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(٢١-١) ٢٠٢٢

Do Saudi Commercial Banks benefit From Income Diversification?

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ماجستير في إدارة الأعمال، إدارة مشاريع، كلية الأعمال،
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Published on: 7 Mar. 2022

Abstract

The income diversification puzzle has captured the attention of several researchers and was further accentuated by the global trend for universal banking that sparked in the early 2000s. Today, commercial bank income structure is still a topic of active empirical researches. not reaching clear-cut evidence regarding the merits and the demerits of expanding into new lines of banking activities. This study attempts to investigate the impact of non-interest income and its components on the profitability of Saudi universal banks. Our sample is composed by 10 Saudi commercial banks for the period from 2010 to 2019. We develop an econometric model to explore different dimensions of Saudi bank income structure. Our findings show that Our results show that the interest profits of Saudi banks continue to rise and that they still constituted the major part of bank profits. However, non-interest profits are also growing at a slow pace. Despite their excess liquidity, Saudi banks still prefer financial intermediation to direct and off-balance sheet investments. They do not benefit enough from

diversification.

Keywords: Commercial bank, non-interest income, Profitability, Risk, Saudi Arabia

*** Introduction**

In Saudi Arabia, public and private commercial banks manage have to maxims profit. For a longtime, the main purpose of a commercial banks was the financial intermediation: They collect short term funds from their depositors and transform them into long term credits. Earlier work had recognized loan making as banks' core activity (Diamond 1984; Bhattacharya and Thakor 1993). DeYoung and Rice (2004b) explain that banks were invented as a solution for market inefficiency. Borrowers and lenders have to bear costs due to several market flaws like information asymmetry and other organizational costs like contract costs and so on.

The diversification puzzle became relevant when the topic of universal banking gained wide attention mainly because it goes against market rigid regulations that firmly opposed banks' expansion to other non-interest generating activities. For instance, the Glass–Steagall Act which was established in the U.S. between 1934 and 1999 rigidly oppose mixing up investment banking with commercial banking.

However, due to the deregulation wave which triggered a cutthroat competition which in turn caused the slowing down of bank growth and the shrinking of their interest margins and as survival instinct banks were quick to tilt towards other sources of income in order to absorb the losses reported on their main source of income (DeYoung and Roland, 2001; Lepetit et al. 2008). Allen and Santomero (2001) find that banks are inclined to innovate and to widen their range of products and services in order to survive and provide a "cushion" that is able to absorb risks. In the same line, Roger and Sinkey (1999) argue that competition placed banks in a harsh environment where they were forced to move away from excessive reliance on intermediation towards activities that helped absorb more risks.

Before going on about the merits or the demerits of a diversification strategy, we try to define diversification. Mercieca et al. (2007) identifies three types of banks diversification. The first type is income diversification. The second is

geographic diversification and the third type is a combination of the two aforementioned strategies. In this study, we only deal with the first type of diversification. Several studies prefer to examine the composition of non-interest income instead of studying its overall impact (DeYoung and Roland 2001; Hidayat et al.,2012; Lee et al.,2014b).

We follow the Saudi accounting standards and divide non-interest income into three elements: (i) Fees and commissions, (ii) Short term trading and (ii) Long term trading.

"To diversify or to focus?" has been a major research question. The first well known paper to probe the impact of revenue diversification was that of in which he examined the relationship between diversification and performance.

Several researchers opine that the answer depends mostly on the specific characteristics of the banking system in each country (Nguyen et al., 2012) and the level of liberalization, and banks' ownership structure (Thomas, 2002). We do not retain these aspects in this paper. However, these different results have led to two lines of thought. The first line, which we will refer to as the Cervantes supporters, embellish the gains of diversification such as cost-efficiency, profitability and reduced risk. The second line, which we will refer to as Twain's supporters alert of the pitfalls of diversification such as agency costs, overdiversification, reduced profitability and intensive risk taking.

For commercial banks managers, income diversification remains a controversial decision to make. They need a thorough understanding of the benefits and the of such strategy.

Traditional intermediation theories predict that when diversification is present, banks shall reap the benefits of said strategy (Diamond, 1984) in the form of risk reduction and improved profitability.

