Risk-adjusted profitability and stability of Islamic and conventional banks: Does revenue diversification matter?

Andrea Paltrinieri [a,*], Alberto Dreassi [b], Simone Rossi [c], Ashraf Khan [d]

[a] Department of Economics and Statistics, University of Udine, Via Tomadini 30/A, 33100, Italy
[b] University of Trieste, Italy
[c] Università Cattolica del Sacro Cuore, Milan, Italy
[d] Institute of Business Administration, Karachi Pakistan

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ABSTRACT

Revenue diversification in banking offers opportunities and threats. Recent academic research shows that disadvantages may outweigh advantages, in terms of both volatility of profitability and bank riskiness. Literature on this topic in emerging countries and in the field of Islamic finance is limited: our aim is to empirically test if revenue diversity affects Islamic banks differently than conventional institutions. We analyze the impact of income diversification on profitability and firm-risk of banks in selected OIC countries, in the period 2007–2016, using a comprehensive dataset of 47 Islamic and 154 conventional banks, through diverse measures and econometric approaches. We find that diversification provides lower rewards for Islamic banks than conventional banks, with effects that are stronger for accounting-based measures rather than market-based metrics. Shares of non-interest income positively contribute to profitability regardless of the business model, whereas income diversification shows a not significant effect on the risk-adjusted profitability of Islamic banks. Moreover, we do not find any relationship between income diversification and stability for both conventional and Islamic banks.

1. Introduction

As a result of the deregulation in the late 90's, the banking landscape changed significantly, especially in terms of business models. The supervisory concern on restoring profitability, while improving capital and liquidity, led to several calls for income diversification, from traditional to non-interest-bearing activities, such as trading, advice, underwriting or the distribution of third-party products. This phenomenon has been further reinstated after global financial crises and shows a global increasing trend (BIS, 2018).

Several studies examine the impact of income diversification on profitability and its volatility, with evidence for both a positive and a negative relationship (Chiorazzo, Milani, & Salvini, 2008; DeYoung & Rice, 2004; Maudos, 2017; Stiroh & Rumble, 2006). The same issue involves studies on diversification and bank stability, with recent studies showing greater evidence of a negative relationship (Abuzayed, Al-Fayoumi, & Molyneux, 2018; Ahamed, 2017; Köhler, 2015; Sanya & Wolfe, 2011).

The effect of income diversification varies across banks and depends on both business models and the economic environment. On the one hand, traditional activities (i.e. deposits and loans) are considered to be stable, despite exposing to significant credit, liquidity

* Corresponding author.
E-mail addresses: andrea.paltrinieri@uniud.it (A. Paltrinieri), adreassi@units.it (A. Dreassi), simone.rossi@unicatt.it (S. Rossi), ashrafkhan@iba.edu.pk (A. Khan).

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and interest-rate risks. Non-interest-bearing operations, on the other hand, are prone to market, operational and reputational risks and show greater volatility, but at the same time involve greater expected returns.

The global financial crisis of 2008–2009 and the following trends of commodity prices forced the Organization of Islamic Cooperation (OIC) countries, which are dependent on the oil sector, to review their economic policies, mainly with the purpose of increasing the contribution to GDP by the non-oil sector. Due to lower oil prices, government deposits shrunk, pushing banks to raise funds through other more expensive channels, with impacts on their profitability (KPMG, 2017).

Although Islamic banks offer products similar to those of their conventional counterparts, compliance to *Sharia* (prohibition of interest-based transactions, excessive uncertainty and gambling, among other requirements) significantly influences their business models. Previous studies show that Islamic banks are comparatively less diversified and, therefore, may benefit more from diversification, also in enhancing financial stability. At the same time, interest-bearing activities are not present in Islamic banks and the distinction impacting diversification is between income from financing and non-financing activities (Abuzayed, Al-Fayoumi, & Molyneux, 2018).

Additionally, conventional banks face agency issues towards both depositors and borrowers. This problem may be lower in Islamic banks for two reasons. Firstly, equity-based funding models (*Mudarabah* and *Musharakah*), as opposed to those that are debt-based (*Murabahah* and *Ijarah*), should increase the incentive of depositors to monitor and exert discipline on banks' management. Secondly, an important monitoring role is played by the *Sharia* supervision boards of each institution: assuring compliance with religious requirements of each operation may avoid excessive risk-taking or poor-quality lending.

In this paper, we investigate the impact of income diversification on risk-adjusted profitability and stability of Islamic and conventional banks within the OIC region. More specifically, we test the aforementioned link under different measures of profitability and firm-risk, including both accounting and market-based specifications.

We contribute to the existing literature by adding our findings to the few existing studies on income diversity, bank profitability and stability in emerging economies. Unlike previous studies, with which we share motivation and some comparable results, we also extend the geographical scope of analysis beyond GCC countries, to include other economies in which Islamic banking is a well-established phenomenon. Moreover, our evidence is grounded on a large number of banking institutions, on a more recent time frame and with utmost care in ensuring data quality. Finally, to the best of our knowledge, this study is the first attempt to investigate this matter by considering both accounting and market-based measures of firm-risk and to investigate jointly on the same dataset all implications of income diversity on risk-adjusted profitability and stability.

Our analysis shows that diversification provides lower rewards for Islamic banks than conventional banks, with stronger results associated with accounting-based measures. While shares of non-interest income positively contribute to profitability regardless of the business model, income diversification shows a not significant effect on the risk-adjusted profitability of Islamic banks. Moreover, we do not find any relationship between income diversification and stability for both conventional and Islamic banks.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes our dataset, variables and econometric strategy. Section 4 discusses our findings and provides a series of robustness tests. Finally, Section 5 concludes with our policy implications.

2. Literature review

2.1. Income diversification and bank profitability

Diversification should be beneficial, with the leading examples of firms' income sources and investors' asset allocation. In the specific case of banking, non-interest-bearing activities less than perfectly correlated with traditional operations should provide profit smoothing, resilience to downside risks and a reduction of the overall riskiness of the firm (Chiorazzo et al., 2008).

However, DeYoung and Roland (2001) argue that non-interest income may be more volatile for three reasons. Firsly, relationship-based loans have high switching costs when compared to fee-based activities, and notwithstanding higher credit and interest-rate risks, they generate more stable revenues. Secondly, non-interest activities require significant fixed costs (technology and human capital), while the marginal cost of interest-bearing operations is relatively low. Lastly, several non-interest activities incur limited effects on regulatory capital and may incentivize leveraging and, as a result, higher earnings volatility.

A significant number of studies focus on revenue diversity in conventional banking with a positive (Ahamed, 2017; Al-Obaidan, 1999; Elsas, Hackethal, & Holzhäuser, 2010; Meslier, Tacneng, & Tarazi, 2014; Roengpitya, Tarashev, Tsatsaronis, & Villegas, 2017) and negative relationship (Acharya, Hasan, & Saund, 2006; DeYoung & Rice, 2004; Maudos, 2017; Stiroh, 2004). Al-Obaidan (1999) finds diversification in commercial banks to increase allocative and scale efficiency and an overall positive economic gain, however, the results are negative for technical efficiency. Likewise, Elsas et al. (2010) find a positive effect of diversification on profitability and market valuation. Ahamed (2017) finds that a higher share of non-interest income increases profits and risk-adjusted profitability in Indian banks, especially when trading is involved.

Roengpitya et al. (2017) conclude that commercial banking models show lower cost-to-income ratios and more stable profitability than the trading model. Moreover, they measure an average 2.5 percentage points improvement on the return-on-equity of deposit-funded banks. Meslier et al. (2014) investigate diversification dynamics in emerging countries' banks and find that non-interest income has positive effects on profits and risk-adjusted profitability.

To begin with negative nexus of diversification-profitability, DeYoung and Rice (2004) investigate the impact of non-interest income on the performance of US commercial banks over the period 1989–2001. They find that well-managed banks are less dependent on non-interest income, while banks with good service quality and customer relationships are likely to produce more non-interest

income. Stiroh (2004), while examining the diversification benefits in US banks, finds non-interest income to be remarkably volatile and correlated with net interest income; banks relying heavily on non-interest income show also lower risk-adjusted profitability.

