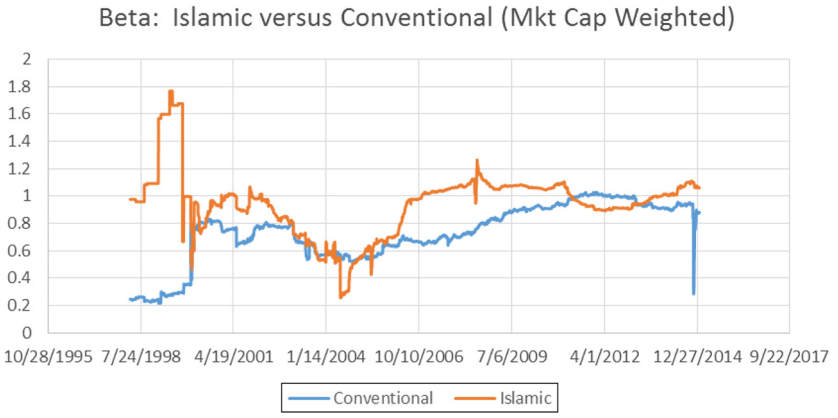

Figure 4.
Beta – Islamic vs conventional banks

two groups move apart at times, especially during the banking crisis. Post crisis the betas have come back toward each other but Islamic is still higher than conventional. The results from T-Tests conducted over the sub-periods are provided in Table IV. The higher general market risk for Islamic Banking is consistent with the fewer market instruments available for hedging risk that are available for Islamic banks in general.

It is clear from Table IV that Islamic banks have higher systematic risk than conventional banks. Interestingly enough there are sub-periods in which this relationship is reversed but these tend to be temporary. There is also a more recent trend, as revealed from the T-Statistics, for the means moving closer together even though the difference remains highly significant. This is consistent with the post crisis tightening have a relatively larger impact upon conventional as opposed to Islamic banks in the following sense. Conventional banks have a larger set of opportunities available for managing general market risk. This is because the available set of derivative securities that can be traded to manage systematic risk is larger for conventional banks. However, the tightening of standards in relation to trading derivatives for conventional banks is being reflected with increasing betas post 2010 compared to pre 2010 which is larger than is the case for Islamic banks. For example, as argued in a recent Economist article:

> By throttling the bits of banks that "make markets" in bonds, shares, currencies and commodities, the theory goes, watchdogs have made such assets less liquid. Investors may not be able to buy and sell them quickly, cheaply and without moving the price. The consequences in a downturn, when markets are less liquid anyway, could be severe.
>
> Regulators have made banking safer. But has that made markets riskier? (April 18, 2015, *The Economist*).

Means	Beta (Conv)	Beta (Islamic)	T-Statistic Beta	Probability
Pre 2008	0.6190	0.8681	−45.8190	0.0000
2008-2010	0.8182	1.0848	−90.4280	0.0000
2010-2012	0.9554	1.0183	−21.3322	0.0000
2012-Current	0.9490	0.9702	−6.4823	0.0000

Table IV.
T-Test of Beta

As a result, the above results are providing a foundation for incorporating and exploiting more fully Pillar 3 in banking regulation. This is because the market is sensitive to the subtle implications of changes in banking regulation and their impact upon risk and bank stress. In the next part of this paper we explore this line of inquiry formally and then draw some implications from the results of this inquiry.

4.3 Sharpe ratio

The second set of hypotheses tested result from an extension of insights from Haldane (2011) who observed that the traditional capital adequacy ratio was not providing timely information to regulators about bank stress. He proposed some standard market-based ratios to augment the Pillar 3 in the Basel regulation. In this current paper's theory section, we argued for refining of these measures by drawing upon insights from optimal growth theory literature. In particular, using a measure that integrates both risk and return as opposed to focusing on return only. Our proposed measure is operationally well defined and is independent of accounting measurement issues that arise from historical cost and fair value accounting standards. As a result, it is equally applicable to financial institutions reporting under either IFRS or US GAAP.