Table 1: Non-interest income evolution

year	Total non-interest income	Growth rate
2010	42679728	0.19
2011	50949007	0.09
2012	55674020	0.07
2013	60028712	0.13
2014	67906273	0.05
2015	71827073	-0.04
2016	68242503	0.038
2017	70865815	0.04
2018	73717863	0.04
2019	77125389	-1

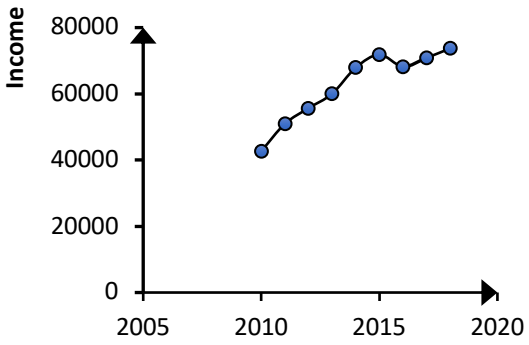

figure 1: Total non-interest income

Table 2: Interest Income evolution

Year	Total interest income	Growth rate
2010	29145878	0.18
2011	34513636	0.05
2012	36409265	0.09
2013	39845362	0.07
2014	42713431	0.11
2015	47498773	0.007
2016	47852852	0.07
2017	51538430	0.16
2018	59808554	0.059
2019	63376897	-1

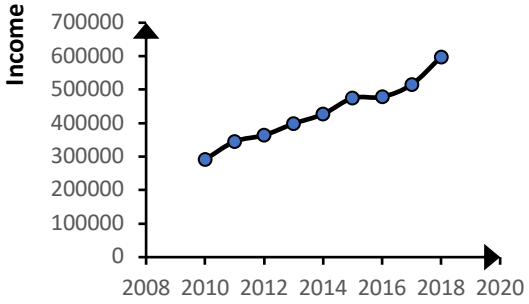

figure 2: Total interest income

* Literature Review

Empirical evidence provided mixed to the diversification-profitability nexus. This section aims to summarize the dichotomy between studies conducted in developing and developed economies.

The European Central Bank (2000) examined the case of European commercial banks for the period 1989-1998 and concluded that non-interest income is a prime driver of the financial profitability growth of EU banks. The study also compares EU banks to banks operating in the

U.S. and reported that NII was less volatile for the period of the study than that witnessed in the American context.

De Young and Rice (2004), while investigating the impact of venturing into non-core lines of businesses of U.S. commercial banks for the period 1989-2001, reported that diversification strategies does not translate into superior performances when adjusting for risk and that engaging in more non-interest income at the expense of their traditional businesses will ultimately harm their risk-return tradeoff. Additionally, they find that in the long run loan making will remain banks major money maker. Using data collected from 710 Western European commercial banks, Saghi-Zedek (2016) finds that diversification is

associated with an increase in profitability. However, when adjusting for risk the costs of said strategy outweighs the benefits translated into greater risk and insolvency risk. He also highlights that ultimately the benefits from diversification depends on the ownership structure. In other words, a higher share of institutional investors is linked to higher diversification benefits.

Stiroh (2004a) showed that at first check, the growing operational income stability may mislead researchers into thinking that it was due to the diversification effect. A closer look will uncover that this stability is ascribed to the lower variability of interest income in the 1990s which more than compensated for the increasing variability of non-interest income. He also challenged the common belief that diversification can mitigate risks as his findings suggest that in the 1990s interest and non-interest income became more and more correlated hence shrinking the potential benefits from the diversification strategy.

Deyoung and Roland (2001) argue that when banks attempt to replace their traditional income generating activities by other non-traditional activities like fee and trading income, their earnings are more likely to garner higher variability.

Stiroh and Rumble (2006) studied the case of Financial Holding companies established in the

U.S and found that there was no use in venturing in non-traditional banking as revenues coming from such sources are less profitable and more risky than traditional loan making activity. They revealed that the potential gains from diversification are more likely to be absorbed by the losses from risk.

