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Islamic spot and index futures markets: Where is the price discovery?

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G11
G12
G17

A B S T R A C T

This paper examines the source of price discovery for Islamic stocks. We pair a large number of Islamic stocks to country-specific index futures and estimate price discovery using a vector error correction model. The results obtained using data for 19 countries suggest that for most countries (63\% of the sample) price discovery is dominated by the spot market. We show that for these countries, a mean-variance investor makes annualized average profit of 4.91\% compared to an average buy-and-hold profit of 2.97\% per annum.

1. Introduction

In this paper we test whether price discovery is dominated by the Islamic stock market or the index futures market to which these Islamic stocks belong to. The inspiration for this idea has roots in the large empirical literature which has evolved over the last decade-and-a-half, promoted in large part by the influential Presidential Addresses by O’Hara (2003). On Islamic stock markets in particular, Narayan et al. (2016b) test whether price discovery predicts asset prices using a sample of 188 Asia-Pacific Islamic stocks. They show that price discovery matters in pricing stocks. One imminent gap in this Islamic finance literature is the lack of understanding of where exactly the price discovery takes place. In fact, nothing is known about this process at all. Our research question therefore is: Is it the Islamic stock market or the index futures market that dominates the price discovery process? This question is not trivial because understanding the source of price discovery can guide investment decisions.

Our approach to testing for price discovery follows three steps. In the first step, we compile stock-level data comprising of 900 Islamic stocks listed across 19 different markets for the 1982 to 2015 period. We then match this stock-level price data with the corresponding market index futures price data. This gives us a unique spot-futures price dataset. In the second step, we utilize a panel vector error correction model (VECM) recently proposed by Karabiyik et al. (2016) to get panel estimates of price discovery. The main advantage of using this panel approach when compared to the more conventional time series approach is its ability to exploit...
the information contained in the cross-sectional dimension of our panel, leading to relatively accurate estimates of price discovery. Another advantage of the panel approach to price discovery is its ability to summarize the information contained in a large cross-section of stocks. The country-level panels that we consider contain up to 167 stocks. Imagine trying to report and summarize the results from 167 stock-specific VECMs – a daunting task, to say the least. In the final step, we design a framework that links the evidence of price discovery to investment decision making. We, in particular, show that one can utilize the information on price discovery to forecast returns and devise economically meaningful trading strategies.

We make three main findings. Our first finding is that the price discovery process is dominated by the spot market. This is the case for 12 out of the 19 markets. Our second finding relates to the robustness of the evidence of price discovery. We use both monthly and weekly data, and conclude with the same results, suggesting that the evidence of price discovery we document is insensitive to data frequency. Our third finding relates to the economic significance of price discovery. For the 12 countries for which spot market dominates price discovery, we show that the annualized average profit turns out to be 4.91%, whereas the average buy-and-hold profit is only 2.97% per annum. This represents a 62.35% increase in average profits when using the evidence on price discovery.

Our findings make three contributions to the literature. The first literature our work connects to is that on Islamic finance. Islamic finance research offers an avenue for understanding the behaviour of financial markets from a different perspective. The distinction between Islamic and non-Islamic (or conventional) financial markets have been well-documented and we refrain from repeating what is well-known; see, for instance, Ibrahim (2015). There has been a surge in research on Islamic finance, attempting to understand this relatively new investment class. In this regard, recent studies have examined the profitability of Islamic markets (Narayan and Phan, 2016; Narayan and Bannigidadmath, 2015; Ashraf and Mohammad, 2014; Al-Khazali et al., 2014), the efficiency of Islamic banks (see Johnes et al., 2014; Belanes et al., 2015), interactions among Islamic equity markets (Yilmaz et al., 2015) and Islamic bond market (Azmat et al., 2014a, b, 2015), the connection between Islamic markets and global crises (Kenourgios et al., 2016), corporate social responsibility (Mallin et al., 2014; Abdelsalam et al., 2014), and the predictability of Islamic stock prices (Narayan et al., 2016a). We contribute to this literature by exploring the source of price discovery, which is an important component of the functioning of financial markets. While from previous studies we understand that Islamic stock markets are profitable, Islamic banks are more efficient compared to conventional banks and that Islamic stocks, like conventional stocks, are predictable, from our study we now understand that when it comes to price discovery in Islamic stock markets, in most countries it is the spot market that dominates the price discovery process. In discovering this empirical evidence, our findings are consistent with the trading volume hypothesis, which associates high trading volumes in the spot market (compared to the futures market) to a greater role of the spot market in the price discovery process.