H3, in its null form, asserts no difference in the Sharpe ratio for conventional and Islamic banks. Based on the Figure 5, it is observed that the Sharpe ratio is broadly similar for both Islamic and conventional banks.

We test to see if the two series are significantly different over different sub-periods of time and observe that recently this is not the case but it is significant over earlier sub-periods of time (Table V).

That is, *H3*, no difference, is rejected for each of the above sub-periods with the exception of 2012 to current. In other sub-periods the Sharpe ratio has been higher for conventional banks. This is consistent with the fact that under the agent model of banking, conventional banking has greater access to instruments, such as derivatives, that are designed to manage market volatility by transferring risk from one party to another as opposed to sharing such risks.

In Section 4.4, we first examine consider the evidence in support and/or against, of Haldane's observation that measures of capital adequacy fail to provide leading indicator

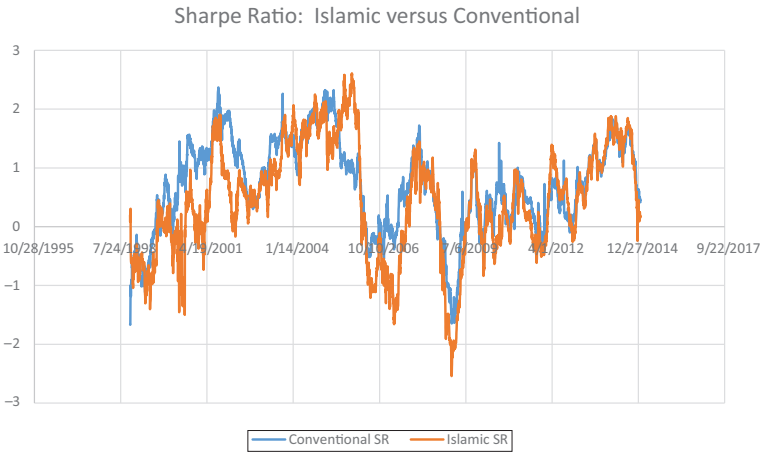

Figure 5.
Sharpe ratio – Islamic vs conventional banks

information for regulators about bank stress. This section is then followed by formal tests of *H4* and *H5* in Section 4.5.

4.4 Regulatory risk: Tier 1 Capital Ratio

The Basel III re-affirms the Capital Adequacy Ratio as the primary measure indicating the financial health of a bank and its ability to withstand shocks to the financial system. Looking at the Figure 6, we can see that there is a considerable difference in the behavior of the Tier 1 Capital Ratios for the two types of banks. The ratio for the conventional banks is less volatile than the ratio for Islamic financial institutions. This difference may be attributed to the fact that Islamic banks, due to structural and regulatory differences, are not permitted to access the same range and variety of hedging instruments that are available to conventional banks. As a result, we posit that conventional banks are able to smooth out their Tier 1 Capital Ratio compared to Islamic banks where we see more volatility.

While this may be construed as a disadvantage for Islamic banks, this limitation also indicates that the Tier 1 Capital Ratio for Islamic banks may do a better job of signaling periods of stress for the financial system. We, therefore, identify certain key events that marked high stress periods for the GCC economies and re-examine the Tier 1 Capital ratio along these events. The first event of significance occurred in 2006, when the stock market in Saudi Arabia crashed, with resulting contagion in the region. The next was in 2008 when the global financial markets went through a downturn and this impacted almost all economies around the globe. The final one is a more recent one and pertains to the ongoing crude oil price decline. Given that the GCC economies depend primarily on the Oil and Gas sector for revenues, this is placing significant pressure on the regional economies.