However, criticism result from the two aforementioned studies attributing criticizing their ways of conducting the studies (Lins and Servaes, 1999; Whited, 2001; Campa and Kedia, 2002; Graham et al., 2002; Villalonga, 2004)

*** Methodology and Data**

1- Data

Our sample encompasses Ten banks operating in the Saudi banking market relevant to the period 2010-2019 data is hand-collected from different but complementary sources from Bank annual reports and Financial Market in KSA (Tadwal).

Table: List of sample banks

Bank	Acronym
RIYA BANK	RJBL
BANK ALJAZIRA	BJAZ
THE SAUDI ANVESTMENT BANK	SIBC
ALFRANSI BANK	BSFR
ARAB NATIONAL BANK	ARNB
SAMBA BANK	SAMB
ALRAJHIBANK	RJHI
BANKALBILAD	ALBI
ALINMA BANK	INMA
ALAHLI BANK	NCBK

2- Methodology

A- Model specification

- Model Basic

$$Y = \propto + \sum_{i=1}^{10} \widehat{\beta}_3 X + \epsilon_{it}$$

To examine the impact of a diversified bank portfolio on 10 Saudi commercial banks operating we propose the following model:

$$ROA = \widehat{\beta}_0 + \widehat{\beta}_1 FINTRE + \widehat{\beta}_2 RINVRE + \widehat{\beta}_3 ASSG + \widehat{\beta}_4 OPEDCOST + \widehat{\beta}_5 LOPRO + \widehat{\beta}_6 DEPORAT + \epsilon$$

Where:

ROA= Return On Assets for the bank (i) for the year (t)

$FINTRE$ = The deposit ratio for the bank (i) for the year (t)

$RINVRE$ = The annual growth rate of total assets for the bank (i) in for the year (t) $ASSG$ = The loan loss provision(reserve) ratio for the bank (i) for the year (t)

$OPEDCOST$ = The operating expenses ratio for the bank (i) for the year (t)

$LOPRO$ = The non-interest income ratio for the bank (i) for the year(t)

$DEPORAT$ = The net interest income ratio for the bank (i) for the year (t)

DeYoung and Roland (2001), Stiroh (2004), Lepetit et al. (2008), Hidayat et al. (2012), Sawada (2013) and Lee et al. (2014b) posit that studying non-interest income as a whole is very misleading hence why each component stemming from a different source of non-interest income should be studied separately in order to gauge its unique impact on profitability. Therefore, we follow their recommendation by dividing the variable RINVRE into three different components. Short term trading (SHORT) (less than 1 year) which mainly englobes government securities and net profit or losses from foreign exchange and long-term trading (LONG) (greater than 1 year) which englobes strategical investments. Meslier et al. (2014) for instance divided nontraditional income into three components: Fees and commission, trading income and other non-interest income.

We end up with the following model.

B- Variable's description:

- Dependent variable

ROA

First, we try to measure the impact of diversification on profitability with the help of the dependent variable Return on Assets (ROA). ROA uses two components net profit as a proxy for profitability and Total assets turnover. In other words, the variable puts forward income generating ability of managers using only available resources held by the bank (Almazari, 2011; Meslier et al. 2014; Edirisuriya et.al. 2015)) it is also used to determine how well they can generate non-core income (Rahman et al. 2015)

To analyze the impact of such strategy on the profitability adjusted to risk we use the Risk Adjusted Return on Assets (SDROA) which consists in dividing ROA by its standard deviation.

- Independent variables

Fintre

The ratio of net interest income over total assets was used to account for banks traditional business following Demirguc-Kunt and Huizinga (1999) and, Maudos and Guevara (2004). There is no denying that bank traditional activity contributes to a significant portion of bank revenue. However, excessive risk taking, low asset quality and economic downturn can contribute to lower income stemming from traditional activities.

H4: Net interest income has a positive impact on profitability and risk adjusted profitability

Rinvre

We use the Loan Loss Provision ratio as a proxy for credit risk. A high value of the ratio would indicate a deteriorating quality of a bank's loan portfolio, poor asset management and extensive risk taking. Edirisuriya et al. (2015) found that for Australian banks, a high level of said ratio is correlated with negative performances. On the same vein, a lot more studies have further shown the negative relationship between credit risk and financial performance (Gaganis et al., 2013; Abdul, 2015; Borroni and Rossi, 2017; Nguyen, 2018)

H4: Credit risk has a negative impact profitability and risk adjusted profitability.

