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The Impact of Loan Diversification on Bank Performance: Evidence from MENA Countries Commercial Banks

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The Impact of Loan Diversification on Bank Performance: Evidence from MENA Countries Commercial Banks

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DECLARATION

I hereby declare that this thesis is entirely my own work and that it has not been submitted as an exercise for a degree at any other University.

Samer Andre Aoun

ABSTRACT

Purpose – The purpose of this thesis was to investigate empirically whether sectoral and geographical diversification has an impact on bank performance in the MENA region.

Design/methodology/approach – Sprouting from a positivist approach, the study encompassed 35 listed commercial banks from 11 countries in the MENA region during 2009-2015. Multiple regression on a balanced panel was used as the parametrical tool to test the impact of diversification on banks' risk and return in the MENA region. The consolidated sample of banks was divided also into 3 sub-samples to achieve homogeneity.

Significant Findings – On the MENA level: a non-linear relationship exists between sectoral concentration/diversification and banks' market returns. Sectoral *concentration* to a certain limit improves market returns while geographical *concentration* reduces banks' market risk *linearly*.
On the GCC level: A non-linear relationship exists between geographical concentration/diversification and banks' accounting returns and between sectoral concentration/diversification and banks' market returns. From a return perspective, sectoral *concentration* to a certain limit improves banks' market returns while geographical *concentration* to a certain limit improves banks' accounting returns. From a risk perspective, the relationship between sectoral concentration/diversification and market risk is nonlinear. Sectoral *diversification* to a certain limit reduces market risk.
On the Levant level: A non-linear relationship exists between geographical concentration/diversification and banks' accounting risk (NPL). From a return perspective, sectoral *concentration* improves banks' accounting returns. From a risk perspective, sectoral *concentration* reduces accounting risk.
On the Levant & North Africa level: A non-linear relationship exists between geographical concentration/diversification and banks' accounting risk. Geographical *diversification* to a certain limit reduces banks accounting risk.

Research limitations/implications – The heterogeneity of banks in the MENA region, and the lack of credible data to dissect into more homogenous subsamples due to the political and economic environment in many parts of the region is a major limitation on the statistical power of the research outcomes. Thus, caution should be taken before extrapolating sub-sample results.

Managerial/Practical implications – Sectoral concentration/diversification should be implemented strategically in the MENA region banks to maximize market returns because an optimal point exists. Also, overstretching a banks' portfolio geographically increases banks market risk and should be pursued when the expected benefits overcome/justify the potential market risk.

Originality/value – Provides MENA bank regulators, investors and managers an optimal point of diversification to guide them when setting their portfolio strategies. It also fills a gap in MENA banks literature.

Keywords - Sectoral Diversification, Geographical Diversification, Bank Risk, Bank Returns, MENA region, GCC region, Levant region, HHI, Optimal HHI, Diversification Strategy.

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Chapter 1

Introduction

1.1 General background

Generally, banks and financial institutions play a significant role in the economy of any country. They provide an array of financial services to various investors, firms, common citizens and "ameliorate the information problems between investors and borrowers by monitoring the latter and ensuring a proper use of the depositors' funds" (Allen et. al, 2014, p.1). In addition to being financial service providers, banks contribute to the development of economies through facilitation of business domestically and internationally. The power of financial intermediary vested in banks has allowed them to support businesses from multiple economic sectors to thrive and make profits. With that statement, a series of particular questions present themselves. Given the power vested in them, should one bank support multiple economic sectors? Does it actually lead to make more profits, and if it does, at what cost? Amidst the soaring competition in the financial sector worldwide, many banks have geographically expanded their scope of activities to reach new and developing markets in attempts to earn some market share and global recognition outside their base countries of operation. This scope expansion has also taken place on the sectorial level with more banks pushing to consolidate by extending different financial services to diverse economic sectors (Chen, 2014). While many studies support the classical theory of loan portfolio diversification as a mean to reduce non-systematic risk and improve returns, there are plenty of recent empirical findings showing that diversification has a negative impact on banks' overall performance and risk.

Acharya (2006) found that diversified banks (with respect to loan portfolio) are at a disadvantage resulting from high competition and a lack of experience in the new sectors which they try to infiltrate. He argued that his study was in line with DeLong (2001), who found that bank mergers with a concentration motive (in terms of activity & geography) generate better economic performance than mergers with a diversification motive. Rossi (2009) showed that diversification decreased the cost efficiency of banks due to higher

loan monitoring costs. Perhaps the more recent study of Tabak (2011) post the financial crisis which adopted a high frequency panel showed that concentration leads banks to realize higher returns while reducing default risk.

1.2 Need for the study

On a more specific note, the MENA region is a vital area in today's business world as it accounts for a significant portion of the world's supply of oil and gas. With that being said, the financial institutions operating in the MENA have a great role to play in facilitating businesses in the most efficient way possible to stimulate the whole economy. In order to do so efficiently, a bank is faced with a pivotal question at the core of its business strategy. Should it be diversified geographically and serve multiple economic sectors or focused domestically and serve niche sectors or follow some another combination? On one hand, the "too big to fail" theory has not surpassed the test of time in the recent financial crisis with the demise of "Lehman brothers". Having a massive asset base that aggressively conducts business everywhere is not a bulletproof strategy. Yet, ten years after the start of the financial crisis, the biggest U.S. banks are bigger than ever (Fontana, 2016). This shows that banks, just like other business organizations need to keep on growing in order to survive in a growingly tougher red market (Fang, 2011). One way for banks to grow is through lending to different industries and engaging in multiple business activities, which help them acquire better-quality information about clients and achieve more efficient capital allocation (Diamond 1984; Rajan 1992; Saunders and Walter 1994; Stein 2002). It also helps them establish more client relationships which opens room for unexpected business opportunities.

However, Klein (1998) argued that when banks engage in new market territories, they tend to dilute their comparative advantage due to a lack of expertise. But according to Salhab (2016), a dilute in comparative advantage of that sort is mostly applicable to small banks which tend to be more successful in concentrated activities due to capital limitations and lower operating costs. This drives them to build core competencies by slightly differentiating themselves on more attractive interest rates or higher flexibility in innovative product offerings. Conversely, large banks tend to be more diversified in their

lending activities in order to boost earnings, and maintain top market shares (Salhab, 2016). On another note, large corporations and sovereign entities which play critical roles in the cycle of any given economy prefer dealing with big banks to fund their massive capital requirements and to maintain a certain prestige. Therefore, it seems that being a big bank while strictly providing concentrated services to niche sectors is a banking oxymoron that is hard to sustain in a region which appears to be on the brink of consolidation.

1.3 Purpose of the study

As a result of this ongoing debate in the literature and given the scarcity of relevant studies conducted on emerging financial markets in many developing countries, this thesis attempts to explore the impact of sectoral and geographical loan diversification on commercial banks' performance and risk in the MENA region. The specific objectives are:

- To investigate whether or not sectoral loan diversification improves MENA commercial banks performance with respect to risk and return on accounting and market levels.
- To investigate whether or not geographical (cross border) loan diversification improves MENA commercial banks performance with respect to risk and return on accounting and market levels.

By doing so, this study hopes to shed light for all banking and finance professionals by uncovering whether or not diversification is a key for higher returns and lower risks. It also aims to add valuable insight to the current state of knowledge, hoping it will bring the debate one step closer to an end.

1.4 Brief overview of all chapters

The thesis will be structured as follows. Chapter 2 will present the literature review and delve into the current state of knowledge surrounding this topic. It will also investigate various theories pertaining to the topic as well as uncover the results of old and recent empirical studies. Chapter 3 will discuss the proposed methodology to be used in this research, the suggested model and all assumptions that need to be made. Chapter 4 will present the results along with a deep analysis and try to link the results with literature theories and previous empirical studies in an attempt to answer the posed research questions. Finally, Chapter 5 will conclude the study and discuss the potential implications of the study and offer some mild recommendations for the future.

Chapter 2

Literature Review

2.1 Role of banks in the economy

Banks are vital institutions in any society as they significantly contribute to the development of the economy through facilitation of business (Abel, 2013). Credit facilities extended by banks fuel the economic activity by allowing businesses to invest beyond their cash on hand, families to purchase homes without having the entire amount in advance, and governments to smooth out their expenditures by mitigating the variations in tax revenues timing (Baily, 2013). Another important contribution of banks is that they help people and businesses alike transfer cash remittances from one country to another. This has facilitated transactions in distant places and has expanded internal and external trade between people and nations (Abel, 2013). According to the World Bank statistics in 2017, expatriates living and working in GCC countries transfer over $85 billion per year back to their countries of origin in order to support their families. Moreover, banks play a major role in the economy by investing in various sectors such as agriculture, industry and trade providing capital at discounted interest rates to promote their development when needed (Kniivila, 2007). Finally, banks help in promoting entrepreneurship by making loans available for new business startups at reasonable rates. Thus, the role of banks in economic development is to remove the deficiency of capital by stimulating savings and investment. A sound banking system mobilizes the small and scattered savings of the community and makes them available for investment in productive enterprises.

In summary, banks perform two important/primary functions:

(a) They deploy people's deposits by offering attractive interest rates, thus converting savings into capital for investors.

(b) They distribute these savings in the form of loans among enterprises which fuel economic development.

It is difficult to see how, in the absence of banks, could small savings be stimulated or even made possible. It is also difficult to see who would distribute these savings among entrepreneurs. Under the financial intermediation theory of banks, it is through the agency of the banks that the community's savings automatically flow into channels which are productive (Mishra, 2008). In terms of safety, "Banks exercise a degree of discrimination which not only ensures their own safety but which makes for optimum utilization of the financial resources of the community" (Mishra, 2008, p.184). Having said that, banks have come to play a dominant and useful role in promoting economic development by mobilizing the financial resources of the community and by making them flow into the desired channels. According to Asenova (2006), "Banks are essential for each country's economy, since no growth can be achieved unless savings are efficiently channeled into investment" (p.3).

2.2 Introduction to the MENA Region

The term "Middle East", referring to a trans-continental area between North Africa and South West Asia, was coined in 1901 by Admiral Alfred Thayer, a celebrated American advocate of naval power. It was further popularized in 1916 during the speeches of Sir Mark Sykes, a British parliament member, mostly famous for negotiating the Sykes-Picot agreement prior to the fall of the Ottoman Empire in 1918 (Meyer, 1991). As time elapsed, its use became more widespread amongst Europeans and non-Europeans, but with some ambiguity over the exact geographical borders of the coined region. As a result, international organizations such as the World Bank started using more specific terms such as MENA to refer to the region spanning horizontally from Morocco to Iran. MENA is an acronym which refers to Middle East and North Africa and is usually interchangeable with the terms "Greater Middle East" and "Arab World" since 90% of the countries in the MENA use Arabic as their first language (IstiZada, 2017). According to the World Bank's definition, the MENA region consists of 20 countries [Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine (Gaza and West Bank), Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates and Yemen] which represent approximately 6% of the world's population. Six countries emerge from

North Africa (Algeria, Egypt, Libya, Morocco, Djibouti, Tunisia) while the rest emerge from Western Asia. From a geographical perspective, the MENA region approximately represents 3% of the world's total squared surface area (Worldbank, 2003).

2.2.1 Overview of macroeconomic environment in the MENA region

On an economic note, in 2015, the GDP of the MENA region is about $3.15 trillion annually and this figure translates to 4.5% of the world's GDP (Worldbank, 2015a). MENA is abundantly rich with natural nonrenewable resources such as oil and natural gas which account for 60% and 45% of the world's proven oil and gas reserves respectively, making the MENA region a major player in the oil and gas supply industry and an important source of global economic stability. It is also worthy to note that in 2010, 8 out of 13 members of the Organization of the Petroleum Exporting Countries (OPEC) belong to the MENA region and they globally represent about 57% and 41% of crude oil and natural gas proven reserves respectively (Worldbank, 2010). The macroeconomic environment between 2005 and 2015 of the MENA region will be dissected into 2 main indicators which capture GDP growth and foreign direct investments.

As shown in Figure 1, the GDP growth figure portrays the real story of economic activity in the region which started out strong at 5.5% in 2005 and reached its peak at 7% in 2006. In 2007, the US financial crisis sent shockwaves all over the world and plummeted the MENA region's GDP growth rate to a twenty-year record low rate of 1.57% in 2009. By 2010, the economy started recovering and the GDP growth rate scored an impressive 5% (higher than the world average by 0.62% at the time) (EDP, 2009). A gradual decline in rates occurred between 2011 and 2015 that can be mainly attributed to the oversupply of oil in global markets which caused the oil barrel price of OPEC to fall from $110 in 2012 to $50 in 2015 (Baffes, 2015). Another undisputable factor would be the Arab Spring events which affected Iraq, Yemen, Libya, Tunisia, Syria and Egypt and undoubtedly sprouted uncertainty and turmoil in the region. These events played a role in the stagnated GDP growth rates the region faced at an average of 3% per year in 2015 (Worldbank, 2015).

Figure 1 portrays the GDP growth in the MENA region over a 10-year period.

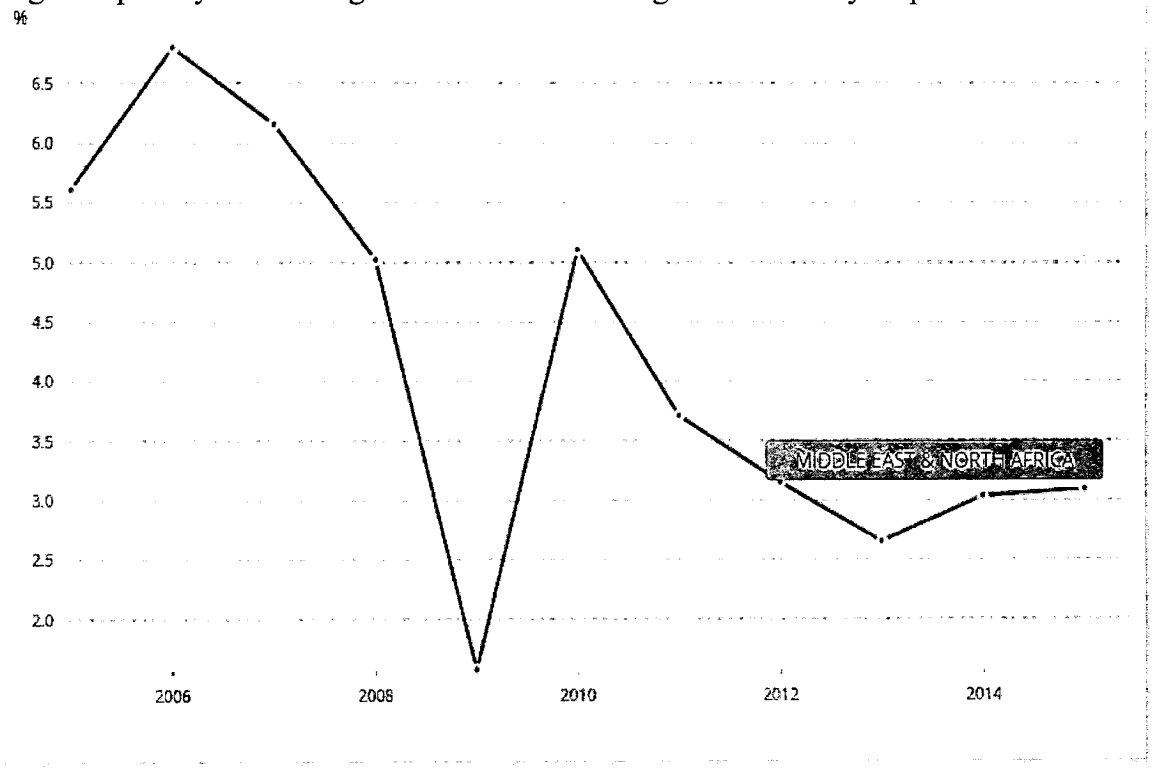

Figure 1: MENA Region GDP Growth Figures (in Percentage) between 2005 and 2015
Source: The World Bank (2005-2015)

Figure 2 portrays the foreign direct investments (FDI) in the MENA region over a 10-year period.

Figure 2: MENA Region FDI figures between 2005 and 2015
Source: The World Bank (2005-2015)

Foreign investments are an important asset to the health of any economy seeking growth, higher foreign currency reserves, visibility on the global map and greater employment opportunities for the youth. Early in 2005, the entire region seemed promising and major Western and Far Eastern nations were investing in the MENA region and expanding their businesses geographical foothold. However, when the US subprime mortgages crisis unfolded in 2007, a sharp decline of foreign investments took place and despite a small attempt of recovery between 2009-2010, the Arab spring events which started in 2011 had a heavy toll on foreign investors' confidence in the region and investments plummeted further below their initial levels a decade before (OECD, 2014).