Year	Means		Variance		T-Statistic	
	Conventional SR	Islamic SR	Conventional SR	Islamic SR	Harpe ratio	Probability
Pre 2008	0.9159	0.5514	0.7754	1.0038	16.3070	0.0000
2006-2008	0.2867	−0.2390	0.5363	0.9048	13.5385	0.0000
2008-2010	0.0801	−0.1082	0.8391	1.0777	3.5179	0.0005
2010-2012	0.3419	0.1951	0.2945	0.4704	8.0841	0.0000
2012-Current	1.1412	1.1204	0.3748	0.4867	0.8052	0.4209

Table V.
T-Test of Sharpe ratio

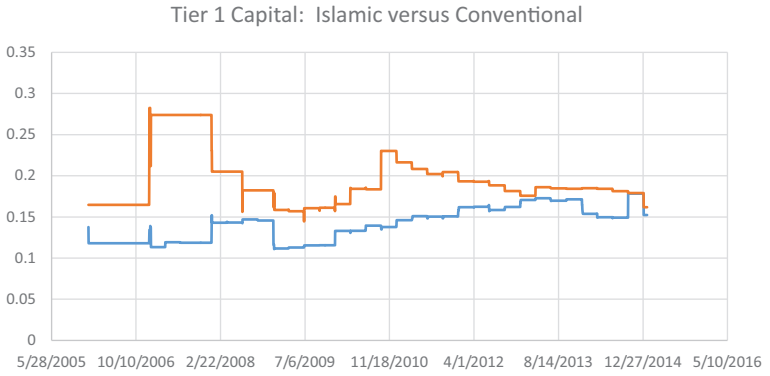

Figure 6.
Tier 1 capital ratio – Islamic vs conventional banks

We can see from Figure 6 (Tier 1 Ratio) that there are clear patterns emerging where conventional bank Tier 1 ratios respond after the event (January 2009) to market downturns. Islamic Banks with their tighter ties to the real economy were well above required ratios and thus less affected. This reflects the fact that Islamic Banking's business model is a "merchant model" which assumes ownership in the real economy at a transaction by transaction level. On the other hand the conventional banking model is more of an "Agent" model where ownership in the real economy is often replaced with derivative contracts. As a result, Tier 1 is on average higher for Islamic Banking than conventional banking over the entire period of time covered in Figure 6.

The drivers of the Tier 1 ratio are the Tier 1 Capital and the Risk Weighted Assets. It is clear from the above chart that the Tier 1 ratio is a lagging indicator of a crisis and the conventional banks were more affected than were the Islamic banks. The components of the Tier 1 ratio are the Tier 1 Capital and the Risk Weighted Assets. The latter provides insight into the riskiness of Islamic versus conventional Banks, whereas the former provides a measure of their response to changing risk. Over time, the two measures behave as shown in Figure 7.

The chart reveals that the jump in Risk Weighted Assets was greater for conventional banks and occurred post the global crisis (around January 2009). Similarly, for shoring up the Tier 1 Capital (Figure 8):

However, the more important question is one of timing and here Pillar 3 is relevant. The objective of invoking Pillar 3 is to find "leading" as opposed to "lagging" indicators that reflect market information.

For each sub-period of time the Tier 1 capital percentages have been increasing for both bank sets and is significantly higher for Islamic compared to conventional banking. This is consistent with the Merchant Model of Islamic Banking plus it does not appear that the Tier 1 ratio provides any leading indicator information about bank stress. To the contrary the tightening up was after the crisis and so this is information that is consistent with Tier 1 capital being a lagging indicator for both bank sets. However, this hypothesis will be formally tested next.

4.5 Sharpe ratio vs Tier 1 Capital ratio

The results from the previous section reinforce Haldane's (2011) observation that traditional measures of capital adequacy measure is a poor indicator of bank stress