Assg

We use the annual growth of

total assets as the risk taking appetite of a bank's managers and the impact of speed of expansion on bank strategy (Stiroh, 2004b; Chiorazzo et al. 2008; Busch and Kick 2009; Sanya and Wolfe, 2011; Gurbuz et al., 2013; Lee et al., 2014). A high growth ratio signals the speedy expansion of bank which translates into more profitable investments which in turn leads to higher profitability. Ismail et al. (2014) found that has a negative and non-significant impact on profitability insinuating that Pakistani banks follow inefficient practices when it comes to allocating additional assets growth to generate profits.

H5: Asset growth has a positive impact on profitability and risk adjusted profitability

Opebcost

We use the ratio of operational costs to total assets as a proxy for bank expenditure in order to function which englobe both labor costs and other operating costs. Banks have the ability to incorporate operational costs to their interest margin. However, while doing so might lift the heavy cost born by banks it will also increase default risks, loans loss provisions as well as screening and monitoring costs also borne by banks.

Bashir (2003) revealed that thanks to advances in technology and the more frequent use of the internet, banks are able to shrink their costs which in turn would lead to better financial performances. On the same note, Karakaya and Er (2013) posit that well performing and efficient banks should be able to manage their operating costs.

H3: Operation costs have a negative impact on profitability and risk adjusted profitability

Lopro

The ratio of non-interest income to total assets was used to account for income diversification (Nguyen et al. (2012, hahm 2008). According to Chiorazzo et al. (2008), Saghi-Zedek (2016), Sanya and wolfe (2011) and Meslier et al. (2014) income diversification is found to have a positive impact on a bank's financial performance. However, Stiroh (2004a), De Young and Rice (2004b) and Stiroh and Rumble (2006). Delpachitra and Lester (2013) found that for the Australian context noninterest income is associated with weak profitability.

Furthermore, the study claims that additional investment in non-traditional activities does not boost

bank's returns or risk of default.

Several studies like Stiroh (2004b), Stiroh and Rumble (2006), Mercieca et al. (2007) and Sanya and Wolfe (2011) use the Herfindahl concentration index (HHI) to measure income diversification. Although this measure has many advantages as it makes it possible measure diversification gains as proposed by the portfolio theory by modeling diversification as a non- linear function of risk and return, mixing both sources of income to make one general index risks losing a valuable amount of information.

H1: interest income positively impacts profitability and risk adjusted profitability.

Deporat

The ratio of net interest income over total assets was used to account for banks traditional business following Demirguc-Kunt and Huizinga (1999) and, Maudos and Guevara (2004). There is no denying that bank traditional activity contributes to a significant portion of bank revenue. However, excessive risk taking, low asset quality and economic downturn can contribute to lower income stemming from traditional activities.

H2: Net interest income has a positive impact on profitability and risk adjusted profitability

*** Empirical Results and Discussion**

A- Specification and post estimation tests

1- Testing for the absence of Multicollinearity between independent variables

Table 3 and Table 4 display the correlation matrixes of ROA with the different independent variables. The correlation matrix can identify strong correlation between explanatory variables which in turn would render our coefficients inflated and estimates biased. In order to check for any multicollinearity, we follow the same method recommended by Wooldridge (2015) in which he considers the existence of multicollinearity if the correlation coefficient between two variables is greater than 0.7. All the correlation coefficient are less than 0.7 suggesting a low chance of multicollinearity biasing our estimations. This result is further confirmed by the Variance Inflation Factor (VIF). The rule of thumb for this test is that if the result shows a mean VIF smaller than 6 and individual VIF smaller than 10 we can affirm that there are no

multicollinearity problems.

*** Statistical analysis**

The researcher will use statistical analysis techniques (descriptive statistics, correlation, and panel data) to check the effect of independent variables (FINTRE, RINVRE, ASSG, OPEDCOST, LOPRO, DEPORAT) on the dependent variable (ROA) using STATA program.