2.2.2 Banking Sector in the MENA

The banking sector in the MENA region is heterogonous due to the different types of government regimes, circumstances and economic activities of its underlying countries. For the sake of trying to maintain consistency, the banking sector of the MENA is divided into 3 subcategories/areas based on homogenous characteristics of the countries within: Levant Area, GCC Area, and North African and Others Area.

2.2.2.1 Levant Area (Lebanon, Iraq, Israel, Jordan, Palestine, Syria)

The Levant area includes Lebanon, Syria, Palestine, Jordan, Israel, Iraq, Cyprus and Turkey. We will exclude Turkey and Cyprus since they are not within the MENA region and Table 1 will summarize the banking sector and the credit rating of the remaining 6 countries.

	Country	Total Number of Commercial Banks*	Current Credit Rating of Country**	Future Outlook**
Levant	Lebanon	45	B-	Stable
	Syria	20	Not Rated	-
	Palestine	11	Not Rated	-
	Jordan	21	BB-	Negative
	Israel	18	A+	Stable
	Iraq	17	B-	Stable

* (Excluding Islamic, Private, Investment, Development Banks and branches)
** (Based on S&Ps Market Surveillance Reports between 2016 and 2017)
Table 1: Summary of banking sector and credit rating in Levant region.

From Table 1, we can see that Lebanon (the smallest country by area size) has the most number of commercial banks and is rated B- by Standard & Poor's (S&P'). According to the rating criteria of (S&P), a B- rating places Lebanese issued bonds in the junk/speculative grade category. Syria and Palestine have 20 and 11 commercial banks respectively with lots of room for future growth (given the area size and population). However, they do not have a credit rating due to their current political situation. Jordan has 21 commercial banks with room to accommodate more (given area size and

population). It also enjoys a slightly better credit rating than Lebanon (at BB-), but a negative outlook loom over it. Jordanian issued bonds are also considered to be in the junk/speculative category. Israel and Iraq have 18 and 17 commercial banks respectively with room for future growth too. However, it should be noted that Israel is the only country in the Levant that enjoys an investment grade credit rating for its bonds at A+.

Lebanon

According to Beyhum (2016) "The strength of the Lebanese banking sector is largely attributable to its liquidity, capital adequacy and stringent regulatory foundation. Banks in Lebanon remain highly liquid with a private sector loans-to-deposits ratio of 32 percent (recorded at year-end 2015), indicating the ample liquidity available within the sector. Moreover, loans to the private sector constituted 94 percent of Lebanon's GDP in 2015, as banks were the main financial intermediaries supporting the needs of the private, as well as the public, sectors. Moreover, in 2015, the size of the banking sector is huge with assets in excess of 360 percent of Lebanon's GDP (Beyhum, 2016).

In fact, the progress realized by the banking sector can be attributed to its dependence on the core customer deposits, which constitute the main source of funding and account for around 82 percent of total liabilities, reflecting the stable funding source and the low reliance on capital markets (Beyhum, 2016). The large deposit base is accredited to the widely-diffused Lebanese diaspora that remain loyal to the Lebanese banks. In 2015, the World Bank estimated inflows of remittances to Lebanon at $7.5bn – a figure equivalent to 14 percent of the country's GDP – ranking Lebanon as the 17th largest recipient of remittances globally and the second highest among Arab countries (behind Egypt) (Worldbank, 2015b).

Syria

Despite the civil war taking place in Syria for the past 6 years, none of the country's public or private banks have shut down their operations. Although they have "endured physical destruction of their branches and offices in violence-ridden cities, robberies by gangs and

militias on both warring sides, tighter inspection of their foreign-currency operations and embezzlement by some of their own staff, all banks have decided to stay put until the resolution of the conflict" (Kattan 2015, p.2). The banking sector in Syria should have collapsed had it not received billions in funding from the Russian and Iranian governments. This constant liquidity pumping into the central bank of Syria has allowed the 6 public banks to withhold their positions (Kattan, 2015).

Palestine

With the establishment of the Palestinian National Authority (PNA) in 1994, the Palestinian Monetary Authority (PMA) emerged, accompanied by the opportunity to open the Palestinian banking sector once again after a blockade that extended since 1967. Despite the Israeli occupation and indirect siege on Palestinian territories, the growth potential for the banking sector in Palestine is very promising. There are currently over 200 branches that serve the entire Palestinian population of over 4 million. Without taking into account the growth in the Palestinian population, the number of bank branches in Palestine needs to double to meet the world standard of a maximum of one branch per 10,000 people. There is no national currency and so three different currencies are widely used in the West Bank and Gaza Strip; the Israeli Shekel in daily financial transactions, and the Jordanian Dinar and U.S. Dollar in savings and investments and for the purchase of durable goods. It is possible to make deposits and withdrawals from banks in any of these three currencies (The Palestine Economic Policy Research Institute, 2010).

Jordan

According to Oxford Business Group (2016a), "Jordan's banking sector is the strongest segment of its financial services industry, with a history dating back to 1948, when Arab Bank moved its headquarters from Jerusalem to Amman. Banking accounted for 18.82% of GDP as of mid-2015, making it one of the largest economic sectors in the kingdom" (p.2)."Despite ongoing regional volatility, low oil prices and slowing GDP growth within the kingdom, the banking sector remains resilient, stable and attractive to investors.

Although banks remain largely profitable, two recent acquisition announcements indicate the sector could be set to undergo consolidation" (Oxford Business Group, 2016a, p.3).

Israel

According to Sacks (2016), "The Israeli economy has been vibrant and dynamic for the last 20 years, but the financial sector has remained remarkably static. A small number of large banks and financial institutions dominate the entire financial and credit sector" (p.1). Also, according to David Zaken, the supervisor of Israeli Banks, "Israel's banking system has continued to maintain its stability and resilience, as well as a high level of liquidity. The banks accumulated profits from business activity and have adopted policies to attain capital levels that are appropriate to their risk profiles" (Zaken, 2015, p.1).

Iraq

After April 2003, the Iraqi economy collapsed and the banking system was underdeveloped in all administrative, financial and service areas. This was due to the wars, economic blockade, militarization of production and the involvement of government banks in external and internal financials relationships that are complex and confusing. This led to the weakness of international confidence in Iraqi banks, and the weakness of the Iraqi role in the economic activity and development activity (Khalil, 2016). According to Mousa (2015), "the effectiveness of banking supervision is questioned and the audit standards are lax. The general mistrust of the banking system is driven by the lack of deposit insurance, the bankruptcy case of Warka bank and the losses registered by the two main banks in the system. There is a real need for transparency and reliable financial media" (p.1-2).

2.2.2.2 GCC Area (Saudi Arabia, UAE, Qatar, Kuwait, Oman, Bahrain)

The Gulf Cooperation Council (GCC) countries include KSA, UAE, Qatar, Kuwait, Oman and Bahrain and are all in the MENA region. Due to the GCC region being rich in oil and gas and comprises countries that share many common fundamental

characteristics such as religion, culture, language and ideology, its banking sector also functions in an almost homogenous way. Their high reliance on the oil and gas sector revenues fuels government spending and ignites the activity of other non-oil sectors in the economy (Prasad, 2015).

Table 2 will summarize the GCC banking sector and the credit rating of its 6 countries.

Country	Total Number of Commercial Banks*	Current Credit Rating of Country**	Future Outlook**
KSA	22	A-	Stable
UAE	20	AA	Stable
Qatar	13	AA-	Negative
Kuwait	17	AA	Stable
Bahrain	21	BB-	Negative
Oman	16	BBB-	Negative

* (Excluding Islamic, Private, Investment and Development Banks)
** (Based on S&Ps Market Surveillance Reports between 2016 and 2017)
Table 2: Summary of banking sector and credit rating in GCC region.

From table 2 we can see that KSA has 22 commercial banks and carries an investment grade bond rating at A- with a stable outlook according to S&P. The UAE and Kuwait have 20 and 17 banks respectively and enjoy a higher credit rating (AA) than the rest of the GCC countries. Qatar has 13 commercial banks along with na AA- credit rating. However, a negative outlook is looming over Qatar due to the tough political situation it is facing. Finally, Bahrain and Oman have 21 and 16 banks respectively with junk grade bond ratings at BB- and BBB- accompanied by negative outlooks. It can be seen that GCC countries enjoy relatively higher credit ratings than Levant region countries given their healthier economies.

KSA

According to the Oxford Business Group (2016b), "Saudi Arabia's robust economy is the principal factor enabling the resilience of its banking sector. Another source of strength is its eventful history, which has included periods of significant challenge from which the sector has returned with renewed vigor. The modern sector evolved from the simple banking industry which existed in the first half of the 20th century, composed of a network of local money exchangers and a handful of foreign banks that catered to a relatively small business community. The rapid expansion of oil production in the years following the Second World War set in process the economic transformation which has established the nation as the regional economic powerhouse that it is today" (p.1).

UAE

According to Sharma (2015), "The UAE banking sector is still in recovery stage, post the 2008-2009 real estate crisis in Dubai. However, the financial performance of the banks has stabilized especially over the past couple of years. The UAE banks, particularly Dubai based banks, are facing asset quality challenges, as reflected in their high proportion of non-performing loans and low level of provisions. On the other hand, Abu Dhabi based banks appear relatively less challenged from these issues due to their relatively lower exposure to real estate and higher exposure to oil based industries, which did well amid favorable oil price environment, but took a swing over the past 2 years when prices fell" (p.1).

Qatar

According to the Oxford Business Group (2016c), "A rapidly expanding population and a steady supply of hydrocarbons and infrastructure projects have allowed Qatar's banking sector to maintain the double-digit growth it has achieved over recent years. However, while the project pipeline remains full, the increasingly competitive banking environment has encouraged the nation's lenders to seek revenue in previously untapped segments of the market. The result is new products and services, and an increasing investment in

markets beyond Qatar's borders. This, alongside the beginnings of regulatory change, suggests that the banking industry has interesting years ahead of it" (p.1).

In addition to that, "While government initiatives remain a central pillar of banking activity in Qatar, more private sector lending opportunities are arising from the large hydrocarbons and infrastructural projects that it commissions. This virtuous relationship will continue to be driven over the coming years by the sizeable project pipeline established by Qatar National Vision 2030 – the strategy document by which the economic development of the country is guided" (Oxford Business Group, 2016c, p.6).

Kuwait

According to the Oxford Business Group (2015a), "After more than half a decade of heavy provisioning and regulatory reforms, Kuwait's banking sector is now in the early stages of resurgence in credit issuance and various other activities. The industry's overall stability and performance has improved markedly since the 2007-08 global economic downturn, due in large part to a series of new rules put in place by the Central Bank of Kuwait (CBK) and other regulatory organizations in recent years" (p.1).

However, "structural weaknesses constitute the industry's key challenges. For example, Kuwait's continued reliance on oil income – which, according to Fitch, accounts for 40% of GDP and 80% of government revenues – represents a major long-term issue that has only been exacerbated by the rapid decline in oil prices since mid-2014, affecting the entire economy. Oil revenues fund the public sector, and government contracts and low energy prices support much of the private sector" (p.2).

Bahrain

According to the Oxford Business Group (2017), "Bahrain's banking sector has managed two years of a challenging low oil-price environment without seeing significant deterioration in its financial stability indicators. Conventional lenders and Islamic financiers operating within the kingdom's famously robust regulatory framework have

also managed to maintain profitability throughout this period thanks to efficiency drives and continued government spending on large infrastructure projects. However, with the industry facing a third successive year of low oil prices, efforts to maintain growth margins are becoming more challenging" (p.1).

Oman

According to the Oxford Business Group (2016d), "Oman's stable and tightly regulated banking sector has continued to perform well in recent times. The expansion of the newly launched sharia-compliant segment, coupled with strong asset growth, has been central to the sector's development. Indeed, the Central Bank of Oman has established a Sharia Supervisory Authority to help regulate the sharia-compliant segment while commercial banking assets have continued to expand, growing at a compound annual growth rate of approximately 12% between 2010 and 2014, well ahead of inflation. As the government ramps up its investment in infrastructure projects, project finance is seen as one of the most promising areas for lending growth. Boosting SME lending is also a priority for the economy, with the Central Bank of Oman introducing a requirement for all banks to allocate 5% of their total loan books to SMEs by 2016" (p.1-2).

2.2.2.3 North Africa Area (Lebanon, Iraq, Israel, Jordan, Palestine, Syria)

The remaining countries in the MENA region arise from North Africa (excluding Yemen & Iran) and are namely: Algeria, Djibouti, Libya, Morocco, Tunisia and Egypt. Table 3 will summarize the North African banking sector and the credit rating of its 8 countries (where possible/available).

Country	**Total Number of Commercial Banks***	**Current Credit Rating of Country****	**Future Outlook****
Morocco	23	BBB-	Stable
Tunisia	20	BB-	Negative
Algeria	21	Not rated	-

Libya	15	Not Rated	-
Egypt	31	B-	Stable
Iran	50	Not Rated	-
Djibouti	7	Not Rated	-
Yemen	9	Not Rated	-

* (Excluding Islamic, Private, Investment and Development Banks)
** (Based on S&Ps Market Surveillance Reports between 2016-2017)
Table 3: Summary of banking sector and credit rating in North Africa region.

From table 3 we can see that only 3 countries have official credit ratings by S&P which are Morocco, Tunisia and Egypt. Morocco and Tunisia have 23 and 20 banks respectively while Egypt has the most at 31. The remaining countries are suffering due to wars, poor economic conditions or lack of stock market which makes it unfeasible for credit rating agencies to rank them.

Morocco

According to the Oxford Business Group (2016e), "Among the best-developed banking sectors in Africa is that of Morocco, where penetration is rising rapidly and recent improvements in macroeconomic fundamentals have helped resolve previous liquidity shortages. The sector's product offering also continues to evolve, most notably through a banking law passed in early 2015, which has set the stage for the creation of fully sharia-compliant banks. Morocco's institutions include some of Africa's largest banks, and several have become major players on the continent and continue to expand their footprint" (p.1).

Tunisia

According to the Oxford Business Group (2016f) "The Tunisian financial services industry, of which banking is by far the largest component, accounted for 3.7% of the country's GDP in 2014. Sector activity rose by 3.8% in 2014 and a further 3.3% during the first nine months of 2015 compared to the same period a year earlier. The sector's

trajectory is largely positive, with lending and leasing activity growing rapidly in recent years, but the stability and profitability of the sector has been negatively affected by poor performance at several large state-owned banks as well as by market fragmentation. However, year 2015 saw several of these institutions recapitalized alongside changes made to their management structures. The recapitalization of key public banks is set to return the sector to comparative health as well as help to address the wider issue of tight liquidity in the market" (p.1-2).

Algeria

According to the Oxford Business Group (2015b), "Algeria's banking sector is characterized by low intermediation and penetration rates, although both have increased dramatically in recent years primarily due to ample liquidity stemming from abundant hydrocarbons revenues. In light of the rapid decline in hydrocarbons receipts in late 2014, the authorities have accelerated implementation of planned reforms and announced new measures to empower the sector to finance broad-based economic development. In 2015, important steps were taken to integrate the very large informal economy into the formal financial system. Today Algeria's banks are seeking new revenue streams as they adapt to the demands of an evolving macroeconomic climate" (p. 1-2).

Libya

According to the World bank (2016), "The cost of the political conflict has taken a severe toll on the Libyan economy, which has remained in recession for the third consecutive year in 2015. Political strife, weak security conditions, and blockaded oil infrastructures continue to constrain the supply side of the economy. Production of crude oil fell to around 0.4 million barrels per day (bpd) or the fourth of potential. The non-hydrocarbon output remained weak due to disruptions in the supply chains of both domestic and foreign inputs, as well as lack of financing. In this context, GDP is estimated to have declined by 10 percent and per capita income has fallen to less than US$ 4,500 compared to almost US$ 13,000 in 2012" (p. 1-2).

Egypt

According to the Oxford Business Group (2016g), "Benefiting from the nation's increasing economic stability over the past year, Egypt's banks have enjoyed both ratings upgrades and continued profitability. Thanks to an ambitious government development strategy and new investment legislation, the project finance pipeline is returning to form after a period of muted activity. Elsewhere on the aggregate loan book, competition is heating up to serve a largely untapped retail segment and the nation's challenging, but potentially rewarding, small and medium-sized enterprise (SME) segment. With only 14% of the adult population (>40 million) owning or sharing an account at a formal financial institution, according to a 2014 survey by the World Bank and Gallup, the Egyptian banking sector yet has much potential" (p. 1).