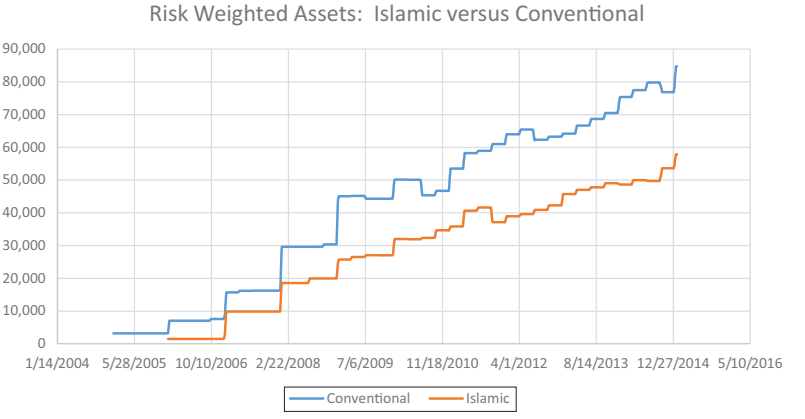

Figure 7.
Tier 1 risk weighted assets – Islamic vs conventional banks

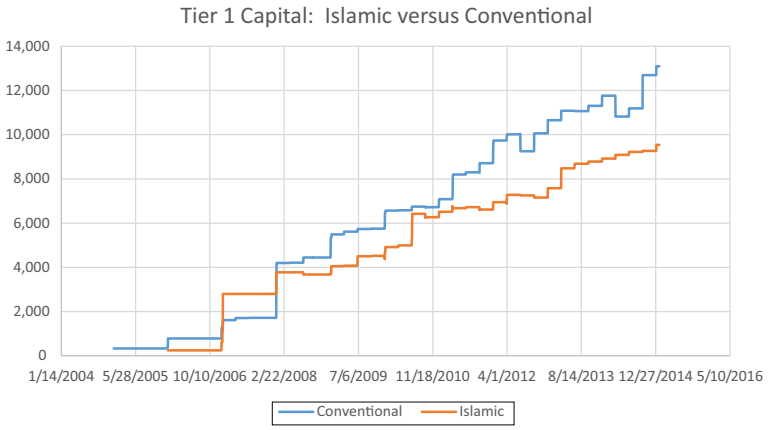

Figure 8.
Tier 1 capital – Islamic vs conventional banks

before and during the 2008 global crisis. In this paper we conduct a Granger causality test on both the Sharpe ratio and Tier 1 capital in relation to bank returns. Currently, we observe Tier 1 capital being used as the trigger in CoCo's, and thus the results of this analysis will be used to support the assertion that the Sharpe Ratio can provide a more a more relevant trigger if it avoids the type of criticism leveled upon the Tier 1 ratio from Haldane.

Formally, we test this by conducting a Granger Causality test on both variables relative to bank returns. Before conducting this test we need to establish that each of the three series, Banking Returns, Sharpe Ratios and Tier 1 Capital, are stationary in either levels or differences. We conduct an Augmented Dickey–Fuller test using the Stata statistical package for this purpose and the results are provided in Table VI below:

The results from this table reject the null hypothesis for the existence of a unit root from returns (both conventional and Islamic) and the Sharpe ratio (conventional and Islamic). For the case of the Sharpe ratio rejection is at the 5 per cent level for Islamic and for the other series at the 1 per cent and higher levels. For Tier 1 the hypothesis could not be rejected at the 5 per cent level and so first differences are then taken. The results from the first difference analysis strongly support rejection of a unit root.

The Granger Causality test is then conducted using Bank Returns, The Sharpe Ratio and Tier 1 Capital in differenced form. A Vector Autoregression Analysis (VAR) model is used as the basis for testing Granger causality using the Stata statistical package. The results from this test are provided in Table VII. They reveal that there is information in past returns and the Sharpe Ratio but consistent with the observations of Haldane that there is no information for either conventional or Islamic banks from

Year	Means		Variance		T-Statistic	Probability
	Conventional	Islamic	Conventional	Islamic	Tier 1	
Pre 2008	0.1010	0.2197	0.0245	0.0545	−55.2581	0.0000
2008-2010	0.1299	0.1775	0.0154	0.0194	−40.5844	0.0000
2010-2012	0.1491	0.1959	0.0106	0.0166	−72.7011	0.0000
2012-Current	0.1645	0.1819	0.0112	0.0051	−34.6857	0.0000