We also connect with the recent study of Narayan et al. (2016a), which is to the best of our knowledge the only study on price discovery in Islamic stocks. This is in fact the study which comes closest to our work although it is completely different in its aims. This other study searches for time-varying price discovery in a wide range of stock price-based portfolios (made up of 188 Asia-Pacific stocks) and then uses this as a predictor of Islamic stock returns. The hypothesis is that time-varying price discovery is able to predict Islamic stock returns, and the authors find strong support for their hypothesis. Our goal is to search for price discovery in Islamic spot and corresponding country futures market price index for 900 stocks belonging to 19 countries. Our study can therefore be seen as complementing the work of Narayan et al. (2016a). In interpreting the connection between our work and that of Narayan et al. (2016a) it is important to note that while we take the classical definition of price discovery Narayan et al. (2016a) depart from this definition. Their point is that as long as stocks belong to the same universe the sum of stocks contribution to price discovery should be 100%.

Our finding of mixed evidence on price discovery documenting a role in price discovery for both spot and futures markets joins studies in other strands of the literature where similar sort of evidence has been found. In particular, the evidence from the commodity market suggests that the process of price discovery is not clear-cut. Dolatabadi et al. (2015) test whether price discovery in the commodity markets is dominated by the spot or the futures market. They find mixed evidence. Moreover, analysing the stock index cash and futures markets, Pizzi et al. (1998) also document mixed evidence on the source of price discovery.1 Our results seem consistent with this literature.

Our final contribution relates to the economic significance of price discovery. Identifying price discovery is one thing but understanding its economic relevance is another. We design a framework within which one can utilize the information on price discovery to specify return-forecasting models. The relevance of such models is that return forecasts can be utilized to devise trading strategies. We demonstrate that these strategies are meaningful, and are robust to different risk aversion parameters and to the allowance for both short-selling and borrowing. The trading strategy framework we design offers a fresh perspective on understanding the importance of price discovery. In this regard, our paper makes both a statistical and an economic contribution to the literature on price discovery.

We organise the balance of the paper as follows. In Section 2, we discuss the econometric methods used to examine price discovery. Section 3 discusses the dataset and presents the results. The final section provides concluding remarks.

2. Econometric method

The majority of the empirical literature on price discovery analysis has been focusing on time series estimation of price discovery.

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1 For some recent studies on Islamic markets, see Shaban et al. (2016), Shamsuddin (2014), and Bahim and Masih (2016).

2 There are a number of other studies which document strong evidence of price discovery in the spot market; see, inter alia, Bohl et al. (2009), Cabrera et al. (2009), and Chen and Gau (2009).
parameters. However, recently there has been some attempts to use a panel data approach. In this paper we follow this fashion and adopt a panel data approach to price discovery. The theory behind this approach is developed by Karabiyik et al. (2016). They consider the two most popular time series approaches for price discovery and adapt them to a panel data setup. These are the information share (IS) and permanent-transitory (PT) approaches of Hasbrouck (1995), and Gonzalo and Granger (1995), respectively. In order to describe the panel versions of these approaches, denote by $p_{st,t}$ and $f_{st,t}$ the stock and futures prices of stock $i = 1, \ldots, N$ at time $t = 1, \ldots, T$. We assume that these prices follow the following VECM:

$$
\Delta p_{st,t} = \alpha p_{st,t-1}^s + \sum_{\ell=1}^{k} A_{st,\ell} \Delta p_{st,t-\ell} + \epsilon_{st,t},
$$