2- Descriptive statistics

Table 4: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
FINTRE	100	0.760972	.0451173	.5963959	0.875766
RINVRE	100	0.085096	.073504	.0000854	0.348142
ASSG	100	0.039868	.0195154	.0007051	0.074773
OPEDCOST	100	0.019542	.0067232	.0106612	0.047679
LOPRO	100	0.023154	.0121436	.0010279	0.046003
DEPORAT	100	0.014928	.0145839	4.71e-06	0.049353
ROA	100	0.017126	.0064634	.000564	0.03663

The mean for FINTRE is 0.76, while the mean value for RINVRE is 0.085 the mean the asset growth rate (ASSG) is 0.039 for all the sample period. the mean for OPEDCOST is 0.019, while the mean value for LOPRO is 0.023, the mean for DEPORAT is 0.0149, while the mean for ROA is 0.017.

3- Correlation matrix

We use pearson correlation coefficient to study the relationships between independent variables (FINTRE, RINVRE, ASSG, OPEDCOST, LOPRO, DEPORAT) and the the relationship between dependent variable (ROA) and all the independent variables of our model.

Table 5: Correlation Matrix

	FINTRE	RINVRE	ASSG	OPEDCOST	LOPRO	DEPORAT	ROA
FINTRE	1						
RINVRE	0.0637	1					
ASSG	-0.058	-0.5036	1				
OPEDCOST	0.4419	0.3346	-0.5549	1			
LOPRO	0.1342	-0.2031	0.2081	0.0798	1		
DEPORAT	0.1063	0.186	-0.2661	0.2524	-0.8681	1	
ROA	0.0797	-0.2665	0.3023	-0.1534	-0.2474	0.446	1

Table 3 shows that there is no significant correlation between FINTRE on ROA where the value of correlation coefficient is (0.079) which is less than 0.1. There is positive significant correlation between (RINVRE, DEPORAT) and ROA where the value of correlation coefficient is between (0.302) and 0.466There is negative significant correlation between (RINVRE, OPEDCOST, LOPRO) and ROA where the value of correlation coefficient is between -0.153 and -0.264

4- Regression model

The researcher will use multiple linear regression to estimate the effect of independent variables (FINTRE, RINVRE, ASSG, OPEDCOST, LOPRO, DEPORAT) on the dependent variable (ROA) according to the following equation

ROA= $\widehat{\beta}_0 + \widehat{\beta}_1 FINTRE + \widehat{\beta}_2 RINVRE + \widehat{\beta}_3 ASSG + \widehat{\beta}_4 OPEDCOST + \widehat{\beta}_5 LOPRO + \widehat{\beta}_6 DEPORAT$

Table 6: Regression model

Source	SS	Df	MS	Number of obs	100
				F (6, 93)	25.72
Model	0.002581	6	.000430119	Prob > F	0.0000
Residual	0.001555	93	.000016721	R-squared	0.6240
				Adj R-squared	0.5997
Total	0.004136	99	.000041775	Root MSE	0.00409

ROA	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
FINTRE	-0.00067	.0106962	-0.06	0.950	-0.02191	0.020568
RINVRE	-0.00512	.0067075	-0.76	0.448	-0.01844	0.008204
ASSG	0.044045	.029847	1.48	0.143	-0.01523	0.103315
OPEDCOST	-0.59326	.1100431	-5.39	0.000	-0.81179	-0.37474
LOPRO	0.704009	.1006328	7.00	0.000	0.504172	0.903845
DEPORAT	0.796262	.0825465	9.65	0.000	0.632341	0.960183
_cons	-0.00028	.0073117	-0.04	0.970	-0.0148	0.014244

$ROA = -0.0003 - 0.00067FINTRE - 0.00512RINVRE + 0.044\,ASSG - 0.59OPEDCOST + 0.704LOPRO + 0.79DEPORAT$

*** From the previous table we can see that**

The model is significant (at least one independent variable has an effect on dependent variable) where the value of prob>F= 0.00001 which is less than α=0.05. The model is fit where the value of adjusted R-squared =0.62 which is higher than 0.5, so the independent variables managed to explain 62% of the variations in the dependent variable. There is no significant effect for (FINTRE, RINVRE, ASSG) on ROA where the values of p>|t| are higher than α= 0.05 There is significant effect for OPEDCOST ROA where the value of p>|t|=0.0001 is less than α= 0.05, the value of estimate= -0.59 so we can conclude that any increment with one unit in OPEDCOST will has decline in ROA by 0.59 unit.