Iran

"Over the past year, increased oil revenues boosted GDP growth despite the sluggish performance of other sectors" (Badawi, 2017, p.1). On December 5, Mohammad Bagher Nobakht, the head of Iran's Planning and Budget Organization, announced that the Iranian government is forecasting a 7.7 percent annual growth rate in 2017—a slight increase from the 7.4 percent achieved in the first half of 2016—with the inflation rate projected to fall to 7.6 percent. In December 2016, the International Monetary Fund (IMF) projected growth to drop to 3.5 percent in 2017-18 as oil production levels out, noting that non-oil sector growth remains modest. "Thus, Iran is seeking to diversify its economy by attracting some of the foreign direct investment (FDI) flowing to the Gulf region". However, Iran still lacks a well-functioning banking sector that enables it to absorb massive FDI to help diversify the economy. According to Badawi (2017) "The country is still trying to reform its banking sector after years of unhealthy practices under the Ahmadinejad administration" (p.2).

Djibouti

According to the Oxford business group (2016h), "Djibouti's banking sector has seen considerable expansion in recent years. The most visible change has been the growing number of players in the market, which has led to an increase in competitiveness, and the expansion of products and services targeting local clients. The increasingly robust regulatory role being adopted by the Central Bank of Djibouti has led to the promulgation of various new rules – ranging from risk assessment frameworks and sharia compliance to regulations for new payment systems. This should help pave the way for increased retail and corporate activity. Although some vulnerabilities persist, the range of measures currently on the sector's reform agenda is set to further modernize the financial industry" (p.1).

Yemen

According to Nebehay (2016) "Yemen and its cash-strapped central bank need support from donors and international financial institutions to save the economy from collapse. A fragile ceasefire between the Iran-allied Houthis and the Saudi-backed Yemeni government to end the 15-month war has held in some areas in a bid to end the 15-month war that has crippled the economy and halted payment of many salaries. Also, restrictions on importation, the banking sector, central bank, the systems that were in place before which were broken anyway are now completely exhausted". (p.1)

2.3 Diversification

2.3.1 Definition and History of Diversification

Perhaps the simplest and earliest signs of diversification can be traced back to the Old Testament of the Holy Bible in the book of Ecclesiastes in 935 BC, "But divide your investments among many places, for you do not know what risks might lie ahead" (Ecc. 11:2, New Living Translation). Even more surprisingly, diversification is mentioned in the Jewish Talmud which suggests an individual split his investments into equal thirds

(one third in real estate or land, one third in highly liquid assets such as gold or silver and one third in trade activities (Ineichen, 2012). Those ancient verses found in Holy Scripture prove that the notion of diversification has been in existence for a long time. In modern finance, diversification is best defined as the process of allocating capital to reduce the exposure to any particular asset or risk (O'Sullivan, 2003). A common path towards diversification is to reduce risk or volatility by investing in a variety of uncorrelated assets. Diversification is also regarded as a risk management technique because a portfolio constructed of different kinds of investments will, on average, yield higher returns and pose a lower risk than any individual investment found within the portfolio.

2.3.2 Diversification Measures

2.3.2.1 HHI

There are several proxies to measure diversification in banks' portfolio of loans. The most common measure of concentration (inverse of diversification) has historically been the Herfindahl-Hirschman index (HHI) which was developed independently by the economists A.O. Hirschman and O.C. Herfindahl in 1945 and is mathematically defined as:

$$HHI = \sum_{i=1}^{n} \xi_i^2$$

where n is the number of credits in the portfolio and ξi is the exposure of credit i=1 to n relative to the portfolio's total value in period t=1 to n (Avila et. al 2011). Acharya (2006) defines HHI as the sum of the squares of exposures as a fraction of total exposure under a given classification and uses the same basic formula to compute his HHI indices for bank loans in different industries. Thus, HHI is bounded between 0 and 1, where a maximum value of 1 represents total concentration, while a value of zero represents complete diversification. Thus, higher values indicate high specialization (concentration), while lower values indicate increasing diversification (lower exposure to a particular sector). Similar to Acharya (2006), Bebczuk (2008) also calculated an HHI index based

on nine sector classifications to measure the impact of sectoral diversification on Argentinian banks. According to Rhoades (1993), "the HHI has achieved an unusual degree of visibility for a statistical index because of its use by the US Department of Justice and the Federal Reserve in the analysis of the competitive effects of mergers" (p.188).

2.3.2.2 Adjusted HHI

Mirzaei et. al (2016) and Elsas et. al (2010) preferred to use an adjusted HHI index to measure income diversification in their studies on whether bank revenue diversification affects bank value and improves output growth amidst a crisis. Mirzaei et. al (2016) defined diversification (DIV) by subtracting HHI from unity, so that the index increases with diversification. Although other closely related measures exist such as the ratio of non-interest income to total income (see Pennathur et al. 2012; Sawada, 2013; and Edirisurya, 2015) and risk adjusted HHI for sectoral diversification (Chen, 2014), it is evident that most diversification measures stem from the original HHI concept which has dominated the literature.

2.3.2.3 THI & ECI

Other alternative measures of concentration were proposed during the 60's and 70's, such as the Tideman and Hall index (THI) which is mathematically defined as:

$$THI = \left(2\sum_{i=1}^{n} i\xi_{(i)} - 1 \right)^{-1}$$

Also, the Entropy Concentration Index (ECI) was proposed by Jacquemin (1975) and defined as:

$$ECI = \exp\left(\sum_{i=1}^{n} \xi_i \ln \xi_i\right)$$

"These two measures are not different from the popular HHI, but the THI has the property of emphasizing the absolute number of credits composing the portfolio, while the ECI is more sensitive to small credits". (Avila, 2011, p.4).

2.3.3 Types of Diversification

There are several types of diversification in the field of finance and some banks adopt all of them in their business models. Below, we briefly cover the most commonly used diversification strategies implemented by banks.

2.3.3.1. Sectoral diversification

The most common type is sectoral diversification under which banks extend loans or lines of credit to various sectors (or industries) in any given economy. Banks pursue sectoral diversification to increase market share, remain competitive, improve market intelligence, reduce concentration risk, increase revenues and attract a larger customer deposit base through extending services and facilities to various businesses in different sectors (Grino, 2016). Also, traditional banking theory suggests that banks should diversify their credit portfolio to decrease credit risk, "given that through the expansion of their credit lines to new sectors, the bank's probability of default will be reduced" (Belguith, 2017, p.36). Typically, the optimal goal of managers is maximizing shareholder wealth and achieving their growth targets at the end of each year especially if their income is tied to their banks' performance. To achieve that, bank directors may find themselves placing the business on an automatic path that lends to multiple sectors of the economy.

2.3.3.2. Geographical diversification

The second type is geographical diversification under which banks expand by extending loans to business clients outside the banks' main country of operation. According to Chahine (2016), banks that have growth and network expansion as top priorities on their strategic agenda are most likely to engage in geographical diversification instead of remain bound to domestic operations. Several theories are in favor of geographic diversity because it reduces agency costs, enhances efficiency and spreads idiosyncratic risk which leads to positive corporate valuations (Goetz, 2012). Although risky and costly at times, banks usually try to mitigate such risk by distributing the burden of the full loan amongst credible banks in the foreign country. This technique, also known as syndication, reduces the required provisional amount for all banks in case the cross-border client defaults.

2.3.3.3. Product Diversification

The third type is product diversification under which banks attempt to attract more clients and differentiate themselves through innovative products which clients might opt for. According to Chahine (2017), banks are in a fierce competition to remain in top positions and maintain their market share. Thus, continuous improvement in service providing and valuable product innovation is a must for sustainability. It should be noted that product diversification falls under the umbrella of traditional banking where the products being developed by managers are fundamentally driven by interest income. For example, a bank may notice a trend in lavish marriages amongst the youth of a particular country, so they take the initiative and develop an attractive financial product to fill the need in the market. Such products are developed by bank managers in response to changing consumer behaviors and market trends.

2.3.3.4. Revenue Diversification

Finally, the last type is revenue diversification under which banks seek different income sources from non-interest generating assets such as advisory and transaction fees,

annual and monthly account service charges in addition to investing in promising stocks and other securities (trading). According to Stiroh (2006), "a financial holding company (FHC) that earns all of its revenue from net interest income is considered concentrated, while an FHC that derives its revenues evenly from non-interest income and net interest income is considered diversified" (p.2132).

2.4. Diversification and performance: Theoretical Point of view

The issue of concentration versus diversification is well established in the corporate finance, but is particularly important for banks, since they, by their nature, are designed to diversify. Moreover, regulations and supervision might create incentives for banks to either diversify or focus, thus it is interesting to investigate this issue.

The banking literature does not provide any consensus on whether banks should diversify their portfolio and geographical regions or they should specialize. Some cases of bank crisis can also support both sides. For example, Continental Illinois' failure in 1984 and Bank of New England's failure in 1991 can be attributed to a large concentration in the type of loans. On the other side, the problems faced by Citicorp and Bank of America can be linked to the rapid diversification and the expansion of banks into securities. Thus, this part will present the theoretical theories supporting both arguments, with an emphasis on the banking industry.

Going back to the era of the 19th century, specifically the 1870's, the UK witnessed an increased awareness of the benefits of financial diversification, with much of the emphasis on geographical rather than sectoral diversification and some discussion of avoiding highly correlated investments (Rutterford and Sotiropoulos, 2016). The only drawback was that investors used to divide their investments in securities equally across countries instead of following a scientific model that maximizes returns for every level of risk undertaken. By 1914, "only the mathematical optimization of Markowitz' model was lacking in terms of portfolio best practice" (Rutterford and Sotiropoulos, 2016, p.940).

The 20th century officially marked the birth of modern portfolio theory (MPT), thanks to Henry Markowitz's Ph.D. dissertation titled "Portfolio Selection" in 1952, which revolutionized the way many investors and fund managers diversified their portfolios and

earned him the title of "father of modern portfolio theory" (Markowitz, 1999, p.5). Although the concept of diversification existed before 1952, Markowitz's work allowed investors to optimize their diversification strategy by matching their risk tolerance with returns using mathematical models which relied on correlations between securities, expected returns, co-variances and standard deviations. However, and according to Beattie (2015), the goal of most investors, prior to and shortly after the publication of Markowitz's Portfolio Selection, was to find a good performing stock and buy it at the lowest price. He argues that the reason behind that was the slow pace by which new information arrived and that prices on the ticker tape did not accurately reflect a company's position. He further explains that successful managers at the time like Benjamin Graham were able to make sound investing decisions by first getting accurate information and looking at a company's fundamentals. Their motivation was driven by finding undervalued companies with high potential to perform well. Few focused-on risk measures and this was the key trigger for Markowitz's work. Surprisingly, his publication in the Journal of Finance was shelved for a decade before being rediscovered, because the majority of his work was dominated by mathematical graphs with minimal text or discussions which proved that when "nothing is ventured, nothing is gained" and "don't put all your eggs in one basket" (Beattie, 2015, p1).

2.4.1 Sectoral and Geographical Diversification and Bank Performance

According to traditional banking and portfolio theory, diversification reduces the risk of financial losses (Diamond, 1984) and reduces the intermediation costs created by the information asymmetries. However, banks face a tradeoff between diversification, which lowers the risk exposure, and specialization, which lowers the cost of information gathering on borrowers. The long debate of diversification vs specialization rests upon several theories, including but not limited to coinsurance effect, economies of scope, capital structure, tax advantage, and performance interaction.

Advantages of Diversification

- Coinsurance Effect

Diversification helps to reduce the risk of distress as long as there is an imperfect correlation among the segment cash flows that the bank is serving (Jensen and Ruback, 1983). Shapiro (1978) shows that the risk associated with variations in the timing of cash inflows domestically may be offset positively if multinational firms engage in geographical diversification because foreign cash inflows are usually not correlated with domestic ones. This translates into a reduction in liquidity risk for shareholders and the company due to the unsynchronized timing by which earnings are generated domestically and abroad. This mechanism forms as a continuous cash buffer system that protects the quick assets of a company balance sheets in times of domestic or foreign economic downturns.

- Economies of scope

Diamond (1984) argues that as the number of loans to borrowers with unrelated businesses increases, fixed costs of the delegated monitoring will decrease, thus diversification will give rise to economies of scope. A portfolio manager who specializes in real estate can handle 10-20 loans and monitor them closely at a much lower cost than having ten individual creditors monitor their borrowers respectively. The simple intuition is that the manager has become specialized and experienced at what he does and can perform the monitoring more efficiently in parallel with his experience curve. Diversification also allows financial intermediaries to perform a positive role in the society and implement economies of scope to its fullest advantage. If diversification of loans was not possible by banks, the logical alternative would be for lenders to find borrowers and monitor them individually. This would introduce a duplication of efforts and incur higher costs and time wastage on lenders who find intermediaries to be the best solution to invest their excess monies with while letting them bear the risk at the same time.

- Capital Structure

Diversified firms have a greater advantage in capital structure as they have the opportunity to use external and internal resources, while a single business firm has limited access to capital. This allows for creating additional borrowing capacity (Lewellen, 1971). Shapiro (1978) discussed that "a reduction in the total earnings variability could allow a multinational company to leverage itself more highly leading to a reduction in its marginal cost of capital" (p222).

- Tax advantages

Many researchers pointed out the tax advantages of diversification (Berger and Ofek, 1995). First diversification might create a tax advantage by allowing the losses of one segment to be offset by the gains of others. Berger and Ofek (1995) highlighted a major tax reduction advantage when conglomerates diversify due to the tax code's asymmetric treatment of gains and losses. If banks do not diversify their products via mergers or acquisitions with a related counterparty such as an insurance company, both parties tend to pay more taxes to the government on an individual basis. Though a merger might sound as if a bank is consolidating complementary lines of business such as consulting, advisory, insurance and others, it actually is doing itself and the counterparty a favor by reducing the tax burden and diversifying product offerings at the same time.

- Performance

Weston (1970) argued that financial conglomerates improve their risk/return ratios through diversification in addition to improved resource allocation on a managerial and financial level which yields better performance. Jensen and Ruback (1983) also stated that bank product diversification via mergers and acquisitions (if successful) provides greater investment opportunities and helps in creating new strategic collaborations in different markets and industries which ultimately yields higher firm value. Haugen (2001) argued that diversification reduces the risk of bankruptcy for a given entity because they allocate their resources more efficiently across different industries. This wide allocation of

resources allows banks and other diversified firms to reap the maximum output from their resources without duplicating costs.

Disadvantages of Diversification

On the other side, corporate finance theory suggests that sectoral concentration is better than sectoral diversification since it allows an entity to concentrate exclusively on a particular sector, thus gaining benefits from the expertise and experience of doing business in one sector (Jensen, 1986). Another agency problem which may arise according to Jensen (1986) is that managers of large diversified firms have larger access to free cash flows and are more likely to undertake value decreasing investments. "Such firms invest in more negative net present value projects than their segments would if operated independently" (Berger and Ofek, 1995, p.41). When firms grow through diversification, their top managers gain greater power and access to capital which grants them a cushion that may cause them to feel complacent when placing new investments. In focused firms where capital is scarcer, a bad investment may lead the company to bankruptcy, hence managers are under more pressure to choose wisely how much and what to invest in to maximize shareholder wealth.

Wilson (1967) found that diversification might lead to winner's curse phenomenon. For example, when a bank enters a new market sector characterized by an aggressive competition, the bank might choose borrowers that have been already filtered by existing competitors (Broecker, 1990). Similarly, Krishnaswami and Subramaniam (1999) found that concentration reduces agency costs while diversification increases the information asymmetry between stakeholders and managers.

When discussing the geographical diversification, Shaalan (2015) claimed that caution should be practiced by companies in selecting the foreign entities they plan to invest in (or with) when diversifying their portfolios geographically. While Shapiro's (1978) study shows no correlation in cash earnings between foreign and domestic investments, Shaalan (2015) believed that geographical diversification does not eliminate the probability that the economies of both countries may be correlated. He uses the US subprime mortgage financial crisis of 2008 as a fine example to support his claim that if the domestic and

foreign economies are correlated with respect to bilateral trade and financing, then the earnings will be affected and the company would have highly leveraged itself and become more liable (prior to diversifying).

Denis and Sarin (1997) also reported that corporate diversification strategies through takeovers or mergers are associated with significant value losses to the firms' shareholders. Berger and Ofek (1995) reported that corporate concentration yielded significant increases in shareholder value. The rationale behind these theories is simply that specialization and mastery reduce costs and result in higher returns to owners, while diversification strategies may dilute a firm's core competencies and cause it to lose its competitive advantage by delving into unknown lines of business which may be costly to specialize in and master. When firms diversify via acquisitions or mergers, they are automatically incurring an operational and synergy risk which could erupt into a financial catastrophe if not anticipated or managed carefully. Sudden change without notice to stakeholders and ample training to employees about the aftermath of the diversification strategy could cause operational disruption which may lead into inefficiencies and heavy losses to a firm's value. Berger and Ofek (1995) stated that one of the value reducing effects of diversification is that it allows poor segments within the firm to drain resources from better-performing segments. Although this notion may be looked at from the opposite angle, it seems that on the short to medium run, diversification may lead to a drainage of good resources in order to compensate for any underperforming units until they improve and become better.