(1)

where $p_{st,t} = (p_{st,0}, p_{st,1}, \ldots, p_{st,T})'$, $\alpha = (\alpha_{s,t}, \alpha_{f,t})'$, $p_{st,t}^s = p_{st,t} - p_{st,0}$ and $\epsilon_{st,t} = (\epsilon_{s,t}, \epsilon_{f,t})'$. It is assumed that the prices are non-stationary; however, $p_{st,t}^s$ is stationary, which means that the two price series' are cointegrated with the elements of $\alpha$ measuring the extent of error correction at each market.

Given the above VECM, we can use the Granger representation theorem (see Engle and Granger, 1987) to obtain the so-called “common trends representation” of $p_{st,t}$. In order to do this, we define the orthogonal component $a_{s,t} = (a_{s,t,s}, a_{s,t,f})'$ of $\alpha$, which is such that $\alpha_{s,t,s} = 0$. The common trends representation has the following general form written as

$$
p_{st,t} = B_{st} a_{s,t} \sum_{n=1}^{t} \epsilon_{s,n} + s_{st,t}
$$

(2)

where $B_{st}$ is a constant and $s_{st,t}$ is a stationary process that depends on $\epsilon_{s,t}$ (and its lags and leads). This representation shows how the prices in the stock and futures markets contain a common random walk term, namely, $B_{st} a_{s,t} \sum_{n=1}^{t} \epsilon_{s,n}$, and also how the extent to which each market is affected by shocks to this term is determined by $a_{s,t,s}$.

Hasbrouck’s (1995) IS measure is based on this representation. It measures the contribution of each market to the total variance of those innovations that have a permanent effect on prices. Let us therefore denote by $\Omega_i = E(\epsilon_{t,s}, \epsilon_{t,f})$ the covariance matrix of the errors in the VECM. Then, the total variance of the innovations that have a permanent effect on prices is given by $B_{st}^2 a_{s,t} \Omega_i a_{s,t}$. Suppose that $\Omega_i = C_i \Sigma_i$, where $C_i$ is a lower triangular matrix. This is the so-called “Cholesky decomposition” of $\Omega_i$. The IS of stock $i$ in the spot market is now given by

$$
\frac{\left(\left[a_{i,s} C_i\right]_{11}\right)^2}{a_{i,s} \Omega_i a_{i,s}}
$$

(3)

where $[a_{i,s} C_i]_{11}$ is the first element of $a_{i,s} C_i$. It is important to note that the above IS depends on the ordering of the markets. In particular, assuming the correlations between the innovations are positive, the IS of the spot market is maximized (minimized) if the spot price is ordered first (last). The IS computed for each of the two possible orderings gives the upper and lower bound for the IS, which can then be combined by taking the average. The same procedure can be applied to obtain the IS of the futures market.

The PT approach of Gonzalo and Granger (1995) is very similar to the IS approach in that it presumes that the data can be decomposed into a stationary and a random walk component. The main difference is that in the PT decomposition the innovations driving the stationary component are not the same as those driving the random walk component. This is convenient because it means that it is easy to make is that the error-correcting behaviour of stocks within the same country has one component that is common and one that is idiosyncratic. Formally, if stocks $1, \ldots, N$ belong to the same country, then

$$
a_i = a + \eta_i,
$$

(5)

where $\eta_i$ is an idiosyncratic error term. Denote by $a_i = (a_{s,t,s}, a_{f,t,f})'$ the orthogonal component of $\alpha$, and let $\Omega_i = CC'E(\Omega_i)$. The panel versions of the above IS and PT measures, henceforth denoted PIS and PPT, respectively, are obtained quite naturally by simply replacing $a_{s,t,s}$, $C_i$ and $\Omega_i$ by $a$, $C$ and $\Omega$, respectively. As with the IS and PT measures, PIS and PPT are parameters of the data generating process that are unknown. Valid inference therefore relies on the availability of suitable estimators. Karabiyik et al. (2016) show how such estimators can be constructed, and study their asymptotic and small-sample properties.
3. Data and results