There is significant effect for LOPRO on ROA where the value of p>|t|=0.0001 is less than α= 0.05, the value of estimate= 0.704 so we can conclude that any increment with one unit in LOPRO will has increment in ROA by 0.704 unit There is significant effect for DEPORAT on ROA where the value of p>|t|=0.0001 is less than α= 0.05, the value of estimate= 0.79 so we can conclude that any increment with one unit in DEPORAT has increment in ROA by 0.79 unit.

5- multi-collinearity diagnostics

will check for multi-collinearity problem in the model using Variance Inflation Factor (VIF). If VIF >10 then there is multi-collinearity problem, otherwise there is no multi-collinearity problem.

Table 7: Multi-collinearity diagnostics

Variable	VIF	1/VIF
LOPRO	8.84	0.113096
DEPORAT	8.58	0.116541
OPEDCOST	3.24	0.308567
ASSG	2.01	0.49781
RINVRE	1.44	0.69482
FINTRE	1.38	0.725228
Mean VIF	4.25	

For all the defends route, the (VIF) is les, there is no multi-collinearity problem in independent variables where the mean VIF value = 4.25 which is less than 10, and the VIF`s values for all variables (fintre, rinvre, assg, opedcost, lopro, deporat) are less than 10.

6- Auto-correlation diagnostic

To check for Auto-Correlation problem in on model we the Durbin Watson test. (7, 100) = 1.927319 witch region (1.804, 2.3) which means that the test cannot decide, is there auto-correlation problem or not? so we will use durbin`s alternative test.

If the value of prob>chi2 is higher than 0.05 then there is no Auto-Correlation problem, otherwise there is a problem.

Table 8: Auto-correlation diagnostic

lags(p)	chi2	df	Prob > chi2
1	0.118	1	0.7311

H0: no serial correlation

There is no Auto-Correlation problem where the value of prob>chi2=0.731 is higher than 0.05

Table 9: Signification

Has significant effect	Has no significant effect
Opedcost	assg
Lopro	
Deporat	
Fintre	
Rivnre	

*** Statistical analysis**

Check the variability in means of variables (FINTRE, RINVRE, ASSG, OPEDCOST, LOPRO, DEPORATE, ROA) according to either years or banks using STATA program.

Firstly: According to year

FINTRE

Analysis of Variance

Table 10: FINTRE

Source	SS	df	MS	F	Prob > F
Between groups	0.096	9	0.010667	9.1	0.000
Within groups	0.105521	90	0.001172		
Total	0.201521	99	0.002036		

There is significant difference in means of FINTRE according to years where the value of prob>F = 0.00001 which is less than α=0.05.

RINVRE

Analysis of Variance.

Table 11: RINVRE

Source	SS	df	MS	F	Prob > F
Between groups	0.198632	9	0.02207	5.91	0.000
Within groups	0.336249	90	0.003736		
Total	0.534881	99	0.005403		

There is significant difference in means of FINTRE according to years where the value of prob>F = 0.00001 which is less than α=0.05.

ASSG

Analysis of Variance

Table 12: ASSG

Source	SS	df	MS	F	Prob > F
Between groups	0.02679	9	0.002977	24.55	0.000
Within groups	0.010914	90	0.000121		
Total	0.037704	99	0.000381		

There is significant difference in means of ASSG according to years where the value of prob>F = 0.00001 which is less than α=0.05.

OPEDCOST

Table 13: OPEDCOST

Source	SS	df	MS	F	Prob > F
Between groups	0.00361	9	0.00040112	41.74	0.000
Within groups	0.000865	90	9.61E-06		
Total	0.004475	99	0.0000452		

There is significant difference in means of OPEDCOST according to years where the value of prob>F = 0.00001 which is less than α=0.05.