Winton (1999) came with a deduction in his study that "diversification is more likely to be unattractive, particularly when the bank's home sector loans have either low or high downside risk" (Winton, 1999, p.2). To expand on his notion, when a bank lends to the economic sectors which have low downside risk, diversification plays a little role in boosting performance and reducing risks. When there is a high downside risk to certain sectors of the economy, diversification may do a significant damage to the banks' returns and the impaired loans of the ailing sectors may place the bank under a liquidity crunch despite the well performing loans it possesses from the healthier sectors. Similar to the Arab proverb of "when many chefs cook, the plate doesn't look good", Winton (1999) mentioned that diversification may result in an increase in management layers which

introduces free riders and lowers monitoring effectiveness. He also adds that "although pure diversification tends to reduce the frequency of both worst case and best-case outcomes, diversification that lessens monitoring effectiveness may *increase* the frequency and severity of worst-case outcomes, increasing failure probability and underinvestment problems" (Winton, 1999, p.4).

Last but not least, Markides (1992) shed an important light on the economic characteristics of de-diversifying (re-focusing) firms and his results were consistent with the theory that "every firm has an intrinsic limit to how much it can diversify" (p.80) and that exceeding this limit may result in managerial diseconomies of scale leading their profitability to suffer.

2.5. Diversification and performance: Empirical Findings and Results

The existing studies provide mixed evidence regarding the impact of diversification on bank's performance. The studies are related to sectoral diversification and geographical diversification. Away from conventional and modern theories which revolved around the pros and cons of diversification, this paper now moves on to review the empirical findings surrounding this controversial topic.

2.5.1. Sectoral Diversification

Acharya (2006) found that sectoral loan diversification produced an inefficient risk–return tradeoff for Italian banks with very high levels of risk. His results were aligned with Winton's (1999) theory that predicted high risk banks face a deterioration in their monitoring quality upon expanding into new competitive industries. Assume a risky bank is exploring penetrating the aviation industry which is heavily competitive and sometimes referred to by practitioners as a "loss-making industry". If risky banks lend such risky industries and the portfolio manager is not monitoring the aviation industry closely, banks may suffer from the losses of the airline industry.

Hayden (2007) also found that sectoral diversification is associated with reduced bank returns in Germany. However, and contrary to Acharya (2006) who found an inefficient

risk-return tradeoff for banks with high risk profiles, Hayden (2007) noted that German banks with high risk exhibit positive returns when they diversify loans on an industry level.

However, Bebczuck (2008) uncovered that large Argentinian banks with high tradeable shares in the market benefitted greatly from sectoral diversification by generating higher returns to assets and lower non-performing loans especially during weak macroeconomic cycles (low GDP growth rate). This finding contradicts the European bank results and aligns more with the traditional portfolio theory which advocates diversification. However, Tabak (2011) revealed that Brazilian banks possess more concentrated loan portfolio than developed countries in Europe and the USA. He found that concentration improves returns and reduces default risk, which might be due to the higher monitoring efficiency which comes along with lending to specific sectors in line with Winton's (1999) theory.

Rossi (2009) found that sectoral diversification had positive effects for Austrian commercial banks in the sense that it reduces risk which in turn reduces the need for a bank's provisioning against bad debts and ultimately reduces the capital requirements a bank is needed to hold.

Moving to the Far East, Berger (2010) reported that diversification across Chinese banks always leads to a discount. This diversification discount yielded lower profits, and higher costs irrespective of the banks ownership structure. This is in line with corporate finance theory which believes that focusing leads to better financial results. Berger (2010) believes that the reason Chinese banks are still diversifying despite the discount they experience is due to a lack of competent managers since most are assigned by the government.

Moving to Turkey, Turkmen (2012) believes that sectoral diversification is a zero-sum game and profits garnered from one sector in the Turkish banking sector are usually offset by the losses of the other. Therefore, he undermined any major value of having banks diversify their activities and believed that additional diversification can lead to additional monitoring cost.

On a wide scale study which covered 77 countries from 2001-2011, Beck (2014) found that sectoral specialization does not significantly increase profitability of banks but adds

to the risk of banks. However, such risk varies significantly across countries and should be taken into consideration by regulators. On the other hand, he argued that diversification does not necessarily lead to higher profitability either, but that may be due to the fact that he examined a heterogeneous sample.

2.5.1.2. Geographical Diversification

Acharya (2006) found that geographical diversification results in an improvement in the risk–return tradeoff for Italian banks (with minimal levels of risk). This means that banks which have a low risk profile will harness no added return value for the additional risk they incur if they diversify geographically. Contrary to Acharya (2006), Hayden (2007) tried to test Acharya's finding on German banks but found no improvement in returns for banks that diversify their portfolio of loans geographically even after controlling for risk. Instead, Hayden (2007) found that at (least on average) "the mean profits arising from focusing loan portfolios exceed the mean profits achievable through diversification" (p.130). According to Hayden (2007) "The highest benefits seem to be attainable through geographical focus, whereas the benefits from industrial focus appear to be only moderate" (p.130). Berger (2010) also found that geographical focus/concentration leads to higher profits and reduced costs across Chinese banks. He believes the government is to blame since they do not have incentive schemes in place for bank managers to maximize shareholders wealth by expanding outside of China.

2.5.1.3. Other Types of Diversification

Stiroh (2006) found that benefits exist in revenue diversification among US financial holding companies (FHC), however he warned that the gains are offset by the exposure an FHC builds against non-traditional activities which may not necessarily be more profitable. Income from non-interest yielding activities (trading, derivatives, etc.) are more volatile in nature and the marginal increase in non-interest income is associated with lower risk-adjusted profits. The perfect real-life example to support his study would be the Lehman Brothers case, a bank that engaged in very risky non-interest derivative activities which led to its collapse. Mercieca (2007) also found that a shift from interest

income activities into non-interest income activities in small European banks results in lower profitability (on average). This implies that small banks in Europe are better off focusing on traditional product lines which generate interest income and avoid delving into the riskier non-interest income activities.

Moving on to Australia, Edirisurya (2015) found that Australian banks have benefitted significantly from diversification ever since deregulation took place by the government. He noted that Australian banks enjoyed increased accounting profitability as a result of revenue diversification strategies backed with special emphasis on securities trading and insurance. The prominent findings from across the world are neatly summarized in table 4 following Tabak's (2011) structure.

Authors and Year of Publication	**Country**	**Period of observations**	**Type of Diversification**	**Empirical findings**
Acharya, Hasan, & Saunders (2006)	Italy	1993-1999	Sectoral	Diversification not guaranteed to produce superior performance or greater safety for banks
Stiroh & Rumble (2006)	USA	1997-2002	Revenue	Diversification gains are more than offset by the costs of increased exposure to volatile activities.
Hayden, Porath, & Westernhagen (2007)	Germany	1996-2002	Sectoral & Geographical	Diversification tends to be associated with reductions in bank returns, even after controlling for risk.
Mercieca, Schaeck, & Wolfe (2007)	15 European countries	1997-2003	Revenue	No direct diversification benefits within and across business lines and an inverse association between non-interest income and bank performance.
Bebczuk & Galindo (2008)	Argentina	1999-2004	Sectoral	Larger banks benefit more from diversification than smaller ones and that the benefits of diversification are greater during the downside of the business cycle.
Rossi, Schwaiger, & Winkler (2009)	Austria	1997-2003	Sectoral & Loan book granularity	Diversification negatively affects cost efficiency, it increases profit efficiency and reduces banks realized risk.
Berger, Hasan, & Zhou (2010)	China	1996-2006	Geographical & Sectoral	All dimensions of diversification are associated with reduced profits and higher costs.
Tabak, Fazio & Cajeuiro (2011)	Brazil	2003-2009	Sectoral	Concentration increases returns and also reduces default risk.

Turkmen & Yigit (2012)	Turkey	2007-2011	Sectoral & Geographical	Losses in one sector or location can be compensated from the gain obtained from other sector or location.
Edirisuriya, Gunasekarage & Dempsey (2015)	Australia	2000-2012	Revenue	Australia's banks have improved their risk-return profiles as an outcome of diversification.
Mirzaei & Kutan (2016)	66 countries	2008-2009	Sectoral/Industry	Countries with significant bank diversification have also been the most resilient to the recent US global crisis.
Beck, T., & De Jonghe, O. (2014).	77 countries	2002-2011	Sectoral	There seems to be no significant benefits in terms of profitability from diversifying or specializing.

Table 4: Summary of Empirical Findings from around the world.

2.5.2. Diversification and Bank performance in the MENA

Unfortunately, very few studies have been conducted to address the issue of diversification and performance in the vast MENA region. We name the most relevant study by Mensi and Labidi (2015) who found that MENA banks operate in a very competitive market with a moderate-income diversification strategy and suffer from financial instabilities. Mensi (2015) found that "in a competitive environment, an income diversification strategy may lead to financial instability" (p.190) because of the competitive pressure which may push MENA banks to engage in new high-risk activities to gain market share. Therefore, the financial instability of the banking sector may be the "result of a fierce competition between banks born from the desire to distinguish themselves by various non-traditional activities, for which banks lack the experience to control its risks" (p.190). Table 5 below summarizes the closest study found on the issue in the MENA region.

Authors and Year of Publication	Country	Period of observations	Type of Diversification	Empirical findings
Mensi & Labidi (2015)	MENA	2000-2008	Income/Revenue	Low market power banks in the MENA region are less robust and more unstable when they poorly diversify their income activities.

Table 5: Summary of Empirical Findings in MENA region.

The lack of other prominent studies has been a major driver behind this thesis which is expected to shed light on corporate banking strategies in a promising region such as the Middle East and North Africa. The majority of existing empirical evidence on diversification and bank performance is heavily concentrated in the US, Europe and the Far East, leaving emerging economies largely unexamined. Thus, this thesis will attempt to fill this gap by investigating the impact of diversification on banks in the MENA region.

Chapter 3

Research Methodology

3.1 Research Approach

A paradigm is "a system of ideas or theoretical principles that determine, maintain and reinforce our way of thinking about an issue or a topic" (Plowright, 2011, p. 177). According to Guba (1990, p. 18), "paradigms can be characterized through their *ontology (what is reality?), epistemology (how do you know something?)* and *methodology (how do you go about finding out?)*". These characteristics create a holistic view of how we view knowledge: how we see ourselves in relation to this knowledge and the methodological strategies we use to discover it. Accordingly, disciplines tend to be governed by paradigms, which are known as positivism, post-positivism, and phenomenology/Interpretivism.

3.1.1. Positivism or the Quantitative Approach

It relies specifically on scientific evidence, such as experiments, statistics and mathematical assumptions, to reveal a true nature of how society operates. Payne and Payne (2004, p. 180) stated that, "Quantitative methods (normally using deductive logic) seek regularities in human lives, by separating the social world into empirical components called variables which can be represented numerically as frequencies or rate, whose associations with each other can be explored by statistical techniques and accessed through researcher-introduced stimuli and systematic measurement". It observes an objective reality that is detached from the researcher. Many researchers prefer this approach since it is backed by scientific evidence and inferences are usually made with statistical significance using parametric or non-parametric tests. There are three main advantages behind following quantitative approaches:

1- It allows researchers to generalize their findings to a whole population or a sub population if results were found to carry statistical significance.

2- Data analysis is less costly and time consuming due to the availability of powerful statistical programs such as E-views, SPSS and Stata which process large amounts of data quickly.
3- If the sample was large enough and proper statistical tools along with an appropriate research methodology was implemented, the results may be robust and serve many industry professionals, policy makers and academics for a good period (Easterby-Smith, 2008).

According to Rahman, "among the available research paradigms, the quantitative one is dominant in the context of assessment research" (Rahman, 2016, p102). However, there are also some disadvantages behind following this approach and they are outlined as follows:

1- It fails to take into consideration the underlying or hidden meanings present in some data. They are usually referred to as outliers and are discarded from the sample. However, those outliers may be valuable if a researcher digs deeper and tries to understand the root cause behind their abnormality.
2- It does not take into account how social reality is constructed and how people interpret their actions and others. It isolates itself from reality while the study is being conducted, not taking into consideration the potential or current changes taking place in people's mind.
3- It takes a snapshot of a phenomenon and studies it rather than treating it as a continuous stream which is how the world runs around us since the actions of the past affect the future (Rahman 2016).

3.1.2. Post positivism or Mixed View

It tries to seek objectivity but recognizes that all observation is fallible and has error and that all theory is revisable. This paradigm is considered to be a relatively new paradigm in the research world as it is regarded by some as a hybrid between the qualitative and quantitative approaches. According to Menassa (2016), post positivists strive to strike a balanced ground when conducting their research and do not believe in a

white or black reality. Instead, they admit that a grey zone exists in most social science disciplines and they adopt a combination of quantitative and qualitative techniques in their methodology. The notable advantages behind these approaches can be outlined as follows:

1- Data collection and analysis is conducted from multiple angles rather than relying on a sole source such as secondary or primary data and pure mathematical assumptions.
2- It allows for deeper understanding of the research problem by engaging with participants first hand in an attempt to capture their feelings and intentions.
3- It acknowledges that research cannot be objective at all times and allows a room for error and future revisions.

Despite the critical thought and multi-methodologies implemented by these approaches, some limitations also exist in using them:

1- They do not offer clear criteria or framework for choosing among the multiple and competing explanations they produce which may lead to intellectual incoherence or confusion (Bierstecker, 1989).
2- Results may be subjective to personal interpretations which introduce a risk of bias in the data collected. This limits the chances of the research to be generalized and may benefit few entities only (Menassa, 2016).

3.1.3. Phenomenology/Interpretivism or Qualitative Approach

Phenomenologists believe that reality is socially constructed and not out there to be studied. They also believe that social issues should be studied in context rather than being the subject of pure mathematical assumptions. Unlike positivism, this approach views reality as subjective and *not* detached from the researcher. According to Strauss and Corbin (1990, p.11) the term 'qualitative research' means "any type of research that produces findings not arrived at by statistical procedures or other means of quantification. It can refer to research about persons' lives, lived experiences, behaviors, emotions, and feelings as well as about organizational functioning, social movements, cultural

phenomena, and interactions between nations". The main advantages associated with this approach are:

1- It takes into account participants' feelings, opinions, and experiences; and interprets the meanings of their actions (Denzin, 1989).
2- It has a flexible structure as the design can be constructed and reconstructed to a greater extent (Maxwell, 2012).

The main disadvantages associated with this approach are summarized below:

1- It is more time and cost consuming than other approaches (Menassa, 2016).
2- It relies on experiences and interactions with participants in data collection which is ambiguous given human nature and may introduce subjectivity in interpretation of results (Atieno, 2009).
3- It cannot be generalized to a population or sample although it may useful in shedding light on hidden aspects which quantitative approaches cannot tackle (Atieno, 2009).
4- It requires careful consideration in order not to violate ethical issues (Menassa, 2016).

In this research, a positivist position will be embraced because the researcher will rely on econometrics, statistics and mathematical assumptions to test hypotheses in an objective manner. Previous studies done by Elsas et al. (2010), Tabak et. al (2011) and Zhou (2014) among others have embraced similar positions in their empirical research which fortifies the researcher's selected paradigm under the scope of this study.

3.2 Reasoning Approach

In logic, there are two broad methods of reasoning known as the deductive and inductive approaches (Trochim, 2006). It is worthy to note that most social research involves both inductive and deductive reasoning processes at some time in the project. Inductive reasoning moves from specific observations to broader

generalizations and theories. Informally, it is known as a 'bottom up' approach. The approach starts with specific observations and measures, then begins to detect patterns and regularities, formulates some tentative hypotheses that can be explored, and finally ends up developing some general conclusions or theories (Trochim, 2006).

Conversely, deductive reasoning works from the more general to the more specific and it is informally called a 'top-down' approach that begins with thinking of a theory about a topic of interest. It is then narrowed down into a more specific hypothesis that can be tested. This ultimately leads the researcher to be able to test the hypotheses with specific data to either confirm or refute the initial theory or answer the research questions (Trochim, 2006).

Given the aims and exploratory nature of this research, a deductive reasoning approach will be followed because the researcher has a starting point or theory regarding a topic of interest. Secondary data will be collected, analyzed and tested to answer the posed research questions. The test results will then be verified for logic and coherence by comparing them to previous established theories and empirical studies.