Acharya et al. (2006) argue that diversification does not assure improvements in performance or greater stability. By analyzing 105 Italian banks for the period of 1993–1999, they find that diversification reduces earnings for high-risk banks, while generating riskier loans and having no or marginal effects on risk-return profiles for low-risk banks. Using data for a panel of European banks over the period of 2002–2012, Maudos (2017) shows a negative impact of increases in non-interest income on profitability during the crisis.

Banks, traditionally, borrow funds from depositors and lend to borrowers, building profitability on the net interest margin. However, profit may also arise from non-interest activities, such as fees and commissions or trading. The literature provides mixed results on the effects of income diversification.

Banks can diversify their sources of income through technological advancement and managerial skills. This may increase revenues and reduce the costs of running non-interest activities (Ahamed, 2017; Meslier et al., 2014; Sanya & Wolfe, 2011). In contrasts, banks with more aggressive diversification may lose its competitive managerial advantage and generate more volatile returns (Stiroh, 2004: Acharya et al., 2006; DeYoung & Roland, 2001).

Islamic banks are relatively young and experiencing significant growth. Therefore, they could better reap the benefits of diversification (Chen, Liang, & Yu, 2018; Molyneux & Yip, 2013). Moreover, specific operations (f.i. *sukuk* underwriting) and religious affairs (f.i. *Hajj*) require the services of Islamic banks, increasing their profitability. At the same time, complying with the *Shariah* on top of other regulatory requirements may generate higher costs (f.i. the *Shariah* board) and exclude some prohibited business activities. Thus, the net benefit of diversification could be affected downwards for Islamic banks.

The above arguments lead us to the following research questions:

RQ1. : "How does diversification affect the profitability of banks?"

RQ2. : "Is there any difference in diversification effects on profitability between Islamic and conventional banks?"

2.2. Income diversification and bank stability

Traditional banking (i.e. deposit-funded loans) involves exposure to interest-rate, credit and liquidity risks, that may show significant correlations. By participating to non-interest-bearing activities, banks should be able to reduce the impact of the worsening quality of their loan portfolio, as well as to offset credit losses with fee-based revenues. Non-traditional operations seem to be negatively associated with the asset quality of credit institutions (Ahamed, 2017).

The existing literature on the link between income diversification and bank stability in conventional banks focuses on advanced economies, with mixed results and non-conclusive explanations.

Lepetit, Nys, Rous, and Tarazi (2008) investigate bank risk and product diversification in Europe for the period 1996–2002 and show that higher insolvency probabilities are attributed to firms switching to non-interest-bearing activities, as compared to those involved in traditional banking.

De Jonghe (2010) explores divergent strategies within the context of specialization and diversification of financial activities and their impact on bank stability in Europe. The author finds that non-interest-bearing activities increase bank's systematic risk, suggesting that diversification of financial activities does not contribute to stability. Köhler (2015) studies the impact of business models on stability of EU countries over the period 2002–2011 and finds that banks with an increasing share of non-interest income are more stable and profitable.

DeYoung and Torna (2013) test if non-traditional banking activities contributed to failures in the US banking industry: they find that the probability of failure increases with asset-based non-traditional activities (f.i. venture capital or securitizations), while decreases with pure fee-based operations (f.i. securities brokerage and insurance distribution).

Williams (2016) examines the relationship of Australian banks' income structure and risk, finding that a lower non-interest income and higher revenue concentration is associated with lower volatility. Although non-interest income is typically found to be risk increasing, some of its sources are risk decreasing, after controlling for bank specialization effects. Using quarterly data of almost 7000 US commercial banks for the period 2007–2016, Abedifar, Molyneux, and Tarazi (2018) find no adverse effect of non-interest income on credit risk, while cross-subsidization between non-interest activities and lending is observed for larger banks.

Additionally, there is a growing body of literature investigating the relationship between income diversification and bank stability in emerging economies.

Sanya and Wolfe (2011) find that diversification across and within both interest and non-interest-bearing activities has positive impacts on stability and profitability. Using a broad dataset of almost 1000 banks in 55 emerging countries, Amidu and Wolfe (2013) identify diversification across and within non-interest-bearing activities as a way by which competition improves bank stability. Similarly, Moudud-Ul-Huq, Ashraf, Gupta, and Zheng (2018) posit that diversification depends on the riskiness of the related activities. They find that diversification in the banking sector of Thailand, Vietnam, the Philippines, and Malaysia improves the risk-return tradeoff.

While investigating the impact of income diversification on profitability and asset quality of Indian banks, Ahamed (2017) finds that entities with lower asset quality benefit more from diversification than those with higher asset quality.

Finally, to the best of our knowledge, Abuzayed, Al-Fayoumi, & Molyneux, 2018 and AlKhouri and Arouri (2019) are the only authors that focus on the comparative impact of diversification on the stability of Islamic and conventional banks, yet with inconclusive results, focusing only on GCC countries, and for the periods 2001–2014 and 2003–2015 respectively. These authors find diversification to adversely influence the stability of both banking systems, but the results are more pronounced for conventional

Table 1
Sample description.

Country	Sample dataset		Listed banks	Of which Islamic	Total
	Islamic banks	Conventional banks			
Bahrain	8	9	9	6	17
Oman	3	6	5		9
Kuwait	5	5	9	4	10
Qatar	5	6	8	3	11
Saudi Arabia	4	9	11	4	13
UAE	8	18	16	4	26
Pakistan	2	18	20	2	20
Bangladesh	7	22	29	7	29
Malaysia	1	10	11	1	11
Indonesia	2	41	41	2	43
Turkey	2	10	12	2	12
Total	47	154	171	35	201

banks. They also find that asset diversification improves the stability of Islamic banks. Despite similarities in the purpose of our research, our study differs both by considering the impacts of diversification on risk-adjusted profitability jointly with stability, as well as extending the geographical scope significantly to the OIC region.

Islamic banks are generally risk-averse in their investment-based operations, for instance by not exposing themselves to CDOs or CDS instruments. This might increase their stability (Hassan, Khan, & Paltrinieri, 2019) on one hand, while it can limit diversification opportunities.

Therefore, the inconclusive literature on diversification in emerging economies further intensifies our motivation and leads us to the following additional research questions.

RQ3. : "How does diversification affect the stability of banks?"

RQ4. : "Is there any difference in diversification effects on the stability of Islamic and conventional bank?"

3. Data and methodology

3.1. Data

We collect data in the 2007–2016 period for banks in eleven Members of the Organization of Islamic Cooperation (OIC) for which Islamic banks represent an important and well-established type of financial institutions. These countries include the GCC area (namely United Arab Emirates, Saudi Arabia, Qatar, Bahrain, Oman, Kuwait), as well as Malaysia, Indonesia, Pakistan, Bangladesh and Turkey.

Financial data were obtained from different sources: Bankscope (2007–2010) and Orbis Bank Focus (2011–2016) for accounting information, Bloomberg Professional Services for the Distance-to-Default (DD) measures and World Bank for macroeconomic figures.[1] Since we are interested in the effect of diversification on the risk-return profile of a specific entity, we use consolidated data, where available, and individual data for the remaining banks.

Matching data from different sources is usually a tricky task to fulfill; since data quality is a major concern in empirical analysis, we put great efforts in ensuring the reliability of our sample. Bankscope and Orbis Bank Focus share a common set of variables' names and identification codes; however, some items are calculated with different formulas and identification codes are sometimes the same for unconsolidated and consolidated financial statements. Then, we started collecting data from both the datasets, checking accurately the consistency of the time series of each entity, matching the unique bank identifying code and financial statement type (consolidated vs. unconsolidated) in Bankscope and Orbis Bank Focus. Several banks showed overlapping time series: we controlled that observations coming from different datasets for the same year have the same value. When we found different values (since, as previously said, some variables are computed with different equations), we re-calculated the corresponding figures in Bankscope using Orbis Bank Focus standards. For several banks overlapping observations were not available; in that case we checked the percentage variation of each variable between 2010 and 2011 (i.e. the matching point between the different data sources), starting from total assets figures. Where we found abnormal values of increase or decrease, hand-made further checks have been made to explain this event; if nothing seemed to justify these extreme variations, we dropped the corresponding entities from the dataset. This selection of banks has been matched with Bloomberg Professional Services data using the ISIN code as a unique identifier of each bank.