LOPRO

Table 14: LOPRO

Source	SS	df	MS	F	Prob > F
Between groups	0.013762	9	0.001529156	164.45	0.000
Within groups	0.000837	90	9.30E-06		
Total	0.014599	99	0.000147467		

There is significant difference in means of LOPRO according to years where the value of prob>F = 0.00001 which is less than α=0.05.

DEPORATE

Table 15 : DEPORATE

Source	SS	df	MS	F	Prob > F
Between groups	0.020239	9	0.002248759	247.58	0.000
Within groups	0.000817	90	9.08E-06		
Total	0.021056	99	0.00021269		

There is significant difference in means of DEPORATE according to years where the value of prob>F = 0.00001 which is less than α=0.05.

ROA

Analysis of Variance

Table 16 : ROA

Source	SS	df	MS	F	Prob > F
Between groups	0.002082	9	0.000231345	10.14	0.000
Within groups	0.002054	90	0.000022818		
Total	0.004136	99	0.000041775		

There is significant difference in means of ROA according to years where the value of prob>F = 0.00001 which is less than α=0.05.

Secondly: according to banks

FINTRE

Table 17: FINTRE

Source	SS	df	MS	F	Prob > F
Between groups	0.096	9	0.010666677	9.1	0.000
Within groups	0.105521	90	0.001172455		
Total	0.201521	99	0.002035567		

There is significant difference in means of FINTRE according to banks where the value of prob>F = 0.00001 which is less than α=0.05.

RINVRE

Analysis of Variance

Table 18: RINVRE

Source	SS	df	MS	F	Prob > F
Between groups	0.198632	9	0.022070243	5.91	0.000
Within groups	0.336249	90	0.0037361		
Total	0.534881	99	0.00540284		

There is significant difference in means of FINTRE according to banks where the value of prob>F = 0.00001 which is less than α=0.05.

ASSG

Table 19: ASSG

Source	SS	df	MS	F	Prob > F
Between groups	0.02679	9	0.002976675	24.55	0.000
Within groups	0.010914	90	0.00012127		
Total	0.037704	99	0.000380852		

There is significant difference in means of ASSG according to banks where the value of prob>F = 0.00001 which is less than α=0.05.

OPEDCOST

Table 20: OPEDCOST

Source	SS	df	MS	F	Prob > F
Between groups	0.00361	9	0.000401115	41.74	0.000
Within groups	0.000865	90	9.61E-06		
Total	0.004475	99	0.000045201		

There is significant difference in means of OPEDCOST according to banks where the value of prob>F = 0.00001 which is less than α=0.05.

LOPRO

Analysis of Variance

Table 21: LOPRO

Source	SS	df	MS	F	Prob > F
Between groups	0.013762	9	0.001529156	164.45	0.000
Within groups	0.000837	90	9.30E-06		
Total	0.014599	99	0.000147467		

There is significant difference in means of LOPRO according to banks where the value of prob>F = 0.00001 which is less than α=0.05.

DEPORATE

Analysis of Variance

Table 22: DEPORATE

Source	SS	df	MS	F	Prob > F
Between groups	0.020239	9	0.002248759	247.58	0.000
Within groups	0.000817	90	9.08E-06		
Total	0.021056	99	0.00021269		

There is significant difference in means of DEPORATE according to banks where the value of prob>F = 0.00001 which is less than α=0.05.

ROA

Analysis of Variance

Table 23: ROA

Source	SS	df	MS	F	Prob > F
Between groups	0.002082	9	0.000231345	10.14	0.000
Within groups	0.002054	90	0.000022818		
Total	0.004136	99	0.000041775		

There is significant difference in means of ROA according to banks where the value of prob>F = 0.00001 which is less than α=0.05.

1- General to specific model selection

In order to choose the most relevant an appropriate control

variable we follow Stanley and Doucouliagos (2012) general-to-specific approach. The method consists of predetermining a list of potential control variables commonly used in empirical literature and could have an effect on the dependent variable then dropping all the non-statistically significant variables until only significant variables remain in the model. That being said, we will keep the variables that are commonly included in previous studies related to bank income diversification and are usually statistically significant.