Table VI.
T-Test of tier 1 ratios

Variable	United Root Test (Augmented Dickey–Fuller) Test statistic (*H0*: unit root)
Returns (Z-Test)	
Conventional	−45.487
Islamic	−47.87
Levels (Z-Test)	
Conventional Sharpe Ratio	−2.235
Islamic Sharpe Ratio	−1.987
Conventional Tier 1	−1.804
Islamic Tier 1	−0.809
Differences (Z-Test)	
Conventional Tier 1	−52.589
Islamic Tier 1	−57.843
Critical Z-Values (1%, 5%, 10%)	−2.58, −1.95, −1.62

Table VII. Augmented Dickey–Fuller test of the unit root hypothesis

the Tier 1 ratio. From Table VII, we reject *H4* (the Sharpe ratio provides no leading indicator information relevant to predicting bank stress) and fail to reject *H5* (same as hypothesis for Tier 1 Capital) (Table VIII).

To illustrate the above results and further relate them to bank stress, in Figure 9, we plot the Sharpe ratio against the traditional Capital Adequacy measure of Tier 1 Capital Ratio where the primary axis (LHS) is the Sharpe Ratio and the secondary axis (RHS) is Tier 1 capital. By further decomposing into sub-periods allows the drawing of additional inferences in relation to responsiveness to bank stress (Tables IX and X).

To compare the responsiveness of the two measures, we again look at the two periods where the GCC markets experienced financial stress (2006-2008, 2008-2010). In each instance we find the Sharpe Ratio reacting well in advance of the traditional Tier 1 Capital Ratio. In fact, in the case of the ongoing crude oil price oil decline, we have not seen any drop in the Tier 1 Capital Ratio while the Sharpe ratio has already started dropping. Given previous instances of the Sharpe Ratio's predictive ability, we believe that this could be the signal of financial stress on the banks which may

Vector autoregression analysis	Parameters	RMSE	R^2	χ^2	Prob > χ^2
Granger causality (DV = banking returns, IV's return lags, sharpe ratio and Tier 1 (differenced)					
Conventional Returns	4	0.006182	0.063	229.6958	0
Variables	Coefficient	Standard Error	Z	Prob > Z	
Lagged Returns	0.2322	0.01666	14.07	0	
Lagged Tier 1 Differenced	−0.0105	0.0113	−0.93	0.351	
Lagged Sharpe Ratio	0.000554	0.000139	3.99	0	
Constant	0.000184	0.0001787	1.03	0.303	
Islamic Returns	4	0.00955	0.0402	143.0156	0
Lagged Returns	0.19246	0.016812	11.45	0	
Lagged Tier 1 Differenced	0.00655	0.00593	1.1	0.269	
Lagged Sharpe Ratio	0.0004216	0.0001578	2.67	0.008	
Constant	0.0001804	0.0001787	1.01	0.313	

Table VIII. Vector autoregression analysis and Granger causality

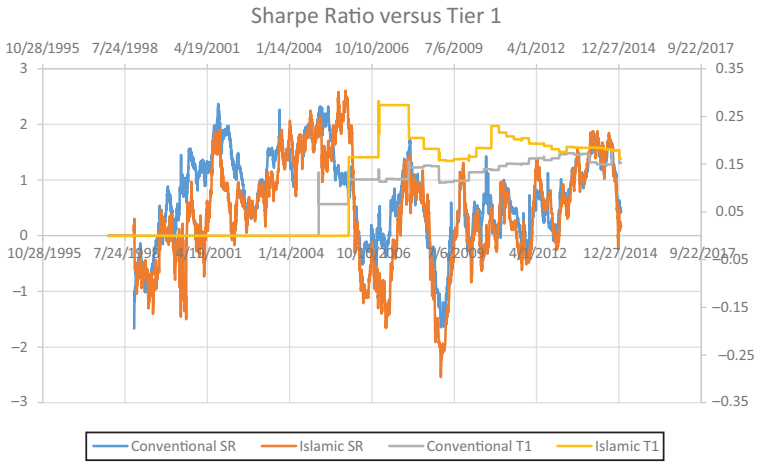

Figure 9.
Sharpe ratio versus 1/Tier 1 capital ratio – Islamic vs conventional banks