The resulting sample is made of 201 banks (47 Islamic and 154 conventional banks) and it is unbalanced, due to the scattered pattern of available data. However, the sample dataset remains highly representative of the related countries and only few observations required to be dropped. Furthermore, for the computation of distance to default as proxy of bank stability, the banks are required to be listed banks. Due to some data unavailability, we are forced to reduce the sample of this analysis to 169 banks (34

[1] Specifically, for the variable capturing regulatory and supervisory conditions of each country, we used World Bank's BRSS database, available at the following website: www.worldbank.org/en/research/brief/BRSS

Islamic banks and 135 Commercial banks).

We pay great attention to sample composition, excluding banks that were not mainly operating in the traditional "commercial banking framework" (e.g. several Islamic banks which showed a clear orientation towards investment banking or corporate finance services). Table 1 describes the sample in greater detail.

3.2. Target variables

Since we are interested in the effects of diversification on banks' risk-adjusted profitability and stability, we use two variables that are widely used in the literature (Chiorazzo et al., 2008; Maudos, 2017; Stiroh & Rumble, 2006), namely the Risk Adjusted Return On Average Assets (RAROAA) and the Risk Adjusted Return On Average Equity (RAROAE). Both these measures are calculated dividing the return on average assets and return on average equity for their respective standard deviation. More specifically, standard deviation has been calculated as the variability of ROAA and ROAE for the whole period under consideration. Volatility figures are affected by the number of data used for the computation: a small number of items can lead to extremely low or high levels of standard deviation (with the extreme case of zero-volatility that makes impossible to calculate the corresponding risk-return variables). In order to reduce these drawbacks and improve the quality of data, we performed further robustness checks including only banks with at least 5 years of consecutive values for ROAA and ROAE; main results are unaffected by this stricter data filtering.

Additionally, bank stability is investigated with both an accounting and a market-based variable, accordingly to the literature (Abuzayed, Al-Fayoumi, & Molyneux, 2018; Beck, Demirgüç-Kunt, & Merrouche, 2013; Cihák & Hesse, 2010): respectively, the *Z*-Score and the distance-to-default.

Z-score is calculated as the sum of the ROAA and the equity-to-asset ratio, divided by the standard deviation of the ROAA. Higher values of Z-score signal higher resilience and, therefore, more stability. Cihák and Hesse (2010) argue that Islamic banks, by having large portions of investment account holders (IAH), sharing similarities with equity capital, are not fully reflected in this traditional measure. Therefore, measures can be biased and lead Islamic banks to be perceived as less stable. In order to control for this issue, we adopt also a market-based measure of stability, i.e. Merton's Distance to Default (DD). Consistently with the literature (Abuzayed, Al-Fayoumi, & Molyneux, 2018; Kabir, Andrew, & Gupta, 2015), this measure should be more efficient in predicting bank stability.

A traditional measure of DD is the difference between the market value of assets and a default point, defined as the sum of short term and half of long term liabilities, divided by the product of the market value of assets and their volatility. Therefore, the higher the DD, the higher the stability. For this study, we collect default probabilities from Bloomberg Professional Services and measure the DD by the inverse cumulative distribution function as follows.

Let *DD* be a standard normal variable, where $D \sim N(0,1)$. The probability of default ($P_{default}$) is defined as:

$$P_{default} = CDF(-DD) = \phi(-DD) = 1 - \phi(DD)$$

$$\phi(DD) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{DD} e^{-t^2/2}\, dt$$

or, equivalently:

$$\phi(DD) = \frac{1}{2}\left[1 + erf\left(\frac{DD}{\sqrt{2}}\right)\right] \tag{1}$$

Eq. 1 allows us to define DD from the probability of default, as follows:

$$\phi^{-1}\left(P_{default}\right) = \sqrt{2}\, erf^{-1}\left(2P_{default} - 1\right), P_{default} \in (0,1) \tag{2}$$

To measure income diversification, we build a variable (*DIV*) based on the shares of operating revenues represented by financing and non-financing streams of income. In order to calculate *DIV*, we firstly collect data on *NONsh*, which is the share of operating revenues attributable to non-interest income (or non-financing income, in the case of Islamic banks). Higher values of *NONsh* indicate a greater exposure to non-traditional sources of revenues. According to the literature, observations with values outside the [0;1] range are excluded. Following recent literature (Abuzayed, Al-Fayoumi, & Molyneux, 2018; Sanya & Wolfe, 2011), we include the squared value of this variable among the control covariates in our estimations.

DIV, instead, is built accordingly to the Herfindahl–Hirschman Index (HHI), as follows:

$$\text{DIV} = 1 - \left\{(\text{NONsh})^2 + (1 - \text{NONsh})^2\right\} \tag{3}$$

By definition, *DIV* values can range between 0 and 0.5, with lower values indicating less diversification. It is worth noting that an increase in non-traditional activities (*NONsh*) does not necessarily lead to a greater diversification (*DIV*): the final effect depends on the initial level of *NONsh*. For instance, consider a bank with operating revenues composed by 40% financing/interest-bearing activities, and 60% for the remaining: its level of diversification would be 0.48. If non-traditional activities increase to 70%, diversification would fall to 0.42. We control for this issue in the robustness checks section, where we test our estimations on a subsample of banks with *NONsh* lower than 50%.

Finally, in our estimation *DIV* is interacted with the dummy variable capturing Islamic banks. This choice aims at testing the existence of a link between diversification and performance or stability that is contingent on the type of financial institution. Therefore, this interaction term is the key variable of our analysis, allowing us to check whether Islamic banks per se are different in terms of

Table 2
Description of variables.

Type	Variable	Measure
Dependent variables	ROAA	Net Income/Average Total Assets
	ROAE	Net Income/Average Total Equity
	σROAA	Standard deviation of ROAA
	σROAE	Standard deviation of ROAE
	RAROAE	ROAE/σROAE
	RAROAA	ROAA/σROAA
	Z-SCORE	(ROAA + Equity/TA)/σROAA
	DD	$\frac{\text{Market value of assets} - \text{Default Point}}{(\text{Market value of assets})(\text{Volatility of assets})}$
Independent variables	$NONsh^2$	$(\text{Non-interest revenues/Total income})^2$
	DIV	1 - Herfindahl-Hirschman index (built on NONsh)
	Size	Natural Logarithm of total assets
	Equity Ratio	Equity/Total Assets
	Loans/TA	Net Loans/Total assets
	Cost income	Operating Expenses/Total Revenue
	Asset growth	Annual growth of total assets (level and squared value)
Macroeconomic variables	GDP	GDP Growth
	INF	Inflation (Consumer price index)
	REG	Regulatory restriction which can take 4 values: 1(no restriction), 2(allowed), 3(restricted), 4(prohibited)
	Crisis	Dummy variable takes value 1 for the year 2008 and 2009 and 0 otherwise.

This table summarizes our dependent and independent variables, together with the explanation of their measure.

profitability or resilience through the pursuit of specific diversification strategies.

3.3. Control variables

Following the literature on income diversification, we add firm-specific variables to control for other effects on profitability and stability.

We use the natural logarithm of total assets (*SIZE*) to capture the impact of each bank's dimension. Larger banks might be more profitable due to economies of scale or scope, or greater investments in technology. We also consider the level and squared value of total assets growth (*Asset Growth*) to reflect potential non-linear relationship between bank expansion and the risk-adjusted performance: a greater focus on growth could encompass more relaxed credit screening criteria and lower, in the longer run, profitability (Chiorazzo et al., 2008).