3.3 Research Questions and Hypotheses

This research raises questions on whether various diversification strategies followed by banks in the MENA region yield better performance and reduce risks. The researcher's initial intuition is that some diversification strategies help banks grow and become more profitable but feels that a threshold exists on the extent or level of diversification pursued. Low concentration is indicated by HHI value less than 0.1 while high concentration is indicated by HHI value greater than 0.9 (Pulaj, 2013). For simplicity, we shall assume that any HHI value less than 0.5 acts in favor of diversification, while any HHI value greater than 0.5 acts in favor of concentration. A proper balance may be the key to be optimized to reap maximum benefits and minimize risks.

The formulated research questions will be then translated into a null hypothesis and an alternative hypothesis. A null hypothesis, denoted as "H0", reflects that there will be no

observed effect for a research, which is why a researcher attempts to find evidence against it in the hypothesis testing in order for the research to be meaningful. The alternative hypothesis, denoted as "H1" is usually the opposite of "H0", and reflects the purpose of the research or what needs to be proved using hypothesis testing. "H1" is usually achieved when a null hypothesis is rejected.

As a result, the following research questions along with their corresponding hypotheses have been raised and answering them will be the focus of this thesis:

Research Question 1: Does Sectoral diversification contribute positively towards MENA banks' performance?
H0: Sectoral diversification does not contribute positively towards MENA banks' performance.
H1: Sectoral diversification contributes positively towards MENA banks' performance.

Research Question 2: Does Geographical diversification contribute positively towards MENA banks' performance?
H0: Geographical diversification does not contribute positively towards MENA banks' performance.
H1: Geographical diversification contributes positively towards MENA banks' performance.

Research Question 3: Does Sectoral diversification reduce the risk of MENA banks?
H0: Sectoral diversification does not reduce the risk of MENA banks.
H1: Sectoral diversification reduces the risk of MENA banks.

Research Question 4: Does Geographical diversification reduce the risk of MENA banks?
H0: Geographical diversification does not reduce the risk of MENA banks.
H1: Geographical diversification reduces the risk of MENA banks.

Research Question 5: Is there a non-linear relation between diversification and return?
H0: The relationship between bank returns and diversification is not non-linear.
H1: The relationship between bank returns and diversification is non-linear.

Research Question 6: Is there a non-linear relation between diversification and risk?
H0: The relationship between bank returns and diversification is not non- linear
H1: The relationship between bank returns and diversification is non-linear.

3.4 Data and Variables

3.4.1 Source of Data

In research, there are two distinct sources of data and one hybrid source which is a combination of the two distinct ones. Accordingly, a researcher needs to decide which source he intends to base his research on and confirm his findings.

Primary data is often used in qualitative researches and is collected first hand by the researcher himself via (i) Direct or Indirect observations from the field; (ii) Structured or unstructured interviews with participants; (iii) Questionnaires distributed to the sample or population under study; and (iv) Case studies conducted intensively on a small sample of participants (Menassa, 2016)

Secondary data is often used in quantitative researches and is often readily found and already shared with the public via (i) Official Statistics found on the internet or newspapers; (ii) Government reports; (iii) Credible websites information; (iv) Annual reports of firms; (v) Historical data; (vi) Audited financial statements of firms; and (v) Previous reliable research studies (Menassa, 2016).

The dual Methodology or Triangulation is a hybrid method which involves using both primary and secondary data. It is often used in post positivist researches and sometimes qualitative researches. The combination of methods or channels can be selected based on the nature of the research questions being addressed (Menassa, 2016).

In this research, secondary data will be obtained from reliable databases such as Thomson Reuter's Eikon and the official annual reports of MENA banks (with audited financial statements). This will ensure the researcher is detached from reality when conducting the analysis, thus eliminating any unwanted bias or subjectivity in data collection. Since the MENA region includes many banks, the following restrictions will be placed on the population in an attempt to help the researcher achieve homogeneity and consistency within the sample selected. The criteria which will govern the final sample size of this research are as follows:

1- Commercial Banks will only be selected thus excluding Islamic, development, investment and special purpose banks to maintain homogeneity.
2- Publicly listed banks on local stock exchanges of MENA countries will only be selected in order to have full access to audited financial statements and historical data for stock prices.
3- Only banks with a complete data set of the required and audited records from 2009-2015 will be selected since the research is aiming to achieve a strongly balanced panel of observations covering the timeframe of 7 years post the (2007-2008) US financial crisis.

Thus, MENA countries, which do not have commercial banks that meet the above criteria, will be omitted from this study. After applying the filters above, the reduced final sample size and characteristics are summarized in Tables 6, 7, and 8 for each region independently.

Region	Country	Bank Name	Establishment Year
Gulf Cooperation Council – GCC	KSA	Arab National Bank	1979
		Banque Saudi Fransi	1977
		Riyad Bank	1957
		Samba Financial Group	1980
		Alawwal Bank	1926
		Saudi Arabian British Bank	1978
	UAE	Abu Dhabi Commercial Bank	1985
		Emirates National Bank of Dubai	2007
		Mashreq	1967
		National Bank of Abu Dhabi	1968

	Qatar	Qatar National Bank	1964
		Commercial Bank of Qatar	1975
		Doha Bank	1979
	Kuwait	Ahli Bank of Kuwait	1967
		National Bank of Kuwait	1952
		Commercial Bank of Kuwait	1960
	Bahrain	Ahli United Bank	2000
		Bank of Bahrain and Kuwait	1971
		National Bank of Bahrain	1957
	Oman	Bank Dhofar	1990
		Bank Muscat	1982
		Bank Sohar	2007
		National Bank of Oman	1973

Table 6: Final Sample and Characteristics for GCC region

Region	Country	Bank Name	Establishment Year
Levant	Lebanon	Bank Audi	1962
		Byblos Bank	1963
		Blom Bank	1951
	Palestine	Al Quds Bank	1995
		Bank of Palestine	1960
	Jordan	Jordan Commercial Bank	1977
		Bank of Jordan	1960
		Arab Bank	1930
	Israel	N/A	N/A
	Syria	N/A	N/A
	Iraq	N/A	N/A

Table 7: Final Sample and characteristics for Levant region

Region	Country	Bank Name	Establishment Year
North Africa	Morocco	Attijariwafa Bank	1911
		Banque Centrale Populaire	1926
		Banque Marocaine du commerce exterieur	1959
	Tunisia	Banque Internationale Arabe de Tunisie	1976
	Egypt	N/A	N/A
	Algeria	N/A	N/A
	Djibouti	N/A	N/A
	Libya	N/A	N/A
Others	Iran	N/A	N/A
	Yemen	N/A	N/A

Table 8: Final Sample and characteristics for North Africa region and others

Table 9 summarizes the excluded MENA Countries with the reasons behind excluding them.

Region	Country	Reason for Exclusion
Levant	Israel	Data Access Restriction
	Syria	Lack of Fresh Data due to Civil War
	Iraq	Lack of stock exchange and accurate data
North Africa	Algeria	No Listed Banks on Stock Exchange
	Djibouti	No Stock Exchange available
	Libya	Lack of Fresh Data from banks due to political instability
	Egypt	Lack of Complete data
Others	Iran	Excluded due to US imposed sanctions and lack of complete data
	Yemen	No Stock Exchange available

Table 9: Summary of Excluded MENA Countries and Justification

As a result, the final sample size will comprise 35 banks covering 11 countries as shown below.

Region	Country	Number of Banks	Years Observed	Number of Observations
GCC	KSA	6	2009-2015, 7 Years	42
	UAE	4	2009-2015, 7 Years	28
	Oman	4	2009-2015, 7 Years	28
	Kuwait	3	2009-2015, 7 Years	21
	Qatar	3	2009-2015, 7 Years	21
	Bahrain	3	2009-2015, 7 Years	21
Levant	Lebanon	3	2009-2015, 7 Years	21
	Jordan	3	2009-2015, 7 Years	21
	Palestine	2	2009-2015, 7 Years	14
North Africa	Morocco	3	2009-2015, 7 Years	21
	Tunisia	1	2009-2015, 7 Years	7
Total	**11 Countries**	**35 Banks**	**7 Years**	**245 Observations**

Table 10: Summary of Final Sample Size and observations across all regions.

3.4.2. Variables

The variables are divided into dependent and independent variables. First, the dependent variable is a variable whose value or variation depends on that of another. The independent variable is a variable whose variation does not depend on that of another and may be able to explain a percentage of the variation in a dependent variable. The Independent control variable is a variable that is held constant throughout the research or experiment to test the relative relationship between the dependent and independent variables. It is not usually of primary interest to the research but should be included in order to accurately measure the impact of the selected independent variables on the dependent one.

3.4.2.1. Dependent Variables

Bank performance

Following Acharya (2006), Elsas et al (2010), Bebczuk et al. (2008), the dependent variables chosen to proxy MENA banks' accounting performance are Return on Equity (ROE) and Return on Assets (ROA) obtained from Eikon between 2009 and 2015. Those measures are very common proxies in the banking literature as they represent the key indicators of banks' performance.

- ROE defined as net income divided by shareholders' equity is a ratio that provides investors with insight into how efficiently a company (or more specifically, its management team) is managing the equity that shareholders have contributed to the company. Mathematically, it is formulated as:

$$\frac{Net\ Income}{Total\ Equity}$$

- ROA is an indicator of how profitable a company is relative to its total assets. It gives an idea as to how efficient management is at using its assets to generate

earnings and will be computed as net income divided by total assets. Mathematically, it is formulated as:

$$\frac{Net\ Income}{Total\ Assets}$$

One market performance indicator known as Annual Stock Log Returns "ASLR" will be also used as a dependent variable to proxy MENA banks' performance. This measure will allow us to test whether or not diversification is appreciated by the financial markets.

- ASLR is a market performance indicator of a bank's annual stock log returns. It shows investors how profitable a bank's stock was from year end to year end. Log returns are used since it is known that stock returns behave in a log linear fashion rather than a linear way. Mathematically, it is formulated as:

$$Ln[\frac{Closing\ Stock\ Price\ of\ Bank\ i\ in\ Year\ t}{Closing\ Stock\ Price\ of\ Bank\ i\ in\ Year\ (t-1)}]$$

Bank Risk

Inspired by Bebczuk et al. (2008), Berger (2010), and Tabak (2011), the first dependent variable chosen to proxy the risk undertaken by MENA banks will be measured by the percentage of non-performing loans to total loans (NPL) obtained from banks' annual reports (audited financial statements) between 2009 and 2015.

- NPL is defined as the ratio of non-performing loans across all sectors and cross borders over total loans and advances made. Mathematically it is formulated as:

$$\frac{Non-performing\ Loans}{Total\ Loans\ and\ advances}$$

This proxy is very practical and easy to analyze for banking experts in various disciplines (not just the risk department staff). Experts or investors typically use this figure to establish a sense or a first impression on the quality and riskiness of a bank's loan portfolios. Under normal market conditions, a higher ratio (typically

above 0.05) indicates that the bank's management team might be facing troubles with their choice of counterparties or it is following an aggressive strategy of lending to inflate assets on the books to serve other agendas (Chahine, 2016).

Inspired by Baele et al. (2007) and a personal curiosity to examine if stock's volatility can be significantly affected by sectoral and geographical diversification, the second measure will be banks' daily stock log returns standard deviations (DSLRSD) while the third measure will be banks' daily stock price standard deviation (DSPSD).

- Daily Stock log-returns standard deviation (DSLRSD): It is the standard deviation of daily stock log returns computed as follows:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

Where: n= number of daily observations in a business year, usually 250

x_i = the daily stock log return measured as log(p1/p0) (where: p1 is the closing price in day 2 and p0 is the closing price in day 1).

μ = the average/mean daily stock log returns over a year.

- Daily stock price standard deviation (DSPSD): It is the standard deviation of daily stock prices computed as follows:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

Where: n= number of daily observations in a business year, usually 250

x_i = the daily stock closing price

μ = the average/mean daily stock closing price over a year.

We shall extract the daily stock prices of each bank in the sample between 2009 and 2015 from Eikon and import them into excel for all standard deviation and log-return calculations.

3.4.2.2. Independent Variables

The independent variables will measure diversification using the HHI index, which is the sum of the square of exposures as a fraction of total exposure under a given classification. HHI index values range from 0 to 1 with 0 representing a perfect diversification scenario while 1 represents a perfect concentration scenario. Since this paper is focusing on sectoral and geographical diversification's impact on MENA banks' performance, two unique indices will be computed.

Following Acharya (2006), Meyer and Yeager (2001), and Bebczuk (2008), the first HHI index will measure economic sectoral diversification and will be denoted as 'S-HHI', while the second HHI index will measure geographical diversification and will be denoted as 'G-HHI'.

- S-HHI: The sectoral decomposition is based on the top sectors that each bank lends money to and it is defined as the sum of the squared exposure as a fraction of total exposure to a specific sector over total loans made to all sectors by a bank. Mathematically it is formulated as follows:

$$\sum \left(\frac{Loan\ made\ to\ Economic\ Sector\ i}{Total\ Loans\ made\ to\ all\ Sectors}\right)^2$$

The common sectoral breakdown between all countries in the MENA region was as follows: (1) Government & all public-sector entities; (2) Real Estate &

Construction; (3) Trade & Manufacturing; (4) Banks & Services; (5) Personal; and (6) Others

- G-HHI: The geographical diversification is based on exposures to three categories (1) the domestic countries under which each bank operates in, (2) other countries in the MENA region; and (3) other countries (rest of the world). Thus, G-HHI is the sum of the squared exposure as a fraction to domestic, MENA, and Rest of the world loans. Mathematically it is formulated as follows:

$$\sum \left(\frac{Loan\ Made\ to\ Category\ i}{Total\ Loans\ Made} \right)^2$$

There are conflicting/opposing theories and empirical studies over the impact of diversification on banks (when proxied by HHI). While one school of thought (see Markowitz 1952, Weston 1970, Lewellen 1971, Winton 1999, Rossi 2009) believes that portfolio diversification (sectoraly or geographically) reduces non-systematic risk for banks, the other school claims that portfolio concentration (sectoraly or geographically) improves returns and reduces risk for banks (see: Berger and Ofek 1995, Jensen 1986, Acharya 2006). This research's expected sign for sectoral and geographical Herfindahl index (SHHI and GHHI) in relation to returns is negative because diversification (lower index) is translated into a sign of more growth, which should yield higher returns (Chahine, 2016). As for research's expected sign for sectoral and geographical Herfindahl index (SHHI and GHHI) in relation to risk, it is negative because when banks diversify geographically and sectoraly, they are exposed to more risks because of dealing with new counterparties from different geographies and sectors, thus as the index decreases (diversification increases), the risk should increase (Grino, 2016).

3.4.2.3 Independent Control Variables

There are large differences among the banks with respect to asset scale and other characteristics. To control the effect of these differences, and following Acharya et al.

(2006), Fang et al. (2011), and Edirisurya (2015), the selected bank control variables for this research will be:

1- Size (SIZE): Measured as the natural logarithm of total assets, this variable captures the size of the bank (in dollars) and is calculated using the spot exchange rate between the U.S. dollar and the MENA banks' local currency at the point of measurement. We use this control variable to control for the well-known size effect on risk and performance of banks (Edirisurya, 2015). On one side, larger banks have more resources to build up know how and technologies for high-quality risk-management and they are able to exploit economies of scale, resulting in greater profitability. They can also afford to have better risk management procedures and employees in place which should reduce the risk a bank undertakes in its loans portfolio. Thus, the expected sign is positive with ROA and ROE, and negative with %NPL. However, it should also be noted that smaller banks might take advantage of the greater flexibility and adjust faster to changing business environments thus minimizing market risk for them as well (Chiorazzo et al., 2008).

2- Debt Equity Ratio (DER): Measured as total liabilities divided by total equity, this variable captures the financial leverage of a bank and is very important to control for since some banks in the MENA are under scrutiny by their respective central banks to maintain high liquidity levels which leads them to manage customer deposits more conservatively (Ex: Lebanon). Other banks are more lenient when it comes to lending and are less financially leveraged. (Ex: GCC countries). The sign expectation between DER (financial leverage) and returns is negative simply because well capitalized banks who are less financially leveraged enjoy lower cost of funding and thus higher profitability (El Khoury, 2013). Building from the same logic, the sign expectation between DER and risk is positive since the more financially leveraged a bank is, the riskier it becomes in the eyes of other banks and investors.

3- Growth rate of total assets (GRTA): Measured as the yearly percentage change in total assets, this variable is included to capture growth since many banks in the MENA region (developing) have growth strategies and are more likely to be exposed to greater variability of outcome. Growth rate of total assets is expected to be positively related with ROA and ROE since it yields higher returns under wise management. Several empirical studies seem to have reached this result as well (Berger, 2010; Chen, 2014). However, GRTA is expected to have a positive sign with '%NPL' and 'Stock Return Deviation' due to the higher variability of outcome. Furthermore, some banks desire to grow on books fast by acquiring risky assets that do not yield the required profits right away (Grino, 2016).