3.1. Dataset

Our dataset is unique and has two components. The first is stock-level data, which we obtain from Datastream. The second is the stock price index futures data, which we obtain from Bloomberg. There is no specific database that contains Islamic stock price data. The data therefore need to be manually compiled. This we do; hence, the data are unique. In compiling the Islamic stock price data, we implement a criteria suggested in recent work by Narayan et al. (2016a) and Narayan et al. (2016b). We only consider stocks that have data available from the start date of their country’s stock futures index. This selection criteria leads to a sample of 900 Islamic stocks, belonging to 19 countries. To be included into the sample, a stock needs its: (a) total debt divided by trailing 24-month average market capitalization to be less than 33\%; (b) cash and interest-bearing securities divided by trailing 24-month average market capitalization to be less than 33\%; and (c) accounts receivables divided by trailing 24-month average market capitalization to be less than 33\%. Over the sample period we consider (1982 to 2015), there are 85\%, 89\%, and 91\% of time (months) when conditions (a), (b), and (c), respectively, are met. These conditions are consistent with those used in the literature; see also, Narayan et al. (2015).

Table 1 provides a summary of the data. It contains two panels. The upper panel describes our main dataset, which is monthly,
whereas the lower panel describes the same data sampled at a weekly frequency, which is used here as a part of our robustness test. The following features are noteworthy. Beginning with the monthly dataset, we have panels of stocks that vary from 10 (Singapore) to 167 (US). The time period is as small as 43 months (Indonesia) to as much as 405 months (US). The total number of observations fall in the 2080 (Singapore) to 67,635 (US) range. With weekly data the number of time series observations are four times more, with a total sample size in the 9030 (Singapore) to 293,586 (US) range. The reason we emphasise these statistics is because we have a rich Islamic stock panel dataset, one that has not been utilised previously. This richness should matter when we search for price discovery.

The second dataset that we use contains the stock index futures. We proxy this with the market futures index to which each of the 19-country Islamic stocks belong to. These indices are listed in Table 2.

3.2. Preliminary statistics

Table 3 has descriptive statistics of the data. The upper panel contains the statistics for spot returns at the weekly and monthly frequencies. These statistics are based on an equal-weighted stock portfolio by country. Mean returns, we notice, fall in the $-9.26\%$ (Indonesia) to $18.20\%$ (India) range when using weekly data and when using monthly data the range is $-9.71\%$ (Indonesia) to $18.40\%$ (India). The variability in volatility as depicted by the standard deviation is as expected with those markets with higher returns associated with higher volatility. Generally, the skewness is negative and the distribution is leptokurtic. These statistics of the data on Islamic stocks are consistent with those reported in earlier studies such as Narayan et al. (2016a), Narayan et al. (2016b), and Narayan et al. (2015).

The lower panel contains descriptive statistics for the future price index returns by country. Three countries (Taiwan, Japan, and Turkey) have negative futures returns; the rest of the futures returns are positive, with the monthly returns falling in the $0.012\%$ per annum (Malaysia) to $10.98\%$ per annum (France) range.

Finally, we estimate the (unconditional) correlation between country portfolio spot returns and the corresponding country futures index returns. The correlations are reported in Table 4 based on both weekly and monthly datasets. The correlations are all statistically different from zero at the 1% level of significance. The correlations are in excess of 0.5 for South Korea (0.52), Sweden (0.52), India (0.54), Japan (0.56), Poland (0.59), Malaysia (0.60), and Turkey (0.63). The remaining countries have correlations that are less than 0.5 and in fact for five countries (Hong Kong, Indonesia, Switzerland, South Africa, and France) the correlation is less than 0.35. Hence, as expected given the descriptive statistics reported in Table 3, the relation between Islamic spot and future returns seems to be heterogeneous across countries. This is expected to lead to differences in price discovery.