To control for leverage effects, we use the ratio of tangible equity to total assets (*Equity Ratio*). Higher values should indicate that the bank faces less financial fragility.

The ratio between loans and total assets (*Loans/TA*) is considered to assess the bank's lending strategy. Higher values could encompass greater profitability but also a greater exposure to credit risks.

Lastly, we also include the cost-to-income ratio (*Cost income*) to control for bank efficiency; this variable is used only in stability measures estimations, since it is a relevant component of profitability ratios and this can lead to biased estimates.

Macroeconomic conditions are usually crucial for banks' profitability and overall soundness; we account for this effect including two variables (*GDP* and *INF*) that respectively measure the annual growth of gross domestic product and the level of inflation at country level.

Moreover, following existing literature (Abuzayed, Al-Fayoumi, & Molyneux, 2018; Barth, Caprio Jr., & Levine, 2004), we introduce a variable (*REG*) that measures the level of regulatory restrictions in a specific country with reference to several services, such as brokerage or trading. *REG* can assume 4 values: 1 (no restrictions); 2 (allowed); 3 (restricted); 4 (prohibited). Since this kind of regulation can affect both diversification strategies and financial results, the variable is an effective exogenous instrument in our econometric estimation.

Finally we control for the impact of the financial crisis by adding a dummy variable (*Crisis*) for years 2008 and 2009.

Table 2 summarizes and briefly describes the variables used in the econometric estimations; the correlation matrix is provided in Table 3.

3.4. Methodology

Following Stiroh and Rumble (2006), we first estimate the mean values of all variables over the whole sample period. This allows us to run a first OLS regression to investigate the cross-sectional nature of our sample using the following model:

$$\overline{Y_i} = \alpha_0 + \beta_1 \overline{DIV_i} + \beta_2 \overline{DIV_i} \times Islamic + \gamma \overline{CV_i} + \varepsilon_i \quad (4)$$

where $\overline{Y_i}$ is the alternative measure of profitability, profit volatility or stability that we adopt, *CVi* are firm-specific control variables, α is the intercept and ε_i is the error term. *DIV x Islamic* is an interaction term between our measure of revenue diversification and a dummy that identifies Islamic banks. We also include country dummies which in these first regressions account for country-specific

Table 3
Correlation matrix.

	RAROAA	*RAROAE*	*Z − score*	*DD*	*DIV*	*NONsh2*	*Size*	*Equityratio*	*Loans/TA*	*Assetgrowth*	*Assetgrowth2*	*Costincome*	*Crisis*	*GDP*	*INF*	*REG*
RAROAA	1															
RAROAE	0.7870*	1														
Z-score	0.8287*	0.5562*	1													
DD	0.2871*	0.2528*	0.2134*	1												
DIV	−0.0188	−0.0251	−0.1098*	0.1089*	1											
$NONsh^2$	0.0708*	0.1086*	0.0407	−0.1123*	−0.4617*	1										
Size	0.2270*	0.2376*	−0.0263	0.3965*	0.3059*	−0.1329*	1									
Equity Ratio	−0.031	−0.1403*	0.1830*	0.1785*	−0.1526*	−0.0497	−0.2850*	1								
Loans/TA	−0.0846*	−0.1256*	−0.1053*	0.0732*	0.1158*	−0.3053*	0.0372	−0.1292*	1							
asset_g1	−0.0292	0.0145	−0.0031	−0.0049	−0.0695*	0.0374	−0.1775*	0.0427	−0.0271	1						
asset_g2	−0.1063*	−0.0920*	−0.0083	−0.0914*	−0.0909*	0.0276	−0.2199*	0.1249*	−0.047	0.8071*	1					
costincome1	−0.3373*	−0.3264*	−0.1026*	−0.4007*	−0.1768*	0.1467*	−0.4621*	0.0610*	−0.1454*	0.0551*	0.1422*	1				
Crisis	−0.0679*	−0.0495*	−0.0869*	−0.2481*	−0.0047	0.0943*	0.0039	0.0012	0.0029	0.0274	0.0799*	−0.0493	1			
Gdp	0.0775*	0.1004*	0.0427	0.0592*	0.0247	0.0626*	−0.1093*	0.0244	0.0322	0.1769*	0.1237*	−0.0156	−0.1887*	1		
Inf	0.0148	0.0653*	−0.0502*	−0.2931*	−0.0621*	0.2681*	−0.1501*	−0.2044*	0.0227	0.0131	0.0285	0.1057*	0.2212*	0.0952*	1	
Reg	0.1534*	0.1674*	0.1129*	−0.0316	−0.0843*	0.2260*	−0.1223*	−0.1959*	0.0458	0.0493	0.0038	0.1315*	−0.0618*	0.2990*	0.3922*	1

Stars indicate statistical significance at 5% level.

Table 4
Descriptive statistics (original data).

Variable	Whole sample					Islamic banks			Conventional banks		
	Obs.	Mean	St. Dev.	Min	Max	Obs.	Mean	St. Dev.	Obs.	Mean	St. Dev.
RAROAA	1574	3.561	4.380	−3.434	42.032	342	2.115	2.989	1232	3.962	4.615
RAROAE	1575	3.424	3.680	−4.027	27.261	342	3.174	4.612	1233	3.494	3.375
Z-score	1574	32.791	32.220	−2.134	284.912	342	26.522	30.762	1232	34.531	32.411
DD	1288	3.154	0.488	1.051	5.998	263	3.278	0.518	1025	3.122	0.475
$NONsh^2$	1471	0.234	0.235	0.004	1.000	315	0.201	0.205	1156	0.243	0.242
DIV	1471	0.400	0.119	0.000	0.500	315	0.401	0.100	1156	0.399	0.124
Size	1579	15.478	1.690	10.230	19.102	343	15.393	1.359	1236	15.502	1.771
Equity ratio	1579	0.133	0.121	−1.143	0.998	343	0.156	0.208	1236	0.126	0.081
Loans/TA	1575	0.595	0.132	0.033	0.964	339	0.591	0.149	1236	0.596	0.127
Cost income	1572	0.543	0.377	0.067	7.238	338	0.637	0.607	1234	0.517	0.278
Asset growth	1371	0.142	0.378	−0.669	10.533	294	0.215	0.374	1077	0.123	0.376
Asset $growth^2$	1371	0.163	3.040	0.000	110.935	294	0.186	0.987	1077	0.156	3.391

This table summarizes the descriptive statistics for our variables, for the whole sample as well as for our two sub-samples, considering the original data on our bank population.

Table 5
Descriptive statistics (after winsorization).

Variable	Whole sample					Islamic banks			Conventional banks		
	Obs.	Mean	St. Dev.	Min	Max	Obs.	Mean	St. Dev.	Obs.	Mean	St. Dev.
RAROAA	1574	3.459	3.661	−2.106	23.199	342	2.129	2.967	1232	3.828	3.749
RAROAE	1575	3.411	3.546	−1.926	22.697	342	3.143	4.341	1233	3.485	3.290
Z-score	1574	32.534	30.573	0.744	192.200	342	26.302	29.144	1232	34.264	30.746
DD	1288	3.152	0.463	1.992	4.419	263	3.268	0.487	1025	3.123	0.452
$NONsh^2$	1471	0.234	0.235	0.004	1.000	315	0.201	0.205	1156	0.243	0.242
DIV	1471	0.400	0.119	0.000	0.500	315	0.401	0.100	1156	0.399	0.124
Size	1579	15.478	1.690	10.230	19.102	343	15.393	1.359	1236	15.502	1.771
Equity ratio	1579	0.135	0.094	0.016	0.711	343	0.167	0.136	1236	0.126	0.076
Loans/TA	1575	0.595	0.129	0.189	0.801	339	0.592	0.144	1236	0.596	0.125
Cost income	1572	0.530	0.259	0.186	1.885	338	0.595	0.330	1234	0.511	0.233
Asset growth	1371	0.129	0.191	−0.241	1.081	294	0.191	0.230	1077	0.112	0.176
Asset $growth^2$	1371	0.054	0.146	0.000	1.168	294	0.089	0.206	1077	0.045	0.123

This table summarizes the descriptive statistics for our variables, for the whole sample as well as for our two sub-samples, considering the data resulting from the winsorization procedure.

macroeconomic conditions and regulatory framework. In order to disentangle the effect of profit level and volatility on our risk-adjusted profitability measures, we run 4 additional regressions using ROAA and ROAE, and their standard deviation, as dependent variables.