2- Specification tests

For panel data, pooled OLS methodology is used if unobserved heterogeneity in the error term is not detected. On the other hand, if unobserved heterogeneity is identified Pooled OLS would produce biased estimates. We first test the existence of unobserved heterogeneity in the error term with Breusch and Pagan Lagrangian multiplier test for random effects. The null hypothesis for the test is that there are no unobserved heterogeneity and that Pooled OLS is preferable. The alternative hypothesis is that Random effect modeling is more appropriate.

Table 24: Breusch and Pagan Lagrangian multiplier test for random effects

H0: No unobserved heterogeneity	Model
chibar2(01)	0.85
Prob > chibar2	0.3565

Significant levels at 10%*, 5%** & 1%***

The result shows that for model 1, 3 and 4 we can reject the null hypothesis of no unobserved heterogeneity for the error term while we fail to reject the null hypothesis for model 2. The decision is yet to be made. For models 1, 3 and 4 in which random effects models were found to be more appropriate we need to run a Hausman specification test to choose between fixed effects and random effects.

The results for Hausman specification are as follows:

Table 25: Hausman (1978) specification test

	Model
Chi-square test value	250.32
P-value	0.0000

Significant levels at 10%*, 5%** & 1%***

For model 1 we can conclude that random effect model

is the most appropriate as we fail to reject the null hypothesis.
For model 3 we can also conclude that random effect model is preferable as we accept the null hypothesis.

For model 4 the null hypothesis is rejected, we can conclude that fixed effect model is the most appropriate.

For model 2 we need to check the F test that all u_i= 0 which imply the absence of fixed heterogeneity. The F-tests on the joint significance of the dummies added to the fixed effects model suggest that the fixed effects model is more appropriate than the POLS. The following table summarizes the F test results:

Table 26: Results for the F-tests on the joint significance of the FE dummies

	Model
F (10, 123)	12.38
Prob > F	0.0000

Significant levels at 10%*, 5%** & 1%***

The F test reveals that we can reject the null hypothesis that pooled OLS is appropriate and we accept the alternative hypothesis that fixed effect is appropriate.

3- Testing for heteroskedasticity in the error term

Heteroskedasticity exists when the variance of the error term is no constant. Violating the homoskedasticity assumption would lead to inefficient coefficients which are biased upward or downward.

We test for heteroscedasticity for random and pooled OLS using the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity and the Modified Wald test for groupwise heteroskedasticity for fixed effects.

Table 27: Results for heteroskedasticity tests

H0: Constant variance
Variables: fitted values of ROA

	Model
chi2 (1)	0.85
Prob > chi2	0.3565

Significant levels at 10%*, 5%** & 1%***

We applied Breusch-Pagan / Cook-Weisberg test for heteroskedasticity. The null hypothesis for the test is that the error term variance is constant. For model and we reject the null hypothesis hence we conclude the presence of heteroskedasticity

*** Robustness checks**

The need to control for endogeneity

*** Conclusion**

Great number of previous empirical studies around the world predicts a positive relationship between income diversification and banks' performance. They demonstrated that non-interest income has raised and banks, especially the large banks, prefer trading and off-balance sheet investments if the interest rates are low.

In this study we propose a linear model for investigating the relationship between profitability and diversification in the Saudi banking industry. Our findings are on the same line with the empirical evidence relating to developing economies. We find that indeed non-interest income contributes to the income of Saudi banks but, its share is yet low and increase yearly. Financial intermediation (Loans grant) seems to be the major contributor to the financial performance of Saudi banks. Their managers are risk and believe that trading and direct investment are the most controversial source of revenue and the biggest contributor to banks' income volatility. Furthermore, we find that non interest profit does not contribute to the profitability of Saudi banks which is surprisingly controversial as these banks seem to generally focus on fee-based income as a cheap and fact channel of income. This implies that Saudi bank managers have to review their strategies related to balance sheet investments that incorporate more of trading income and less interest income by diversifying their activities, in order to rise profitability. We also find that size, one of the undisputedly recognized by theoretical and empirical literature is one of the major factors in income diversification for banks all over the world due to economies of scope and scale does not have any significant impact on the profitability of Saudi banks.

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