3.3. Main findings

Table 5 reports the monthly price discovery results. Based on evidence obtained from the PPT measure, we see that price discovery is dominated by the spot market with the exception of the US and the South Korean markets where only 30% and 0.003%,
process.

market-wide information faster than the futures market it is reasonable to believe that the spot market dominates the price discovery.

our results support the trading volume hypothesis.

discovery), trading volume is 119 million whereas the average trading volume of the 12 futures indices is only 78 million. Therefore,

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driven price discovery. The most likely reason for the results we obtain has roots in the so-called
idea is simple and associates price discovery in the spot market to higher trading volumes in the spot market compared to the futures
market. This type of arguments have been made in Lo and MacKinlay (1990), Brennan et al. (1993), Chordia and Swaminathan
2018. We next consider some possible explanations for our results. The key outcome of our analysis is that while theoretically price
discovery is expected to be dominated by the futures market, we discover that with respect to Islamic stocks price discovery for over
60% of countries (in our sample) is dominated by the spot market. The literature is divided on what dictates this type of spot market
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2000), and Hou (2007). We observe this in our data; on average (for the 12 countries for which spot market dominates price
discovery), trading volume is 119 million whereas the average trading volume of the 12 futures indices is only 78 million. Therefore,
our results support the trading volume hypothesis.

Aside from trading volume, McQueen et al. (1996) and Bae et al. (2012) argue that just because stock prices are able to absorb
market-wide information faster than the futures market it is reasonable to believe that the spot market dominates the price discovery
process.
The process of information incorporation for less visible markets. The idea is to test whether price discovery in the futures market. The message therefore is that once we know which market dominates the price discovery process, then this market is no longer safe to assume that price discovery takes place in the futures market for all countries. In other words, in markets where the spot prices dictate the price discovery process, spot price information needs to be utilised to forecast the futures market. The message therefore is that once we know which market dominates the price discovery process, then this market can be used as a predictor of returns from the other market. The way to think about the potential economic significance of price discovery is taking place, it is no longer safe to assume that price discovery takes place in the futures market for all countries. In other words, in markets where the spot prices dictate the price discovery process, spot price information needs to be utilised to forecast the futures market. The message therefore is that once we know which market dominates the price discovery process, then this market can be used as a predictor of returns from the other market. The idea is to test whether profits are higher when using the obtained information on price discovery in forecasting returns. In order to estimate investor profits, we follow the convention in the literature and make the following assumptions: (i) the investor is faced with a mean-variance utility function; (ii) the investor has a two-asset portfolio, one risky asset and one risk-free asset (three-month US Treasury bills), and (iii) the investor allocates her portfolio between these two assets and rebalances the portfolio every month (since our analysis is based on using monthly data). In estimating the portfolio weight, the investor needs: (a) forecasts of excess returns, which are constructed using an in-sample period of 50%; (b) variance forecasts, which we obtain by using a five-year rolling window of monthly returns; and (c) a risk-aversion parameter, which we set to three, representing an investor who undertakes a low level of risk.

The results are presented in Table 7. Column 2 contains profits from a buy-and-hold strategy implemented in both the spot and the futures markets. Column 3 contains two sets of results obtained using the mean-variance utility function. The first set of results restricts the portfolio weight to be between 0 and 1, implying that there is no short-selling and borrowing. The second set of results relaxes this assumption and allows for 50% short-selling and 50% borrowing. The results reported in the last column are the same as those reported in column 3, except that the risk aversion parameter is now set to six (representing an investor who entertains a medium level of risk). In addition to reporting the annualized profits, we also test the null hypothesis that the profits are zero.