In the second part of the econometric estimation, we introduce a two-step system GMM model (Arellano & Bover, 1995; Blundell & Bond, 1998). This approach is particularly effective in dealing with endogeneity problems, which are typical drawbacks of the analyses of the effect of diversification on financial outcomes in the banking sector.

More specifically our estimations are based on the following equation:

$$Y_{i,t} = Y_{i,t-1} + \beta_1 DIV_{i,t} + \beta_2 DIV_{i,t} \times Islamic + \gamma CV_{i,t} + \vartheta M_{i,t} + \beta_3 REG_{i,t} + \alpha_i + \varepsilon_{i,t} \quad (5)$$

Year dummies are included in the level equation. *DIV* and *CV* assume the same meaning of Eq. 4; *M* is a vector of macroeconomic data (*GDP* growth and *INF*) and *REG* is the level of regulatory restrictions.

3.5. Descriptive statistics

Since bank-specific figures may include borderline observations, we improve the data quality through a light winsorizing approach (1% each tail). Tests on data excluding the extreme 2 percentiles (one each tail) or more intensive winsorizing (2.5% each tail) lead our estimations to the same results. Additionally, results are confirmed also when excluding observations falling outside a three standard deviation range from the mean (for *RAROAA*, *RAROAE* and *Z-Score* figures).

Tables 4 and 5 present the summary statistics of our data – respectively before and after the winsorizing process – with evidence of mean values and volatility of each variable for the sub-samples of Islamic and conventional banks.

Mean values of risk-adjusted profitability measures and *Z-Score* are higher for conventional banks, especially in the case of *RAROAA*, while the opposite is true for *DD*. Differences of Islamic banking with impacts on stability can be explained by the effects of *Sharia* compliance, namely higher liquidity and capital ratios (Abedifar, Molyneux, & Tarazi, 2013), a better asset quality (Beck et al., 2013) and the lack of exposure to derivatives (Ahmed, 2009). Interestingly, Islamic banks show levels of diversification similar to

Table 6
Cross section on mean values: Profitability and profit volatility measures.

Variables	(1)	(2)	(3)	(4)
	ROAA	ROAE	ROAA (St.Dev.)	ROAE (St.Dev.)
DIV	0.00	−0.03	−0.01	0.02
	(0.014)	(0.065)	(0.008)	(0.047)
DIV x Islamic	−0.02***	−0.07***	0.01***	0.03
	(0.005)	(0.027)	(0.003)	(0.022)
$NONsh^2$	−0.00	−0.07*	0.01	0.04
	(0.007)	(0.040)	(0.004)	(0.027)
Size	0.00***	0.03***	−0.00**	−0.01***
	(0.001)	(0.004)	(0.000)	(0.003)
Equity ratio	0.08***	0.18**	0.01*	−0.12**
	(0.017)	(0.074)	(0.007)	(0.046)
Loans/TA	0.03**	0.02	−0.00	0.06
	(0.011)	(0.064)	(0.007)	(0.036)
Asset growth	0.02	0.21*	−0.04***	−0.30***
	(0.018)	(0.106)	(0.012)	(0.082)
Asset $growth^2$	−0.03	−0.26**	0.05***	0.30***
	(0.020)	(0.108)	(0.012)	(0.085)
Constant	−0.07***	−0.40***	0.02**	0.17***
	(0.016)	(0.090)	(0.009)	(0.057)
Observations	198	198	198	198
R-squared	0.46	0.47	0.43	0.24

This table presents the cross-section effects of income diversification on profitability ratios and their volatility. The squared share of non-interest income ($NONsh^2$) and *DIV* are income diversification variables. The natural log of total assets (*SIZE*), the equity to total assets (*Equity/TA*), loans to total assets (*Loans/TA*), the annual growth of assets (*Asset growth*) and its squared value ($Asset\ Growth^2$) are the bank-specific control variables. *Islamic* is dummy variable to control the specialization effect of a bank being Islamic: it is used in the interaction term (*DIV x Islamic*). Robust standard errors in parentheses. Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively.

Table 7
Cross section on mean values – Risk adjusted and stability measures.

Variables	(1)	(2)	(3)	(4)
	RAROAA	RAROAE	*Z*-score	DD
DIV	−6.51	−8.52*	−59.71	−0.11
	(4.895)	(4.379)	(41.035)	(0.363)
DIV x Islamic	−3.20**	0.49	−11.46	0.37***
	(1.508)	(1.550)	(14.222)	(0.142)
$NONsh^2$	−3.08	−1.65	−23.30	0.15
	(2.881)	(2.336)	(23.105)	(0.165)
Size	0.97***	1.04***	−0.57	0.07***
	(0.217)	(0.214)	(2.070)	(0.020)
Equity ratio	6.46	1.41	40.02	1.18***
	(3.939)	(2.912)	(34.860)	(0.442)
Loans/TA	0.10	−1.13	−29.28	0.14
	(3.958)	(2.677)	(34.291)	(0.315)
Cost income			−28.54***	−0.54***
			(9.083)	(0.162)
Asset growth	9.86**	9.15**	126.67***	0.39
	(3.882)	(4.239)	(45.798)	(0.594)
Asset $growth^2$	−9.92**	−9.38**	−119.86***	−0.79
	(3.866)	(4.118)	(39.624)	(0.773)
Constant	−11.07**	−10.63***	78.97*	1.73***
	(4.270)	(3.630)	(44.898)	(0.443)
Observations	198	198	198	169
R-squared	0.34	0.30	0.27	0.64

This table presents the cross-section effects of income diversification on risk-adjusted profitability ratios and profit stability measures. The squared share of non-interest income ($NONsh^2$) and *DIV* are income diversification variables. The natural log of total assets (*SIZE*), the equity to total assets (*Equity/TA*), loans to total assets (*Loans/TA*), the annual growth of assets (*Asset growth*) and its squared value ($Asset\ Growth^2$) are the bank-specific control variables. *Islamic* is dummy variable to control the specialization effect of a bank being Islamic: it is used in the interaction term (*DIV x Islamic*). Robust standard errors in parentheses. Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively.

conventional banks (*DIV* around 0.4 for both sub-samples), but at the same time experience a slightly lower value of $NONsh^2$ (0.20 versus 0.24). The main reason for this finding is a lower exposure to non-financing income. These results are consistent with the previous literature (Abuzayed, Al-Fayoumi, & Molyneux, 2018; Chen, Liang, & Yu, 2018; Molyneux & Yip, 2013).

Table 8
Baseline estimation (dynamic panel model).