4- Loan to Deposit Ratio (LTDR): Measured as total loans and advances divided by total customer deposits, this variable is a crucial measure of a bank's liquidity and should be controlled for. Many MENA region banks are known to be highly liquid given the natural resources of oil and gas that their countries possess and the attractive interest rates some banks offer on savings. The expected sign between 'LTDR' and bank return is positive since the higher this ratio is the less liquid a bank is (more lending) thus more profitable. This view is also supported by Chen (2014). A positive relationship is also expected between 'LTDR' and both risk proxies since less liquid banks (with higher ratio) are riskier by nature and tend to be more aggressive in their lending appetite which may increase their non-performing loans and marker risk in general.

5- Net Interest Margin (NIM): According to Maudos (2004), this variable is key for measuring interbank competition within a country or region and should be controlled for when assessing if diversification helps banks amidst high levels of competition. The expected sign between 'NIM' and bank returns is positive because a higher NIM translates into higher profitability (less competition). However, the expected sign between NIM and bank risk is negative because a lower NIM (from heavy competition) may push a bank into bankruptcy. NIM is measured as net interest income divided by total assets.

All variables with their definitions and expected signs are summarized in Table 11 below.

Variable	Type	Definition & Control Dimension	Expected Sign with Return	Expected Sign with Risk
ROA	Dependent in Model 1	Return on Total Assets	N/A since it's a dependent variable	
ROE	Dependent in Model 2	Return on Total Shareholder Equity	N/A since it's a dependent variable	
ASLR	Dependent in Model 3	Annual Stock Log Returns	N/A since it's a dependent variable	
NPL	Dependent in Model 4	Ratio of Non-Performing Loans over Total Loans and advances	N/A since it's a dependent variable	
DSPSD	Dependent in Model 5	Daily Stock Price Standard Deviation	N/A since it's a dependent variable	
DSLRSD	Dependent in Model 6	Daily Stock Log-Returns Standard Deviation	N/A since it's a dependent variable	
S-HHI	Independent in all Models	Sectoral Herfindahl-Hirschman Index Economic Sector Diversification	Negative	Negative
G-HHI	Independent in all Models	Geographical Herfindahl-Hirschman Index Geographical Diversification	Negative	Negative
SIZE	Control in all Models	Natural Logarithm of Total Assets Control Dimension: Size	Positive	Negative
DER	Control in all Models	Total Liabilities/Total Equity Control Dimension: Leverage	Negative	Positive
GRTA	Control in all Models	Annual Growth rate % of total assets Control Dimension: Growth in the Developing MENA region	Positive	Positive
LTDR	Control in all Models	Total loans / Total customer deposits Control Dimension: Liquidity	Positive	Positive
NIM	Control in all Models	Net Interest Income/Total Assets Control Dimension: Competition Between Banks	Positive	Negative

Table 11: Summary of all variables to be used in model and expected coefficient signs.

3.5. The Model

In inferential statistics, the general linear model (GLM) underlies most of the statistical analyses that are used in applied and social research. It is the foundation for the t-test, Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), regression analysis, and many other multivariate methods. This research aims to apply regression analysis, which is a powerful parametric test to test the raised hypotheses and answer the posed research questions.

The model will comprise of panel data also known as longitudinal data and will be assembled from 35 commercial banks in the MENA region spanning from 2009-2015. It will be a balanced one meaning that no missing observations will be present in the consolidated panel. Panel models are a combination of time series and cross-sectional data where researchers are interested in a certain phenomenon from the same or different subject over a finite period.

3.5.1. Regression Analysis

In statistical modeling, regression analysis is a parametric statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on finding out the relationship between a dependent variable and one or more independent or explanatory variables (or 'predictors'). This research will be examining multiple explanatory variables simultaneously and their relationship with several dependent variables (each one at a time) based on the hypotheses will be drawn. Such examination is also known as multiple linear regression and is often used in finance and economics to determine how many specific factors such as the price of a commodity, interest rates, and particular industries or sectors, influence the price movement of an asset.

The six models will be structured as follows:

Models 1-3: Impact of Diversification on Return

$$Y_{1\text{-}3} = \beta_0 + \beta_1 \text{S-HHI} + \beta_2 \text{G-HHI} + \lambda \text{ Control} + \varepsilon$$

Where: $Y_{1\text{-}3}$ will represent the dependent variable of interest, measured as: ROA, ROE, and ASLR.

β_0 is the intercept which represents the minimum return when no diversification is present.

β_1 is the slope of sectoral HHI and shows us the magnitude it carries on the return.

β_2 is the slope of geographical HHI and shows us the magnitude it carries on the return.

λ Control is a column vector of all five control variables summarized in Table 6 above.

ε is the error term resulting from the unexplained or uncaptured variations by the model.

These models will be used to answer research questions 1 and 2.

To answer research question 5, regarding the presence of non-linear relationship between diversification and return, Models 1-3 will be run again by including the square term of S-HHI and the square term of G-HHI.

Models 4-6: Impact of Diversification on Risk

$$Y_{4\text{-}6} = \beta_0 + \beta_1 \text{S-HHI} + \beta_2 \text{G-HHI} + \lambda \text{ Control} + \varepsilon$$

Where: $Y_{4\text{-}6}$ will represent the risk, measured as: NPL, DSPSD, and DSLRSD

β_0 is the intercept which represents the risk when no diversification is present.

β_1 is the slope of sectoral HHI and shows us the magnitude it carries on risk.

β_2 is the slope of geographical HHI and shows us the magnitude it carries on risk.

λ Control is a column vector of all five control variables summarized in Table 6 above.

ε is the error term resulting from the unexplained or uncaptured variations by the model.

These models will be used to answer research questions 3 and 4. To answer research question 6, regarding the presence of non-linear relationship between diversification and return, Models 4-6 will be run again by including the square term of S-HHI and the square term of G-HHI.

3.5.2. Classical Linear Regression Model Assumptions

Since we are using a panel data, three regression models can be performed, namely the pooled Ordinary Least Squares (OLS), the fixed effect, and the random effect. While pooled OLS assumes homogeneity across banks, the fixed and the random effect assume unobserved heterogeneity between banks. The fixed effect is a statistical model in which the model parameters are non-random quantities. It is used to "study the causes of changes within a person or entity since time invariant characteristics cannot cause such a change because they are constant for each person or entity" (Torres-Reyna, 2007, p.23). This is in contrast to the random effect in which all or some of the model parameters are considered as random variables/quantities. If a researcher feels that he did not leave out any variables that may be uncorrelated with the independent variables in the model, then a random effect model is nominated to be used, because "It will produce unbiased estimates of the coefficients, use all the data available, and produce the smallest standard errors" (Williams, 2017, p.1). Conversely, if there are omitted variables, which are correlated with the variables in the model, "then fixed effects models may provide a means for controlling for omitted variable bias" (Williams, 2017, p.1). The Hausman test via statistical software STATA will be used to choose between fixed and random effect for our model.

Before we run a regression and make inferences from its output, some classical linear regression model (CLRM) assumptions should be tested (Poole, 1970).

1- **Assumption 1:** Linearity is Present

Linearity is the assumption initially taken by a researcher that a linear relationship exists between the specified dependent variables and the explanatory variables. i.e.: The dependent variables chosen as $\mathbf{y}$ are a linear combination of the independent variables $\mathbf{X}$ and the error term ϵ. The first approach to test for linearity will be a graphical test known as the matrix scatterplot method since we have more than one independent variable in the model. The second recommended approach is a parametric statistical test known as the Pearson correlation matrix (PCM), which is used to verify (with statistical

confidence) the direction and degree/strength of linear association between any two variables. If linearity at a significant level is not present between variables, linear regression is not the correct statistical tool and results will not be robust or valid.

2- **Assumption 2:** Multicollinearity is not Present

Multicollinearity occurs when one or more independent variables (X's) are highly correlated with another which leads to a distortion of results. The presence of multicollinearity will be tested using Pearson Correlation Matrix (PCM) where any coefficient higher than 0.5 indicates a strong correlation and using Variance Inflation Factors (VIF), where a value of 1 indicates no multicollinearity while a value greater than 1 indicates increasing collinearity (Akinwande, Dikko and Samson, 2015). If Pearson correlation is higher than 0.7, then multicollinearity is a serious problem that needs to be solved (Anderson et al, 2008). If VIF is near or greater than 5, then the correlation between independent variables becomes troublesome and multicollinearity needs to be rectified (Martz, 2013).

3- **Assumption 3:** Stationarity is Present

Stationarity is a common assumption usually taken when working with data that involves time series. In simple terms, a researcher hopes to be working with a stationary process rather than a fluctuating one. This is achieved by having all variables without a unit root, which may cause them to behave in a non-stationary process.

A time series has stationarity if a shift in time does not cause a change in the shape of the distribution or its properties like the mean, variance and covariance. In this study, stationarity of the data (i.e.: it has no unit root) is tested using a Fisher type based on Augmented Dicky Fuller test, where the null hypothesis is that a unit root is present (Hall, 2002).

4- **Assumption 4:** Autocorrelation is not Present

Autocorrelation, also known as serial correlation is used to describe the phenomenon when the error term (today) is correlated with itself back in the past (yesterday) or any other time interval. It is the same as calculating the correlation between two different time series, except that the same time series is used twice: once in its original form and once lagged one (or more) time periods. This means that errors or shocks from the past have a direct effect on the results of today. Although it does not leave the coefficient estimates unbiased, the presence of autocorrelation in the error term might yield to several problems:

1- The standard error of the regression coefficients may seriously underestimate the true standard deviation of the estimated regression coefficients (betas) which ultimately affects hypothesis testing methods because t-test and f-tests have been jeopardized.

2- Statistical inferences can no longer be strictly applicable since p-values may be affected (Drukker, 2003).

Serial correlation causes the standard errors of the coefficients to be smaller than they are and higher R-squared. Since this research involves a panel data rather than a time series data, Wooldridge method will be used to test serial correlation. It is an attractive test since it requires few assumptions and it is easy to implement. The Wooldridge test begins by estimating the parameters through regressing the dependent and the independent variables and finding the residuals. Then, it uses the residuals from a regression in first-differences variables on their lags and test if the coefficient on the lagged residuals is equal to -5, which refers to the absence of a serial correlation (Drukker, 2003).

5- **Assumption 5:** Normality is Present

This assumption states that the residuals of the regression are independent or random and are expected to follow a normal distribution. Whether errors are normally distributed can be assessed either graphically using the histogram or statistically using the Jarque Berra or Shapiro Wilk tests. According to Brooks (2008), if the residuals are normally

distributed, the p-value of Shapiro-Wilk Test should be greater than 0.05 to support the null hypothesis of presence of normal distribution. However, this assumption can be smoothened when sample size is greater than 100.

6- **Assumption 6:** Homoscedasticity is Present

In simple terms, homoscedasticity is when the variance of the error term is constant across all values of the independent variables. Mathematically it is represented as:

$$Var(\varepsilon|X_i) = \sigma_\varepsilon^2 = \text{ a constant for all } i(i = 1,2,\ldots,N)$$

When the error term is homoscedastic, the dispersion of the error remains the same across all our observations. Violation of this assumption leads to the notion of heteroscedasticity and may result in the estimators to no longer being BLUE (Best linear unbiased estimators) because they cause the estimated standard errors to become biased. Heteroscedasticity is a common problem in regression, especially with panel data. However, it is hard to know in advance if it is going to be present, and theory is rarely useful in anticipating that. There are several statistical tests which can be used to check if heteroscedasticity is present in a regression model such as White, Breusch-Pagan-Godfrey, Driscoll-Kraay and others. However, depending on the nature of the model to be used, an appropriate test will be selected. If heteroscedasticity is present, then the regression should be run again with robust standard errors to correct for this violation (Garson, 2012).

After comparing past studies and theories pertaining to the topic, the researcher feels that this thesis is equipped with the best framework to answer the raised research questions. A positivist paradigm coupled with a powerful parametric statistical technique in multiple regression should equip this thesis with the necessary internal and external validity it requires.

Chapter 4

Empirical Results

This chapter presents the empirical results of the study. It will start by providing the descriptive statistics for the variables on both the consolidated and segregated levels (based on geographical regions). Following that, CLRM assumptions established in chapter 3 will be tested to see if they are met statistically before selecting the regression model. After selecting the model and running the regression, the remaining CLRM assumptions will be tested to check if they are respected. Finally, the chapter will present the results of our regression and analyze them deeply in order to answer the posed research questions and link them back to the theories and previous empirical studies.

4.1 Descriptive Statistics

This branch of statistics provides a valuable descriptive summary regarding datasets which may represent populations or their samples. Such statistics comprise dispersion and distribution information like the arithmetic mean or average, mode, range or maximum-minimum, variance and standard deviation of different variables in addition to the skewness and kurtosis of the distributions. Descriptive statistics help researchers gain a sense on the behavior or tendencies of their dataset which supplements the inferential statistics part. Together with simple graphical analysis, they form the basis of virtually every quantitative analysis of data (Trochim, 2016). We first take a look at the important descriptive statistics for the entire MENA region before dissecting them into more homogenous regions based on shared geographical boundaries or proximities.

4.1.1 Consolidated MENA Region

Using SPSS, Tables 12 and 13 present a summary of the key descriptive statistics for the MENA region commercial banks which provides an idea on the dispersion and distribution of the variables selected for this study. These statistics will be then compared to worldwide average benchmarks (where possible) in order to see where the MENA

region's top commercial banks stood globally between 2009 and 2015. The full output of results can be found in **Appendix A.**

N=245 (for all variables) Strongly Balanced Panel	**ROA**	**ROE**	**ASLR**	**NPL**	**DSLRSD**	**DSPSD**
Mean	1.42%	12.05%	2.27%	4.71%	±1.84%	±0.69$
Standard Deviation	±0.6%	±4.28%	±22.48%	±3.89%	N/A	N/A
Minimum	- 0.35%	- 2.94%	- 91.85%	0.13%	±0.58%	±0.01$
Maximum	2.66%	23.55%	80.10%	19.38%	±12.10%	±11.22$
Mean Relative to Global Average (MRGA)	>0.23%	>0.07%	N/A	<1.81%	N/A	N/A

Table 12: Key descriptive statistics for all dependent variables – Consolidated Sample

N=245 (for all variables) Strongly Balanced Panel	**SHHI**	**GHHI**	**SIZE**	**DER**	**GRTA**	**LTDR**	**NIM**
Mean	0.25	0.67	23.57	8.06	8.21%	74.84%	2.49%
Standard Deviation	±0.042	±0.17	±1.24	±2.90	±10.32%	±18.70%	±0.52%
Minimum	0.17	0.25	19.61	3.77	-37.32%	27.39%	1.22%
Maximum	0.38	0.99	25.72	26.43	76.65%	132.75%	4.34%

Table 13: Key descriptive statistics for all independent variables – Consolidated Sample

As shown in Table 12, the means of ROA and ROE in the consolidated sample were 0.23% and 0.07% respectively higher than the global averages between 2009 and 2015. This is a good relative indicator for the performance and profitability of top commercial banks in the MENA region. It may also portray resilience and good crisis management since banks managed to score higher than the worldwide average despite the Arab spring

political instabilities and global oil price shocks which plagued the region since 2011. Another observation in Table 12 is the mean of NPL, which scored 1.81% lower than the global average. This may reflect that the MENA region was less affected by the aftermath of the US financial crisis as compared with the rest of the world with respect to the percentage of non-performing loans post 2008.

As shown in Table 13, the mean of SHHI and GHHI in the consolidated sample were 0.25 and 0.67 respectively. This may indicate that MENA banks (on average) place a higher emphasis on sectoral diversification since a higher HHI value reflects more concentration. Furthermore, the average growth rate of total assets (GRTA) scored an impressive average of 8.21% despite external shocks and political instabilities surrounding the region. A loan to deposit ratio (LTDR) average of 74.84% may indicate that the sample is not aggressive in lending and possesses liquidity. The average debt to equity ratio (DER) of the sample indicates that it was leveraged financially by 8 times between 2009 and 2015. An average net interest margin (NIM) of 2.49% may also reflect the high presence of interbank competition in the region since a low NIM could indicate a high competition in the banking sector (Maudos, 2004). Finally, it should be noted that the average SIZE of banks in the sample (with respect to total consolidated assets) was in excess of US $20 billion (**see Appendix A**) which easily places it in the *large* category of commercial banks (as per Federal Reserve classification, 2017).

Moving on, Table 14 summarizes the shape of the distribution for all variables in the consolidated sample.