Two results are of particular interest here. Let us first consider the seven countries (US, Taiwan, Canada, Indonesia, Turkey, Singapore, and Sweden) for which price discovery is dominated by the futures market. We notice that the profits for the US (9.55%), Taiwan (8.89%) and Turkey (18.83%) are higher than the buy-and-hold profits. For Canada, the buy-and-hold profit is -5.39%, but the mean-variance profit is statistically insignificant and positive (0.29%). For Indonesia, the buy-and-hold strategy leads to a loss of 31.87%, whereas profits obtained for a mean-variance investor indicate a substantially smaller loss at 2.14%. For Singapore, both strategies offer statistically insignificant profits.

Next, consider the 12 countries for which the spot market dominates price discovery. We notice that the mean-variance profits for

<table>
<thead>
<tr>
<th>Countries</th>
<th>Coeff Weekly</th>
<th>t-Test Weekly</th>
<th>Coeff Monthly</th>
<th>t-Test Monthly</th>
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</table>

Other studies, such as Merton (1987), Basak and Cuoco (1998), Shapiro (2002), and Hou and Moskowitz (2005) indicate that institutional forces and information or transaction costs could influence the price discovery process because these factors can delay the process of information incorporation for less visible markets.

We conclude this section with an analysis of the economic significance of price discovery. We have shown that price discovery in most countries in our sample is dominated by the Islamic spot market. What does this mean for investors? This is the questions we answer next. The way to think about the potential economic significance of our results is as follows. Without having the knowledge on price discovery, it is safe to begin by assuming that the futures market contains all the information and therefore should help predict the spot market. There is a large literature on this line of analysis (see Narayan, 2013). However, now when we know where the price discovery is taking place, it is no longer safe to assume that price discovery takes place in the futures market for all countries. In other words, in markets where the spot prices dictate the price discovery process, spot price information needs to be utilised to forecast the futures market. The message therefore is that once we know which market dominates the price discovery process, then this market can be used as a predictor of returns from the other market. The idea is to test whether profits are higher when using the obtained information on price discovery in forecasting returns. In order to estimate investor profits, we follow the convention in the literature and make the following assumptions: (i) the investor is faced with a mean-variance utility function; (ii) the investor has a two-asset portfolio, one risky asset and one risk-free asset (three-month US Treasury bills), and (iii) the investor allocates her portfolio between these two assets and rebalances the portfolio every month (since our analysis is based on using monthly data). In estimating the portfolio weight, the investor needs: (a) forecasts of excess returns, which are constructed using an in-sample period of 50%; (b) variance forecasts, which we obtain by using a five-year rolling window of monthly returns; and (c) a risk-aversion parameter, which we set to three, representing an investor who undertakes a low level of risk.

The results are presented in Table 7. Column 2 contains profits from a buy-and-hold strategy implemented in both the spot and the futures markets. Column 3 contains two sets of results obtained using the mean-variance utility function. The first set of results restricts the portfolio weight to be between 0 and 1, implying that there is no short-selling and borrowing. The second set of results relaxes this assumption and allows for 50% short-selling and 50% borrowing. The results reported in the last column are the same as those reported in column 3, except that the risk aversion parameter is now set to six (representing an investor who entertains a medium level of risk). In addition to reporting the annualized profits, we also test the null hypothesis that the profits are zero.

Two results are of particular interest here. Let us first consider the seven countries (US, Taiwan, Canada, Indonesia, Turkey, Singapore, and Sweden) for which price discovery is dominated by the futures market. We notice that the profits for the US (9.55%), Taiwan (8.89%) and Turkey (18.83%) are higher than the buy-and-hold profits. For Canada, the buy-and-hold profit is -5.39%, but the mean-variance profit is statistically insignificant and positive (0.29%). For Indonesia, the buy-and-hold strategy leads to a loss of 31.87%, whereas profits obtained for a mean-variance investor indicate a substantially smaller loss at 2.14%. For Singapore, both strategies offer statistically insignificant profits.