Variables	(1)	(2)	(3)	(4)
	RAROAA	RAROAE	*Z*-score	DD
$Dependent_{t-1}$	0.79***	0.80***	0.88***	0.29***
	(0.041)	(0.040)	(0.035)	(0.048)
DIV	0.27	0.44	−3.03	0.10
	(0.563)	(0.591)	(4.705)	(0.122)
DIV x Islamic	−1.27**	−0.60	−11.49***	0.06
	(0.520)	(0.517)	(3.226)	(0.218)
$NONsh^2$	0.79***	0.57*	−2.04	0.20*
	(0.304)	(0.316)	(2.715)	(0.105)
Size	0.12***	0.08***	−0.06	0.06***
	(0.035)	(0.027)	(0.238)	(0.019)
Equity ratio	0.91	−0.42	13.20**	0.99**
	(0.804)	(0.458)	(6.089)	(0.466)
Loans/TA	0.09	−0.61	−2.22	0.06
	(0.554)	(0.697)	(3.453)	(0.168)
Asset growth	1.07***	1.65***	−11.92***	0.51***
	(0.361)	(0.328)	(3.290)	(0.142)
Asset $growth^2$	−1.05*	−1.66***	5.94	−0.52**
	(0.557)	(0.542)	(4.444)	(0.254)
Cost income			−4.88*	−0.37**
			(2.728)	(0.166)
Crisis	−0.46***	−0.38***	−1.29***	−0.25***
	(0.093)	(0.102)	(0.463)	(0.057)
GDP	0.02	0.02*	−0.08	−0.01***
	(0.012)	(0.013)	(0.055)	(0.004)
INF	−0.05***	−0.04**	−0.16*	−0.03***
	(0.016)	(0.016)	(0.093)	(0.007)
REG	0.15	0.12	1.73**	0.15**
	(0.123)	(0.101)	(0.819)	(0.065)
Constant	−1.75**	−0.76	9.11	1.21***
	(0.776)	(0.739)	(6.605)	(0.424)
Observations	1281	1279	1279	1024
Number of banks	199	199	199	165
AR1	*0.000*	*0.000*	*0.000*	*0.000*
AR2	*0.569*	*0.212*	*0.753*	*0.570*
Hansen test	*0.489*	*0.480*	*0.377*	*0.967*
No of instruments	*198*	*197*	*198*	*198*
F Test	*F(13, 198) = 110.90*	*F(13, 198) = 108.26*	*F(14, 198) = 127.58*	*F(14, 164) = 68.72*
Prob > F	*0.000*	*0.000*	*0.000*	*0.000*

This table presents the impact of diversification on profitability and stability measures using a two-steps system GMM approach. Each of the four models includes the lagged dependent variable ($Dependent_{t-1}$). Bank profitability measures are the risk-adjusted return on average assets (*RAROAA*) and the risk-adjusted return on average equity (*RAROAE*); stability measures are the *Z-Score* and the distance to default (*DD*). The squared share of non-interest income ($NONsh^2$) and *DIV* are income diversification variables. The natural log of total assets (*SIZE*), the equity to total assets (*Equity/TA*), loans to total assets (*Loans/TA*), the cost to income ratio (*Cost income*), Annual growth of assets (*Asset growth*) and its square (*Asset Growth^2*) are the bank-specific control variables. Macroeconomic variables are GDP growth (*GDP*) and inflation (*INF*). *REG* measures the level of regulatory restrictions and *Crisis* is a dummy equal to 1 for years 2008 and 2009. *Islamic* is dummy variable to control the specialization effect of a bank being Islamic, used in the interaction term (*DIV x Islamic*). Robust standard errors in parentheses. Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively.

We also find that Islamic banks in our sample are only slightly smaller in size and show marginally higher equity ratios. Finally, cost-to-income ratios are significantly higher (0.59 versus 0.51), consistently with potential unexploited scale economies and greater monitoring costs.

4. Discussion of findings

4.1. Income diversification, bank profitability and stability

Table 6 shows the results of our OLS-based analysis of the relationship between diversification and profitability (mean and volatility values).

We observe a general lack of statistical significance of the coefficients associated with our measures of diversification. However, we find that a significant role in explaining the pattern of financial outcomes is played by the interaction term (*DIV x Islamic*). More specifically, for Islamic banks diversification lowers profitability ratios, especially in the case of the *ROAE*, and increases their volatility, however with statistical significance only in the case of the *ROAA*.

With reference to firm-specific variables, we observe that size, regulatory capital and growth enhance profits level and reduce their

Table 9
Only GCC banks

Variables	(1)	(2)	(3)	(4)
	RAROAA	RAROAE	*Z*-score	DD
$Dependent_{t-1}$	0.40***	0.54***	0.78***	0.15*
	(0.076)	(0.083)	(0.149)	(0.074)
DIV	5.67*	6.10**	−1.94	0.79
	(3.340)	(2.544)	(10.235)	(0.702)
DIV x Islamic	−4.89**	−2.39*	−3.17	−0.72
	(2.114)	(1.331)	(7.874)	(0.595)
$NONsh^2$	−1.25	−0.17	−2.49	−0.65
	(1.343)	(1.174)	(4.663)	(0.422)
Size	0.03	−0.07	0.56	0.01
	(0.251)	(0.157)	(0.600)	(0.061)
Equity ratio	2.61	0.28	21.55*	1.32**
	(1.772)	(1.264)	(12.797)	(0.657)
Loans/TA	−0.42	0.47	−2.39	−0.23
	(2.481)	(1.521)	(6.092)	(0.352)
Asset growth	2.15***	1.74***	−21.10**	−0.44
	(0.556)	(0.545)	(8.007)	(0.333)
$Asset\ growth^2$	−2.57***	−2.01***	16.39*	0.33
	(0.693)	(0.683)	(8.829)	(0.450)
Cost income			−7.29	−0.19
			(7.330)	(0.325)
Crisis	−0.34	−0.43*	−1.79**	−0.38***
	(0.240)	(0.232)	(0.714)	(0.084)
GDP	0.04	0.05**	0.07	−0.00
	(0.022)	(0.021)	(0.077)	(0.006)
INF	−0.00	−0.02	0.07	−0.01
	(0.028)	(0.024)	(0.136)	(0.009)
REG	0.45	0.31	−0.09	0.31***
	(0.422)	(0.382)	(1.366)	(0.075)
Constant	−1.36	−0.79	1.32	2.32**
	(3.632)	(2.362)	(12.674)	(1.145)
Observations	626	626	626	479
Number of banks	85	85	85	58
AR1	*0.000*	*0.000*	*0.005*	*0.002*
AR2	*0.566*	*0.576*	*0.196*	*0.085*
Hansen test	*0.244*	*0.130*	*0.188*	*0.679*
No of instruments	*72*	*72*	*72*	*72*
F Test	*F(13, 84) = 10.92*	*F(13, 84) = 13.05*	*F(14, 84) = 30.41*	*F(14, 57) = 15.68*
Prob > F	*0.000*	*0.000*	*0.000*	*0.000*

This table presents the impact of diversification on profitability and stability measures using a two-steps system GMM approach, with our sample limited to GCC banks. Each of the four models includes the lagged dependent variable ($Dependent_{t-1}$). Bank profitability measures are the risk-adjusted return on average assets (*RAROAA*) and the risk-adjusted return on average equity (*RAROAE*); stability measures are the *Z-Score* and the distance to default (*DD*). The squared share of non-interest income ($NONsh^2$) and *DIV* are income diversification variables. The natural log of total assets (*SIZE*), the equity to total assets (*Equity/TA*), loans to total assets (*Loans/TA*), the cost to income ratio (*Cost income*), Annual growth of assets (*Asset growth*) and its square (*Asset Growth^2*) are the bank-specific control variables. Macroeconomic variables are GDP growth (*GDP*) and inflation (*INF*). *REG* measures the level of regulatory restrictions and *Crisis* is a dummy equal to 1 for years 2008 and 2009. *Islamic* is dummy variable to control the specialization effect of a bank being Islamic, used in the interaction term (*DIV x Islamic*). Robust standard errors in parentheses. Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively.

variance, while the impact of loan share is scarcely significant from a statistical point of view, except for the *ROAA*. These outcomes are consistent with previous literature, which argues that banks with higher capital ratios are associated with greater profitability, because they are less dependent from borrowing and are more prudent while lending (Tan, 2016).

We extend this analysis by employing our set of risk-adjusted profitability measures and stability indicators as dependent variables (Table 7).

Once more, the interaction term shows a negative and significant coefficient for the *RAROAA*. Moreover, strong statistical significance is present also in the case of the *DD*, with a positive coefficient.

Size and growth maintain a positive effect on our dependent variables across most estimations; however, the negative coefficient associated to the squared value of growth suggests a pattern of diminishing marginal returns from asset expansion.