Variable	Skewness Score	Graphical Impression	Kurtosis Score	Graphical Impression
ROA	-0.34	Slightly Skewed to the left	-0.13	Platykurtic. Tails are short.
ROE	-0.72	Moderately skewed to the left	0.78	Leptokurtic. Tails are long.
ASLR	0.27	Slightly skewed to the right	1.87	Leptokurtic. Tails are long.
NPL	1.62	Highly skewed to the right	2.75	Leptokurtic. Tails are long.
DSLRSD	4.65	Highly skewed to the right	34.30	Leptokurtic

				Tails are very long.
DSPSD	4.20	Highly skewed to the right	27.26	Leptokurtic Tails are very long.
SHHI	0.25	Slightly skewed to the right	-0.26	Platykurtic. Tails are short.
GHHI	-0.06	Very slightly skewed to the left	-0.97	Platykurtic. Tails are short.
SIZE	-0.95	Moderately skewed to the left	0.50	Leptokurtic. Tails are long.
DER	2.04	Highly skewed to the right	7.79	Leptokurtic Tails are very long.
GRTA	1.09	Highly skewed to the right	8.76	Leptokurtic Tails are very long.
LTDR	-0.4	Slightly Skewed to the left	0.60	Leptokurtic. Tails are long
NIM	0.69	Moderately skewed to the right	1.18	Leptokurtic. Tails are long.

Table 14: Descriptive statistics for the distribution shape of all variables – Consolidated Sample

As shown in Table 14, five variables are flagged in red because of their violation of the standard acceptable values of skewness and kurtosis. According to Bulmer (1979), any skewness value greater than +1 or less than -1 indicates heavy skewness towards the right or left which could jeopardize the normal distribution assumption. Also, any excess kurtosis between -2 and +2 is considered acceptable in order to statistically prove a normal distribution (George and Mallery, 2010). The remaining 8 variables seem to fall within the acceptable ranges of a normal distribution. However, it should be noted that due to the effect of sample size, statistical tests such as Jarque-Berra or Shapiro-Wilk should be conducted in order to judge with more confidence if a variable is following a normal distribution. The heavy skewness and kurtosis in some of the variables could be attributed to the heterogeneity present in our sample of commercial banks. As a result, the consolidated sample will be dissected into three regions in an effort to improve the descriptive results of the distribution. The first one will comprise banks in the Gulf cooperative council (GCC) countries, while the second will comprise banks in the Levant and North Africa (L&NA) region together. Finally, the third sample will comprise banks

in the Levant region only. The reason why North Africa was not analyzed independently is due to its small sample size (N<30).

4.1.2 GCC Region

The descriptive statistics dealing with dispersion are presented in Tables 15 and 16 to be compared to the worldwide average benchmarks (where possible) in order to see where the GCC region's top commercial banks stood globally between 2009 and 2015. The full output of results can be found in **Appendix B.**

N=161 (for all variables) Strongly Balanced Panel	**ROA**	**ROE**	**ASLR**	**NPL**	**DSLRSD**	**DSPSD**
Mean	1.60%	12.43%	2.58%	4.01%	±2.0%	±0.58$
Standard Deviation	±0.57%	±4.12%	±24.42%	±3.67%	N/A	N/A
Minimum	- 0.35%	- 2.94%	- 91.85%	0.13%	±0.60%	±0.01$
Maximum	2.66%	23.55%	80.10%	19.20%	±12.10%	±11.22$
Mean Relative to Global Average (MRGA)	**>0.41%**	**>0.45%**	N/A	**<2.51%**	N/A	N/A

Table 15: Key descriptive statistics for all dependent variables – GCC Sample

From Table 15 and as highlighted in bold, banks in the GCC region scored relatively better (on average) than the global average in their ROA, ROE and NPL between 2009 and 2015. The maximum ROA and ROE belonged to two banks in Qatar during 2009 and 2010 respectively. The maximum ASLR and DSLRSD belonged to a UAE bank in 2013 which may be a strong indicator of a rebound to the US financial crisis effect. The maximum NPL belonged to a Kuwaiti bank in 2009 while the maximum DSPSD belonged to a UAE bank in the same year.

On the other hand, the minimum ROA, ROE, and ASLR values of the sample belonged to a UAE bank in 2009 primarily due to the aftermath of the US financial crisis. Surprisingly, the minimum NPL belonged to a neighboring Omani bank in the exact same year (2009). The minimum DSLRSD belonged to the top bank in Qatar in 2012 which may reflect the stability that the bank and country enjoyed during that period. The minimum DSPSD belonged to a Kuwait bank in 2014.

We notice that the standard deviations of ASLR and NPL are high compared to their means indicating a high dispersion in the annual stock log returns and percentage of non-performing loans to total loans of GCC banks between 2009 and 2015. This may be a reflection to the continuously changing external macroeconomic and political conditions in the region and how each Gulf country absorbed them or reacted to them differently.

N=161 (for all variables) Strongly Balanced Panel	**SHHI**	**GHHI**	**SIZE**	**DER**	**GRTA**	**LTDR**	**NIM**
Mean	0.24	0.70	23.89	6.92	8.13%	80.93%	2.41%
Standard Deviation	±0.038	±0.17	±0.93	±1.47	8.91%	15.63%	0.35%
Minimum	0.17	0.25	21.70	3.77	-19.69%	31.04%	1.65%
Maximum	0.35	0.99	25.72	11.34	41.30%	132.75%	3.44%

Table 16: Key descriptive statistics for all independent variables – GCC Sample

As shown in Table 16, the mean of SHHI and GHHI were 0.24 and 0.70 respectively. This may indicate that GCC banks (on average) place a higher emphasis on sectoral diversification since a higher HHI value reflects more concentration. The mean size of GCC banks stood at 23.89 which translates to $34.7 Billion. The standard deviation of most independent variables was small as compared to the mean indicating little dispersion in the data between 2009 and 2015. However, the standard deviation of GRTA was high relative to the mean indicating a wide dispersion in the growth rate of total assets which may be a reflection of different business growth strategies implemented by Gulf banks.

The minimum SHHI and GHHI belonged to a Kuwaiti and Bahraini bank respectively in 2015. The minimum SIZE with respect to total assets belonged to an Omani bank in 2009. The minimum DER and GRTA belonged to a Qatari and Kuwaiti bank respectively in 2009. The minimum LTDR belonged to a Bahraini bank in 2014, while the minimum NIM belonged to a Saudi bank in 2010. On the other hand, the maximum SHHI belonged to a Qatari Bank in 2013. The maximum GHHI belonged to an Omani bank in 2015. In an interesting note, a Qatari bank holds the maximum SIZE between 2013 and 2015. Surprisingly, an Omani bank held the maximum DER in 2012. A Qatari bank witnessed the maximum GRTA in 2013 which may reflect an aggressive growth strategy followed that year. A UAE bank held the maximum LTDR in 2009, which might be an indication that it was severely affected by the US financial crisis. Finally, an Omani bank held the maximum NIM in 2010. Next, the shape of the distribution for all variables in the GCC sample is summarized in Table 17.

Variable	**Skewness Score**	**Graphical Impression**	**Kurtosis Score**	**Graphical Impression**
ROA	-0.92	Moderately Skewed to the left	1.38	Leptokurtic. Tails are long.
ROE	-0.99	Moderately skewed to the left	1.90	Leptokurtic. Tails are long.
ASLR	0.16	Slightly skewed to the right	1.71	Leptokurtic. Tails are long.
NPL	2.05	Highly skewed to the right	4.40	Leptokurtic. Tails are long.
DSLRSD	4.39	Highly skewed to the right	28.20	Leptokurtic Tails are very long.
DSPSD	5.61	Highly skewed to the right	44.17	Leptokurtic Tails are very long.
SHHI	0.018	Very slightly skewed to the right	-0.77	Platykurtic. Tails are short.
GHHI	-0.33	Slightly skewed to the left	-0.81	Platykurtic. Tails are short.
SIZE	-0.29	Slightly skewed to the left	-0.87	Platykurtic. Tails are short.
DER	0.44	Slightly skewed to the right	-0.03	Platykurtic. Tails are very short.

GRTA	0.36	Slightly skewed to the right	1.13	Leptokurtic Tails are long.
LTDR	-0.075	Very slightly Skewed to the left	1.41	Leptokurtic. Tails are long
NIM	0.43	Slightly skewed to the right	-0.12	Platykurtic. Tails are very short.

Table 17: Descriptive statistics for the distribution shape of all variables – GCC Sample

From Table 17, only three variables are flagged in red because of their violation of the standard acceptable values of skewness and kurtosis. The skewness and kurtosis of NPL in the GCC sample increased by 0.43 and 1.65 respectively as compared to the consolidated sample. This could indicate that NPL may need further dissection on an independent country level in order to achieve a more acceptable value of skewness and kurtosis. Also, the skewness and kurtosis of DSPSD did not improve after the split but increased by 1.41 and 16.1 respectively. This may indicate that DSPSD requires further dissection on an independent country level as well in order to achieve normality.

On a positive note, we can see that the skewness and kurtosis of DSLRSD decreased by 0.26 and 6.1 respectively. Although those values are still flagged in red for not being within acceptable limits of ±1 for skewness and ±2 for kurtosis, it is still considered an improvement to achieving normality. Finally, we can see how the skewness and kurtosis of DER and GRTA fell to acceptable limits of ±2 indicating a major improvement as a result of splitting the consolidated MENA sample.

4.1.3 Levant and North Africa Region

The important descriptive statistics for L&NA dealing with dispersion are summarized in Tables 18 and 19 and compared to worldwide average benchmarks (where possible) in order to see where the L&NA region's top commercial banks stood globally between 2009 and 2015. The full output of results can be found in **Appendix C.**

N=84 **Strongly Balanced Panel**	**ROA**	**ROE**	**ASLR**	**NPL**	**DSLRSD**	**DSPSD**
Mean	1.06%	11.32%	1.70%	6.03%	±1.52%	±0.89$
Standard Deviation	±0.46%	±4.51%	±18.34%	±3.96%	N/A	N/A
Minimum	- 0.17%	-1.45%	-43.50%	1.00%	0.58%	0.027$
Maximum	2.15%	19.50%	53.32%	19.38%	4.32%	6.23$
Mean Relative to Global Average (MRGA)	<0.13%	<0.66%	N/A	<0.49%	N/A	N/A

Table 18: Key descriptive statistics for all dependent variables – Levant & North Africa Sample

Table 18 is a clear indicator that the sample of banks from the Levant and North Africa (L&NA) region scored relatively lower (on average) than global averages in ROA and ROE between 2009 and 2015. On a positive note, NPL in L&NA scored lower than the global average by 0.49%.

It is also safe to say that (on average) the GCC region sample performed better than the L&NA sample in ROA, ROE, ASLR, NPL and DSPSD while the L&NA performed better than GCC in only DSLRSD which may be an indicator of a less volatile stock market or a more immune one to regional/external shocks. The maximum ROA belonged to a Jordanian bank in 2014 while the maximum ROE belonged to the only bank from Tunisia in 2015. The maximum ASLR also belonged to the Tunisian bank in 2009. The maximum NPL belonged to a Jordanian bank in 2009. The maximum DSLRSD and DSPSD belonged to a Lebanese and the Tunisian bank respectively in 2009.

On the other hand, the minimum ROA, ROE, and ASLR belonged to the same Jordanian bank in 2011. The minimum NPL belonged to the bank from Tunisia in 2015. On a

positive note, the minimum DSLRSD belonged to the same Lebanese bank (which had a maximum DSLRSD in 2009) five years later in 2014. Finally, the minimum DSPSD belonged to a bank in Palestine in 2011. Similar to the GCC, most of the standard deviations were much lower than their respective means except for ASLR (which was higher) which is normal given the nature of the variable.

N=84 (for all variables) Strongly Balanced Panel	**SHHI**	**GHHI**	**SIZE**	**DER**	**GRTA**	**LTDR**	**NIM**
Mean	0.27	0.61	22.95	10.23	8.35%	63.15%	2.65%
Standard Deviation	±0.044	±0.16	±1.50	±3.64	±12.65%	±18.62%	±0.72%
Minimum	0.19	0.37	19.61	4.92	-37.32%	27.39%	1.22%
Maximum	0.38	0.98	24.65	26.43	76.65%	97.61%	4.34%

Table 19: Key descriptive statistics for all independent variables - Levant & North Africa Sample

Table 19 shows that the mean SHHI and GHHI for L&NA were 0.27 and 0.61 respectively. Similar to the GCC sample, this may indicate that L&NA banks place a higher emphasis on sectoral diversification since a higher HHI value reflects more concentration.

On a comparative note, the mean SHHI in the L&NA is 0.03 higher than the mean of the GCC sample which may indicate a slightly higher presence/preference for *sectoral concentration.* However, the mean GHHI in the L&NA was 0.09 lower than the mean of the GCC sample which may indicate a higher presence/preference for *geographical diversification.* Mean size (with respect to log of total assets) of L&NA sample was less than GCC sample by 0.95 which translates to approximately less by US $18.2 billion on average. The average DER of L&NA was a lot higher than the GCC sample and this may

be an indicator of a higher tolerance level of debt/liabilities in the capital structure of L&NA banks. Surprisingly, the mean GRTA of banks in L&NA was slightly higher than GCC by 0.22%. Also, LTDR in L&NA was lower by 17.8% than the GCC which may be an indicator of higher liquidity levels from customer deposit bases or very conservative lending practices by L&NA banks. The NIM in L&NA was slightly higher than GCC by 0.24% which may be an indicator of less competition between L&NA banks as opposed to the GCC banks. The standard deviation of most independent variables was small compared to the mean indicating little dispersion in the data between 2009 and 2015. Similar to the GCC sample, the standard deviation of GRTA in L&NA sample was high relative to its mean indicating a wide dispersion in the growth rate of total assets which may be a reflection of different business growth strategies implemented by banks in the region. The minimum SHHI and GHHI belonged to two Jordanian banks in 2013 and 2012 respectively. The smallest bank with respect to SIZE of total assets belonged to Palestine in 2009. The minimum DER belonged to a bank in Jordan in 2010 while the minimum GRTA was for a bank in Morocco in 2009. Finally, the minimum LTDR and NIM belonged to banks in Lebanon during 2013 and Morocco in 2009 respectively. On the other end, the maximum SHHI, GHHI, and SIZE belonged to a Lebanese, Moroccan, and Jordanian bank respectively in 2009 which may indicate higher preference for concentration post the US crisis. The highest DER and GRTA belonged to Moroccan bank in 2009 and 2010 respectively. Finally, the highest LTDR and NIM belonged to a Moroccan and Jordanian bank in 2013 and 2012 respectively. Next, the shape of the distribution for all variables in the L&NA sample is summarized in Table 20.

The skewness and kurtosis values of NPL, DSLRSD, DSPSD, and DER improved as compared to the consolidated sample but are still flagged in red because they exceed the acceptable values of ±1 for skewness and ±2 for excess kurtosis. The reasons could be the sample size or because banks in Levant and North Africa are still heterogeneous and need to be studied independently.

Variable	Skewness Score	Graphical Impression	Kurtosis Score	Graphical Impression
ROA	0.30	Moderately skewed to the right	0.12	Leptokurtic. Tails are very short.
ROE	-0.28	Moderately skewed to the left	-0.35	Platykurtic Tails are short.
ASLR	0.65	Moderately skewed to the right	1.19	Leptokurtic. Tails are long.
NPL	1.21	Heavily skewed to the right	1.99	Leptokurtic. Tails are long.
DSLRSD	1.55	Heavily skewed to the right	4.51	Leptokurtic Tails are very long.
DSPSD	2.09	Heavily skewed to the right	4.87	Leptokurtic Tails are very long.
SHHI	0.33	Slightly skewed to the right	-0.38	Platykurtic. Tails are short.
GHHI	0.46	Slightly skewed to the right	-0.46	Platykurtic. Tails are short.
SIZE	-0.63	Moderately skewed to the left	-1.00	Platykurtic. Tails are short.
DER	1.32	Heavily skewed to the right	4.28	Leptokurtic Tails are very long.
GRTA	1.50	Heavily skewed to the right	10.88	Leptokurtic Tails are very long.
LTDR	-0.37	Slightly skewed to the left	-0.67	Platykurtic Tails are short.
NIM	0.15	Slightly skewed to the right	-0.37	Platykurtic Tails are short.

Table 20: Descriptive statistics for the distribution shape of all variables – Levant & North Africa Sample

4.1.4 Levant Region

The key descriptive statistics dealing with dispersion for the last sub-sample are summarized in Tables 21 and 22 and compared to worldwide average benchmarks (where possible) in order to see where the Levant region's top commercial banks stood globally between 2009 and 2015. The full output of results can be found in **Appendix D**.