Next, consider the 12 countries for which the spot market dominates price discovery. We notice that the mean-variance profits for
South Korea (1.99%), India (8.51%), Hong Kong (5.13%), UK (1.91%), Malaysia (6.43%), Australia (2.46%), Poland (12.86%), Switzerland (7.01%), South Africa (5.59%), and France (3.62%) beat corresponding profits obtained from the buy-and-hold strategy. These results imply that utilizing the information from price discovery in specifying a forecasting model offers investors greater profits compared to a buy-and-hold strategy. For the 12 countries for which the spot market dominates price discovery process, the mean-variance strategy produces an average profit of 4.91% per annum, whereas the 12-country average buy-and-hold profit is only 2.97% per annum. This represents a 62.35% increase in average profits when using the evidence on price discovery to forecast returns. These results are on the whole robust to different risk aversion parameters and to the allowance for both short-selling and borrowing.

4. Concluding remarks

There is no knowledge on whether the price discovery process with respect to Islamic stocks is spot market or futures market driven. This is the subject of our investigation. We compile a unique stock-level dataset covering 900 Islamic stocks belonging to 19 countries. We then form country-wise panels of stock prices and the stock market index futures price. Following this, we measure price discovery within a panel data setting following the proposal of Karabiyik et al. (2016). The evidence we obtain suggests that the price discovery process in most of the 19 countries is dominated by the spot market. At best, in only seven countries it is the futures market.
market that dominates the price discovery process. We also illustrate the economic significance of the evidence on price discovery. For the 12 countries for which the spot market dominates price discovery, we show, using a mean-variance investor utility function, that the 12-country annualized average profit is 4.91% whereas the 12-country average buy-and-hold profit is only 2.97% per annum. This represents a 62.35% increase in average profits when using the evidence on price discovery to forecast returns.

There are two implications of our empirical findings. The first implication relates to the utilisation of the evidence on price discovery to devise trading strategies. What we show is that the price discovery process with respect to Islamic stocks is not homogeneous; that is, while in some countries the futures market seems to dominate price discovery, in most countries it is the spot market that dominates price discovery. Therefore, the investment strategies at least in the 19 countries we analyse will have to be country-specific. We design trading strategies accordingly and demonstrate the usefulness of the knowledge on price discovery.

Subsequently, and to the best of our knowledge, ours is the first paper to develop the connection between the statistical evidence of price discovery and its economic significance. The second implication relates to the fact that in majority of the countries we find the spot market dominating the price discovery process. We are not alone in documenting such a relationship. In commodity markets, for instance, it has been shown that for some commodities it is the spot market that dominates price discovery. The point here is that such a statistical relation is inconsistent with the bulk of the empirical evidence documented in the price discovery literature. Our results though are consistent with the trading volume hypothesis, which associates higher trading volumes in the spot market (compared to the futures market) to a greater role for price discovery in the spot market. The resulting implication, when our results are combined with the broader literature, is that since the evidence in more than one strand of the literature tends to show a dominant role of the spot market over the futures market, it calls for more theoretical work to explain this type of relationship.
Table 7
Mean-variance investor profit. This table reports profits for investors based on a buy-and-hold trading strategy and a mean-variance investor trading strategy. To implement the mean-variance trading strategy, we use the one period lagged spot (futures) returns to forecast the current futures (spot) returns. A 50% in-sample period is used to generate recursive forecasts of returns for the remaining 50% of the sample. Profits are computed based on first estimating the portfolio weight, which is an increasing function of return forecasts and a decreasing function of the return variance and the risk aversion factor. The risk aversion factor equals three and six and the variance is computed using a five-year rolling window of historical returns. The portfolio weight is restricted to be between (a) 0 and 1, implying that there is no short-selling and borrowing, and (b) – 0.5 and 1.5, which allows for 50% short-selling and borrowing. Our portfolio is a two-asset portfolio, where one is a risky asset and the other is a risk-free asset. The portfolio weight is decided according to the price level in the risky asset which is wither the spot or futures.

References