After analyzing the cross-sectional nature of our data, we are interested in increasing the robustness and depth of our findings by exploring the panel dimension of our sample. We therefore implement a GMM panel regression, whose results are provided in Table 8.

In line with earlier findings, the interaction term shows negative coefficients for risk-adjusted profitability measures. The same occurs for the *Z-Score* estimation, while a positive coefficient is found for the *DD*, despite the lack of statistical significance. These results are in line with the literature (Chen, Liang, & Yu, 2018; Molyneux & Yip, 2013) and indicate that for Islamic banks diversification strategies are likely to negatively affect profitability and stability measures and reveal differences with conventional banks. We

Table 10
Banks with average non-interest income lower than 50%.

Variables	(1)	(2)	(3)	(4)
	RAROAA	RAROAE	*Z*-score	DD
$Dependent_{t-1}$	0.71***	0.66***	0.89***	0.21***
	(0.070)	(0.066)	(0.065)	(0.055)
DIV	2.35***	3.06***	−2.79	0.75*
	(0.852)	(0.991)	(8.603)	(0.428)
DIV x Islamic	−3.03*	−3.23**	−7.92	−0.25
	(1.563)	(1.575)	(7.299)	(0.588)
$NONsh^2$	−0.60	−1.02	−4.64	−0.40
	(0.628)	(0.631)	(3.861)	(0.283)
Size	0.10**	0.05	−0.05	0.08***
	(0.048)	(0.050)	(0.405)	(0.032)
Equity ratio	1.09	−0.21	13.61	1.33***
	(1.014)	(0.823)	(11.886)	(0.476)
Loans/TA	0.32	−0.58	−1.31	−0.22
	(1.126)	(0.908)	(4.527)	(0.289)
Asset growth	0.73*	1.08**	−11.59**	0.40**
	(0.414)	(0.434)	(4.450)	(0.172)
$Asset\ growth^2$	−0.88	−1.40**	4.22	−0.73**
	(0.532)	(0.586)	(5.701)	(0.346)
Cost income			−5.04	−0.53**
			(3.922)	(0.236)
Crisis	−0.45***	−0.34**	−1.31**	−0.17***
	(0.163)	(0.164)	(0.603)	(0.065)
GDP	0.02	0.05**	−0.01	−0.00
	(0.016)	(0.017)	(0.070)	(0.006)
INF	−0.04	−0.02	−0.03	−0.01
	(0.027)	(0.025)	(0.099)	(0.013)
REG	0.22	0.09	1.52*	0.13*
	(0.201)	(0.211)	(0.829)	(0.079)
Constant	−1.99	−0.67	6.88	1.40**
	(1.242)	(1.123)	(11.379)	(0.620)
Observations	910	910	910	626
Number of banks	134	134	134	105
AR1	*0.000*	*0.000*	*0.000*	*0.000*
AR2	*0.180*	*0.192*	*0.428*	*0.773*
Hansen test	*0.177*	*0.360*	*0.299*	*0.136*
No of instruments	*72*	*72*	*72*	*71*
F Test	*F(13, 133) = 21.16*	*F(13, 133) = 32.78*	*F(14, 133) = 68.65*	*F(14, 133) = 11.54*
Prob > F	*0.000*	*0.000*	*0.000*	*0.000*

This table presents the impact of diversification on profitability and stability measures using a two-steps system GMM approach, with our sample limited to banks with an average level of non-interest income lower than 50%. Each of the four models includes the lagged dependent variable ($Dependent_{t-1}$). Bank profitability measures are the risk-adjusted return on average assets (*RAROAA*) and the risk-adjusted return on average equity (*RAROAE*); stability measures are the *Z-Score* and the distance to default (*DD*). The squared share of non-interest income ($NONsh^2$) and *DIV* are income diversification variables. The natural log of total assets (*SIZE*), the equity to total assets (*Equity/TA*), loans to total assets (*Loans/TA*), the cost to income ratio (*Cost income*), Annual growth of assets (*Asset growth*) and its square (*Asset Growth^2*) are the bank-specific control variables. Macroeconomic variables are GDP growth (*GDP*) and inflation (*INF*). *REG* measures the level of regulatory restrictions and *Crisis* is a dummy equal to 1 for years 2008 and 2009. *Islamic* is dummy variable to control the specialization effect of a bank being Islamic, used in the interaction term (*DIV x Islamic*). Robust standard errors in parentheses. Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively.

argue that Islamic banks, being smaller and having a limited client base may incur higher fixed costs (DeYoung & Roland, 2001): this translates in lower profitability and, eventually, influences the bank's stability. Moreover, Islamic banks are subject to restrictions in terms of admissible non-Islamic financial services under the *Shariah.* Furthermore, more mature conventional banks may have already achieved the desired level of diversification, hence explaining the related non-significant results.

Size, regulatory capital and growth assume the same positive sign previously described. We also find positive and statistically significant coefficients for $NONsh^2$: hence, a greater share of non-financing revenues seems to increase the level of profitability/stability.

Crisis dummies show a statistically significant negative impact on risk-adjusted profitability for both Islamic and conventional banks. One could expect the impact of the subprime financial crisis to be limited in OIC countries, due to their marginal exposure to the main asset classes involved (IMF, 2010). However, emerging countries and their banking systems suffered indirectly from the changing global economic and financial landscape, consistently with their broad reliance on foreign capitals and export of natural resources.

Negative and significant coefficients are found also for inflation, while GDP has a scattered pattern of results. Interestingly, stricter regulations have a positive impact on the measures of stability.

Table 11
Banks with average cost-income ratio below the median value.

Variables	(1)	(2)	(3)	(4)
	RAROAA	RAROAE	*Z*-score	DD
$Dependent_{t-1}$	0.64***	0.64***	0.91***	0.15**
	(0.104)	(0.100)	(0.092)	(0.073)
DIV	2.47**	4.38***	5.54	0.01
	(1.082)	(1.299)	(8.489)	(0.659)
DIV x Islamic	−3.39***	−4.35**	1.26	−1.04
	(1.185)	(2.022)	(8.775)	(1.143)
$NONsh^2$	1.27**	1.58**	4.71	0.10
	(0.633)	(0.617)	(4.105)	(0.324)
Size	0.22***	0.08	0.31	0.06
	(0.072)	(0.089)	(0.312)	(0.039)
Equity ratio	4.17*	1.42	21.82	0.94
	(2.449)	(1.620)	(17.988)	(0.874)
Loans/TA	−1.28	−1.66	−0.20	0.12
	(1.531)	(1.504)	(4.261)	(0.335)
Asset growth	2.15***	2.01***	−15.19**	0.46
	(0.747)	(0.633)	(7.482)	(0.296)
$Asset\ growth^2$	−2.11*	−1.54	11.55	0.10
	(1.102)	(0.966)	(11.983)	(0.471)
Cost income			−14.54	−0.96
			(10.432)	(0.821)
Crisis	−0.50**	−0.40*	−2.38**	−0.38***
	(0.207)	(0.229)	(0.918)	(0.069)
GDP	0.01	0.03*	−0.07	−0.01**
	(0.019)	(0.020)	(0.073)	(0.004)
INF	−0.05*	−0.04	−0.03	−0.03***
	(0.028)	(0.029)	(0.102)	(0.009)
REG	0.21	0.00	0.67	0.21**
	(0.296)	(0.331)	(0.735)	(0.089)
Constant	−3.36	−1.21	−1.81	1.90
	(2.035)	(1.802)	(10.646)	(1.281)
Observations	694	694	694	574
Number of banks	100	100	100	87
AR1	*0.000*	*0.000*	*0.000*	*0.000*
AR2	*0.240*	*0.746*	*0.321*	*0.496*
Hansen test	*0.120*	*0.233*	*0.460*	*0.315*
No of instruments	*72*	*72*	*72*	*72*
F Test	*F(13, 99) = 23.02*	*F(13, 99) = 19.46*	*F(14, 99) = 101.98*	*F(14, 86) = 20.76*
Prob > F	*0.000*	*0.000*	*0.000*	*0.000*

This table presents the impact of diversification on profitability and stability measures using a two-steps system GMM approach, with our sample limited to banks with an average cost-income ratio below the sample median value. Each of the four models includes the lagged dependent variable ($Dependent_{t-1}$). Bank profitability measures are the risk-adjusted return on average assets (*RAROAA*) and the risk-adjusted return on average equity (*RAROAE*); stability measures are the *Z-Score* and the distance to default (*DD*). The squared share of non-interest income ($NONsh^2$) and *DIV* are income diversification variables. The natural log of total assets (*SIZE*), the equity to total assets (*Equity/TA*), loans to total assets (*Loans/TA*), the cost to income ratio (*Cost income*), Annual growth of assets (*Asset growth*) and its square (*Asset Growth^2*) are the bank-specific control variables. Macroeconomic variables are GDP growth (*GDP*) and inflation (*INF*). *REG* measures the level of regulatory restrictions and *Crisis* is a dummy equal to 1 for years 2008 and 2009. *Islamic* is dummy variable to control the specialization effect of a bank being Islamic, used in the interaction term (*DIV x Islamic*). Robust standard errors in parentheses. Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively.