	Means			
Year	Conventional SR	Islamic SR	Conventional T1	Islamic T1
Pre 2008	0.9159	0.5514	0.1010	0.2197
2006-2008	0.2867	−0.2390	0.1181	0.2197
2008-2010	0.0801	−0.1082	0.1299	0.1775
2010-2012	0.3419	0.1951	0.1491	0.1959
2012-Current	1.1412	1.1204	0.1645	0.1819

Table IX.
Key statistics (by period)

	Sharpe Ratio		Tier 1	
Year	T-Statistic	Probability	T-Statistic	Probability
Pre 2008	16.3070	0.0000	−55.2581	0.0000
2006-2008	13.5385	0.0000	−50.2865	0.0000
2008-2010	3.5179	0.0005	−40.5844	0.0000
2010-2012	8.0841	0.0000	−72.7011	0.0000
2012-Current	0.8052	0.4209	−34.6857	0.0000

Table X.
Key results (by period)

become evident through the Tier 1 Capital Ratio once the quarter end financial results of the banks are declared.

5. Conclusions

In this paper, we explored the different economic implications arising from the two banking business models, agent versus merchant. This paper focuses upon two sets of empirically testable hypotheses relating to:

(1) risk and growth; and

(2) signaling bank stress.

We approached the first question using two of the three F&F risk factors, book-to-market and market risk, with their third factor, size, used as a control variable by weighting returns by bank size.

The results of the F&F book-to-market analysis document a statistically significant and increasing separation between conventional and Islamic banks post the global crisis. This also coincided with the time that Basel II was being implemented. To gain finer insight into the different potential drivers we decomposed the F&F factor into its numerator and denominator and analyzed each separately. The numerator is sensitive to accounting measurements resulting from the implementation of the two different banking business models, and the denominator is more sensitive to expectation differences that drive the markets for Islamic and conventional bank stock prices. The F&F decomposition results reinforce the fact that the market is pricing conventional banks with higher expected return and higher risk than Islamic Banks. That is, this result implies that Islamic banks relative to conventional banks are being valued in the market as growth stocks. From this result we conclude that *relative to conventional banks*, Islamic bank growth is not disadvantaged by the Basel regulations. The likely reason for this result is that conventional banks are being increasingly forced to increase their equity more relative to Islamic bank increases, largely because derivative usage by conventional banks is more closely monitored since the 2008 crisis. That is, the "agent" business model of banking is affected more than the "merchant" business model of banking since the 2008 global crisis. Our results also support the conclusion that market risk is higher for Islamic banks than conventional banks. The reason for this result is likely to result from the fact that under the agent model of banking conventional banks have more opportunities for managing market risk.

In summary for the two important sources of risk analyzed support the general conclusion that Islamic banks have lower operating risk and higher market risk when compared to conventional banks in the Gulf State region and this is *expected to persist* with the eventual implementation of Basel III.

For the second set, again our approach is empirical. First, we formally verify for both conventional and Islamic banks in the Gulf region, Haldane's (2011) observation that Tier 1 capital is not a leading indicator of bank stress. In this paper we theoretically motivate and test a market-based measure of bank stress. This measure is empirically equivalent to the popular investment performance measure, the Sharpe ratio. This measure was demonstrated to provide leading indicator information for *both* Islamic and conventional banks. One immediate implication of this is that the Sharpe ratio is superior to Tier 1 capital as a trigger in a Contingent Convertible Debt (CoCo) contract that are becoming increasingly more popular since the financial crisis. For example, as reported in the Financial Times, February 12, 2015 titled "Chinese banks take lead in coco bonds":

> Faced with increasing demands from regulators for capital that can absorb losses, Chinese banks collectively issued $59bn of contingent convertible bonds in 2014, a third of global volumes, according to research by Moody's.

The results from this current paper suggest that the Sharpe Ratio could be used as a mandated trigger in either Islamic or conventional CoCo's.

Note

1. Available at: www.bis.org/publ/bcbs128c.pdf

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