4.2. Robustness checks

We apply a series of robustness checks to assess the validity of our findings, presenting in this section the results of the four leading alternative settings.

Firstly, we run our analysis on GCC countries only, since these nations have been largely investigated in previous research as leading hubs for Islamic finance (Table 9). Our results remain consistent: the interaction term that accounts for the effect of diversification for Islamic banks on profitability and stability measures is negative and strongly significant for RAROAA and RAROAE, while not statistically significant in the other regressions.

In a second test (Table 10), we consider the impact of income diversification on banks with an average share of non-financing income lower than 50%. This allows us to obtain a sample strictly composed by banks focused on interest or financing income. Our results are largely unaffected by this alternative setting: the interaction term is still associated with negative coefficients. Interestingly *DIV* shows positive and strongly significant coefficients. These outcomes seem to support a picture in which banks focused on the traditional borrowing and lending activities enjoy a greater effect of diversification; however, for Islamic banks, this benefit is lower.

Lastly, since diversification is a strategy that is likely to increase the level of complexity and costs of a bank, we split our sample into two parts, respectively showing a level of the cost income ratio below or above the median value. Our results (Tables 11 and 12) remain

Table 12
Banks with average cost-income ratio above the median value.

Variables	(1)	(2)	(3)	(4)
	RAROAA	RAROAE	*Z*-score	DD
$Dependent_{t-1}$	0.67***	0.67***	0.76***	−0.00
	(0.077)	(0.080)	(0.046)	(0.115)
DIV	1.24	1.35	−3.08	0.12
	(1.118)	(1.056)	(7.008)	(0.334)
DIV x Islamic	−2.37	−2.19*	−12.80	0.41
	(1.464)	(1.226)	(9.448)	(0.551)
$NONsh^2$	−0.01	−0.36	−4.87	0.18
	(0.692)	(0.727)	(3.151)	(0.187)
Size	0.10	0.15**	−0.50	0.08***
	(0.070)	(0.063)	(0.716)	(0.029)
Equity ratio	0.78	−0.39	15.94**	1.34***
	(1.062)	(0.820)	(7.383)	(0.496)
Loans/TA	−0.08	−0.60	−1.34	0.18
	(1.029)	(0.864)	(5.794)	(0.280)
Asset growth	0.71	0.75	−5.40**	0.65***
	(0.526)	(0.462)	(2.578)	(0.189)
$Asset\ growth^2$	−1.01	−0.94	0.94	−0.64*
	(0.646)	(0.614)	(3.471)	(0.350)
Cost income			−5.35	−0.34*
			(5.437)	(0.196)
Crisis	−0.33*	−0.33**	−0.71	−0.27***
	(0.183)	(0.138)	(0.771)	(0.062)
GDP	0.02	0.02	−0.16	−0.01
	(0.030)	(0.028)	(0.173)	(0.012)
INF	−0.10**	−0.06*	−0.51***	0.00
	(0.047)	(0.035)	(0.165)	(0.011)
REG	0.44	0.23	4.70***	0.06
	(0.432)	(0.315)	(1.634)	(0.187)
Constant	−1.41	−1.42	15.36	1.57**
	(1.389)	(1.321)	(17.786)	(0.707)
Observations	587	585	585	450
Number of banks	99	99	99	78
AR1	*0.000*	*0.000*	*0.001*	*0.020*
AR2	*0.135*	*0.132*	*0.254*	*0.837*
Hansen test	*0.238*	*0.525*	*0.481*	*0.251*
No of instruments	*72*	*72*	*72*	*72*
F Test	$F(13, 98) = 20.97$	$F(13, 98) = 27.88$	$F(14, 98) = 57.75$	$F(14, 77) = 11.39$
Prob > F	*0.000*	*0.000*	*0.000*	*0.000*

This table presents the impact of diversification on profitability and stability measures using a two-steps system GMM approach, with our sample limited to banks with an average cost-income ratio above the sample median value. Each of the four models includes the lagged dependent variable ($Dependent_{t-1}$). Bank profitability measures are the risk-adjusted return on average assets (*RAROAA*) and the risk-adjusted return on average equity (*RAROAE*); stability measures are the *Z-Score* and the distance to default (*DD*). The squared share of non-interest income ($NONsh^2$) and *DIV* are income diversification variables. The natural log of total assets (*SIZE*), the equity to total assets (*Equity/TA*), loans to total assets (*Loans/TA*), the cost to income ratio (*Cost income*), Annual growth of assets (*Asset growth*) and its square (*Asset Growth^2*) are the bank-specific control variables. Macroeconomic variables are GDP growth (*GDP*) and inflation (*INF*). *REG* measures the level of regulatory restrictions and *Crisis* is a dummy equal to 1 for years 2008 and 2009. *Islam;8ic* is dummy variable to control the specialization effect of a bank being Islamic, used in the interaction term (*DIV x Islamic*). Robust standard errors in parentheses. Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively.

consistent with previous findings, while some differences emerge between the sub-samples. More specifically, banks characterized by higher cost efficiency can gain from a greater level of diversification and the same occurs increasing the share of non-financing revenues. However, for Islamic banks, these diversification strategies are less effective in boosting risk-adjusted profits. All these relationships are strongly statistically significant for *RAROAA* and *RAROAE* estimations. For less efficient banks this statistical significance disappears: this outcome is coherent with a framework in which the costs linked to the pursuit of diversification strategies can offset its benefits. This can be one of the "dark sides" of diversification.

5. Conclusions

Several studies focused on income diversification and its impact on profitability and risk in conventional banks, both in developed and emerging economies. This paper extends this literature by investigating these issues, in a comparative and extended framework, using a comprehensive high-quality dataset of 47 Islamic and 154 conventional banks from 11 countries in the OIC region.

Our main results suggest that diversification provides a different outcome for Islamic banks than conventional institutions: for the former, both the profitability and the stability are reduced, adding additional empirical evidence to the existing literature and supporting the conclusion that revenue diversity should not be considered as a rewarding strategy per se. In particular, our results are

stronger when we consider accounting-based measures (the *ROAA* or *ROAE*, their standard deviation and the *Z-Score*) rather than market-based ones (the distance-to-default).

Additionally, we find that an increase in the share of non-financing income is associated with both an increased profitability and stability, regardless of the banking business model.

Finally, our robustness checks underline that when cost-income ratios are above median values, the inefficiency proxied by this variable leads the significance of our independent variables to disappear almost entirely.

These findings are consistent with the existing literature, especially considering the growing body of research on the limitations and undesired effects of diversification. We show that, contingent on the alternative measure used for profitability and stability, Islamic banks show differences from their conventional counterparts in the same geographical area, but the partial instability of results across different settings seems to underline that revenue diversity is not always beneficial, but contingent on firm- and environment-specific conditions.

Regulators and bank managers should consider the implications of these results, as well as the need to explore the link between diversification and performance further.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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