The results from Table 21 showed that the sample of banks from the Levant region scored relatively lower (on average) than global averages in ROA and ROE between 2009 and 2015. Furthermore, NPL in Levant also scored higher than the global average by 0.10%

which places it as the weakest performing subsample when compared to global averages. Moving forward, the maximum ROA and ROE belonged to a Jordanian bank in 2014 and Palestinian bank in 2010 respectively. The maximum ASLR and NPL belonged to a Palestinian and Jordanian bank in 2009 respectively. The maximum DSLRSD and DSPSD belonged to 2 Lebanese Banks in 2009 which may be a reflection of the US financial aftermath on the Lebanese stock market. On the other end, the minimum ROA, ROE, and ASLR belonged to a single Jordanian bank in 2011 which may be a reflection of heavy profitability struggles the bank was facing that year. The minimum NPL belonged to a Palestinian bank in 2010. The minimum DSLRSD and DSPSD belonged to a Lebanese bank in 2014 and a Palestinian bank in 2011 respectively.

Similar to the L&NA and GCC samples, most of the standard deviations were much lower than their respective means except for ASLR (which was higher) which is normal given the nature of the variable.

N=56 (for all variables) Strongly Balanced Panel	**ROA**	**ROE**	**ASLR**	**NPL**	**DSLRSD**	**DSPSD**
Mean	1.16%	11.00%	2.04%	6.62%	±1.59%	± 0.25$
Standard Deviation	±0.48%	±4.70%	±17.85%	±4.45%	N/A	N/A
Minimum	-0.17%	-1.45%	-43.5%	1.16%	±0.58%	± 0.027$
Maximum	2.15%	18.43%	49.9%	19.37%	±4.32%	± 1.21$
Mean Relative to Global Average (MRGA)	<0.03%	<0.98%	N/A	>0.10%	N/A	N/A

Table 21: Key descriptive statistics for all dependent variables – Levant Sample

N=56 (for all variables) Strongly Balanced Panel	SHHI	GHHI	SIZE	DER	GRTA	LTDR	NIM
Mean	0.26	0.57	22.57	8.50	9.87%	55.18%	2.58%
Standard Deviation	±0.047	±0.15	±1.62	±2.25	±9.18%	±16.47 %	±0.80%
Minimum	0.19	0.37	19.61	4.92	-10.42%	27.39%	1.24%
Maximum	0.38	0.92	24.65	12.63	0.30	93.11%	4.33%

Table 22: Key descriptive statistics for all independent variables - Levant Sample

Table 22 shows that the mean SHHI and GHHI for the Levant sample were 0.26 and 0.57 respectively. Similar to the L&NA and GCC samples, this may indicate that Levant banks place a higher emphasis on sectoral diversification since a higher HHI value reflects more concentration.

On a comparative note, the mean SHHI in the Levant sample is 0.01 lower than the mean of the L&NA sample which may indicate a slightly higher presence/preference for *sectoral diversification*. Also, the mean GHHI in the Levant was 0.04 lower than the mean of the L&NA sample which may indicate a higher presence/preference for *geographical diversification*. Actually, the Levant sample scored the lowest in GHHI placing it as the most geographically diversified sample between all sub-samples. The GCC sample scored the lowest in SHHI placing it as the most diversified sample on a sectoral basis between all sub-samples. The mean size (with respect to log of total assets) of Levant sample was less than L&NA sample by 0.38 which translates to approximately less by US $200 million. This places the Levant sample as the smallest in SIZE (on average). The average DER of Levant was lower than the L&NA sample by 1.73 but higher than the GCC sample by 1.58. This may be an indicator of a higher tolerance level of debt/liabilities in the capital structure of Levant banks as opposed to GCC banks but a more conservative tolerance level one as compared to L&NA. Surprisingly, the average GRTA of the Levant sample scored the highest amongst all sub-samples at 9.87%. This may be a sign that the

Levant regions banks were aggressively developing (with respect to assets) between 2009 and 2015 despite political instabilities. The mean LTDR scored the lowest in the Levant region amongst all sub-samples which may be an indication of higher liquidity and stricter lending measures by banks of that region. Mean NIM in the Levant sample scored lower than L&NA by 0.08% but higher than GCC by 0.17% placing it second with respect to interbank competitiveness. The standard deviation of most independent variables was small compared to the mean indicating little dispersion in the data between 2009 and 2015. Also, similar to the GCC and L&NA samples, the standard deviation of GRTA in the Levant sample was high relative to its mean indicating a wide dispersion in the growth rate of total assets which may be a reflection of different business growth strategies implemented by banks in the region. The minimum SHHI and GHHI belonged to two Jordanian banks in 2013 and 2012 respectively. The smallest bank with respect to SIZE of total assets was in Palestine in 2009. The minimum DER belonged to a bank in Jordan in 2010 while the minimum GRTA was for a bank in Morocco in 2009. Finally, the minimum LTDR and NIM belonged to banks in Lebanon during 2013 and Morocco in 2009 respectively. On the other end, the maximum SHHI, GHHI, and SIZE belonged to a Lebanese, Moroccan, and Jordanian bank respectively in 2009 which may indicate higher preference for concentration post the US crisis. The highest DER and GRTA belonged to a Lebanese bank in 2013 and 2009 respectively. Finally, the highest LTDR and NIM belonged to a Palestinian and Jordanian bank in 2013 and 2012 respectively. Table 23 summarizes the shape of the distribution for all variables in the Levant sample.

Variable	Skewness Score	Graphical Impression	Kurtosis Score	Graphical Impression
ROA	0.04	Very Slightly skewed to the right	0.17	Leptokurtic. Tails are long.
ROE	-0.45	Slightly skewed to the left	-0.43	Platykurtic Tails are short.
ASLR	0.24	Slightly skewed to the right	1.20	Leptokurtic. Tails are long.
NPL	1.00	Highly skewed to the right	0.98	Leptokurtic. Tails are long.

DSLRSD	1.35	Highly skewed to the right	3.32	Leptokurtic. Tails are very long.
DSPSD	1.71	Highly skewed to the right	2.19	Leptokurtic. Tails are very long.
SHHI	0.41	Slightly skewed to the right	-0.61	Platykurtic Tails are short.
GHHI	0.45	Slightly skewed to the right	-0.93	Platykurtic Tails are short.
SIZE	-0.19	Slightly skewed to the left	-1.50	Platykurtic Tails are short.
DER	0.00	Perfectly symmetrical	-1.16	Platykurtic Tails are short.
GRTA	0.55	Moderately skewed to the right	-0.37	Platykurtic Tails are short.
LTDR	-0.11	Slightly skewed to the left	-0.48	Platykurtic Tails are short.
NIM	0.43	Slightly skewed to the right	-0.62	Platykurtic Tails are short.

Table 23: Descriptive statistics for the distribution shape of all variables – Levant Sample

The skewness and kurtosis values of NPL, DSLRSD, DSPSD, GRTA, and DER improved as compared to the consolidated and L&NA samples but some variables such as DSLRSD and DSPSD are still flagged in red because they exceed the acceptable values of ±1 for skewness and ±2 for excess kurtosis. The reasons could be the sample size or the fluctuant nature of the variables. However, it is safe to say that splitting the consolidated sample into more homogenous subsamples based on geographical proximities has helped improve the shape of the distributions significantly.

4.2 Testing for CLRM Assumptions

Before proceeding to the inferential statistics part, it is crucial to test if the initial assumptions that were previously set in the methodology chapter are respected and abided by for the internal and external reliability of this research. In classical linear regression models, there are 6 assumptions that need to be tested which are: Linearity, Multicollinearity, Stationarity, Serial Correlation, Normality, and Homoscedasticity. This part will only test the first 4 assumptions, while the remaining two (namely normality and homoscedasticity) will be tested after deciding on the regression model.

4.2.1 Linearity Test

Linearity can be tested either graphically or numerically. Graphically, the matrix scatterplot method is used since we have more than one independent variable in the model. Numerically, a parametric statistical test known as the Pearson correlation matrix (PCM), which is used to verify (with statistical significance) the direction and degree/strength of linear association between any two variables is used. For ease of tracking, only the two independent variables and their correlations with all the dependent variables will be presented for the consolidated sample and the subsamples in Tables 24-27.

PEARSON CORRELATION MATRIX (N=245)	ROA	ROE	ASLR	NPL	DSLRSD	DSPSD
SHHI	-0.02	0.14**	0.12	-0.24***	-0.20***	0.06
GHHI	0.017	-0.1	0.02	-0.03	-0.07	-0.11

Table 24: PCM for all Independent and Dependent Variables - Consolidated Sample
*, **, and *** denote significant at 10%, 5%, and 1% respectively

Table 24 showed that SHHI was significantly linearly correlated with 3 of the dependent variables namely ROE, NPL & DSLRSD. GHHI was not significantly correlated with any dependent variable. As a result of those weak findings, further dissection was done and Tables 25-27 show the results of the sub-samples in hopes of getting more significant results.

PEARSON CORRELATION MATRIX (N=161)	ROA	ROE	ASLR	NPL	DSLRSD	DSPSD
SHHI	0.15*	0.19**	0.16**	-0.25***	-0.16**	-0.05
GHHI	-0.03	-0.12	0.02	-0.11	-0.17**	-0.14*

Table 25: PCM for all Independent and Dependent Variables – GCC Sample
*, **, and *** denote significant at 10%, 5%, and 1% respectively

Table 25 showed that SHHI became significantly correlated with all dependent variables except DSPSD. However, GHHI was found to be significantly correlated with DSPSD

only. The major improvement in significant linearity results is a clear reflection on the impact of dissecting the consolidated sample into more homogenous ones.

PEARSON CORRELATION MATRIX (N=84)	ROA	ROE	ASLR	NPL	DSLRSD	DSPSD
SHHI	0.07	0.17	0.08	-0.45***	-0.19*	0.14
GHHI	-0.26**	-0.17	-0.01	0.29***	0.02	0.01

Table 26: PCM for all Independent and Dependent Variables – L&NA Sample
*, **, and *** denote significance at 10%, 5%, and 1% respectively

Table 26 showed that in the L&NA sample, SHHI is only significantly linearly correlated with NPL and DSLRSD. It also showed us that GHHI is significantly linearly correlated with ROA and NPL. While there was a slight improvement in linearity results for GHHI (with respect to the number of significantly linearly correlated dependent variables) in L&NA, Table 27 will present the results of the Levant region only in attempts to discover more significant correlations between GHHI and dependent variables.

PEARSON CORRELATION MATRIX (N=56)	ROA	ROE	ASLR	NPL	DSLRSD	DSPSD
SHHI	0.12	0.18	0.09	-0.50***	-0.23*	-0.16
GHHI	-0.23*	-0.33**	-0.07	0.45***	0.13	-0.58***

Table 27: PCM for all Independent and dependent variables – Levant Sample
*, **, and *** denote significance at 10%, 5%, and 1% respectively

Finally, the results of Table 27 showed that SHHI was significantly linearly correlated with NPL and DSLRSD at 1% and 10% respectively. GHHI was significantly linearly correlated with 4 dependent variables namely: ROA at 10%, ROE at 5%, NPL and DSPSD at 1%. On a collective level, the results seem to indicate that significant linear correlations exist between the independent and dependent variables. It should be noted that SHHI and DSPSD were not found to be significantly linearly correlated at any level across all samples. Also, GHHI and ASLR were not found to be significantly linearly correlated at any level across all samples. However, these results are not surprising as we suspect

significant non-linear relationship may exist between them. Thus, regressions will be run by including the square of SHHI and GHHI in addition to SHHI and GHHI.

4.2.2 Multicollinearity

Multicollinearity occurs when one or more independent variables (X's) are highly correlated with another which leads to a distortion of results in the model. The presence of multicollinearity will be tested using the Pearson Correlation Matrix (PCM) and also using Variance Inflation Factor (VIF) (post regression). If the Pearson correlation coefficient is higher than 0.7, then multicollinearity is a serious problem that needs to be solved by eliminating the redundant variables (Anderson et al., 2008). Also, if the variance inflation factor is near or greater than 5, then the correlation between independent variables becomes troublesome and multicollinearity needs to be rectified (Martz, 2013). Table 28 presents a summary of the PCM coefficients and their significance between all the consolidated sample's independent variables.

PEARSON CORRELATION (N=245)	SHHI	GHHI	SIZE	DER	GRTA	LTDR	NIM
SHHI	1						
GHHI	0.16*	1					
SIZE	-0.03	-0.08	1				
DER	0.19**	-0.10	-0.05	1			
GRTA	0.11	0.03	-0.11	0.15*	1		
LTDR	-0.01	0.43**	0.16*	-0.25**	0.06	1	
NIM	-0.02	0.16*	-0.43**	-0.03	0.00	0.29**	1

Table 28: PCM Summary for Independent variables – Consolidated Sample
*, and ** denote significance at 5% and 1%, respectively (2-tailed).

Table 28 shows that no multicollinearity exists between the independent variables since no correlation coefficient has a value greater than $|0.7|$. The highest correlation coefficient encountered was between LTDR and GHHI, being +0.43 which indicates a

positive, low strength linear association. Another significant correlation coefficient was between NIM and SIZE, being -0.43 which indicates a negative, low strength linear association. Thus, the PCM summary indicates that no independent variables need to be omitted and that the assumption of no multicollinearity has been met. This finding will be verified more conclusively by checking the VIF of all independent and control variables after running the regression.

4.2.3 Stationarity

In this study, stationarity of the data (i.e.: it has no unit root) will be tested using Stata software, where the null hypothesis of the test is that a unit root is present in all panels. This thesis will use a Fisher type unit-root test based on the Augmented Dicky Fuller (ADF) test, which assumes that the number of panels (P) is finite while the number of time periods (T) tends to go to infinity which is the ideal assumption for the nature of this study's desired future outcome. A summary of our findings is presented in Table 29 for all variables of the consolidated sample. The whole Stata output for all variables can be found in **Appendix E.**

Results reported in Table 29 indicate that most variables are stationary at all levels, since the p-values of the ADF test are less than 0.01 meaning that the null hypothesis should be rejected. Only, SIZE and GHHI were stationary at the 10% level because their p-values were less than 0.1 but greater than 0.05. This indicates that all variables do not have a unit root confirming the presence of a stationary process which can be analyzed or studied using regression analysis without having to take any lags/difference and losing observations. We can also check for trends or seasonality graphically to concur that no time trends exist in the variables of interest, but the ADF test is more conclusive statistically.

Variable	P-Value	Conclusion	Remarks
ROA	0.00	Reject Null Hypothesis	Stationary Process at all levels
ROE	0.00	Reject Null Hypothesis	Stationary Process at all levels

ASLR	0.00	Reject Null Hypothesis	Stationary Process at all levels
NPL	0.00	Reject Null Hypothesis	Stationary Process at all levels
DSLRSD	0.00	Reject Null Hypothesis	Stationary Process at all levels
DSPSD	0.00	Reject Null Hypothesis	Stationary Process at all levels
SHHI	0.00	Reject Null Hypothesis	Stationary Process at all levels
GHHI	0.071	Reject Null Hypothesis	Stationary Process at ≥0.1 level
SIZE	0.093	Reject Null Hypothesis	Stationary Process at ≥0.1 level
DER	0.00	Reject Null Hypothesis	Stationary Process at all levels
GRTA	0.00	Reject Null Hypothesis	Stationary Process at all levels
LTDR	0.00	Reject Null Hypothesis	Stationary Process at all levels
NIM	0.00	Reject Null Hypothesis	Stationary Process at all levels

Table 29: Fisher type ADF unit-root test for all variables – Consolidated Sample

4.2.4. Serial Correlation

To statistically inspect if autocorrelation is present in panel data with reasonably sized samples (Drukker, 2003), the Wooldridge test will be used for six different regressions, depending on the definition of the dependent variable.

The built in null hypothesis of the test is that there is no first order correlation. A summary of the findings for all dependent variables in the consolidated sample is represented below and the Full output from Stata can be found in **Appendix F.**

From Table 30, we can see that the p-value for all models is less than 5% meaning that we have to reject the null hypothesis of no autocorrelation in the error term. Unfortunately, this is not in line with CLRM which requires the error term to be independent and random, not exhibiting any correlation with itself in the past. However, serial correlation is considered to be a problem for macro panels with a T greater than 20-30 years (Torres-Reyna, 2007). Since we are dealing with a micro panel data for which the time dimension T (7 years) is largely less important than the individual dimension N (35 banks), first order serial correlation should not be considered as a problem.

Regression Model #	Dependent Variable	P-Value	Conclusion	Remarks
1	ROA	0.00	Reject Null Hypothesis	1st Order Serial correlation is present
2	ROE	0.00	Reject Null Hypothesis	1st Order Serial correlation is present
3	ASLR	0.00	Reject Null Hypothesis	1st Order Serial correlation is present
4	NPL	0.00	Reject Null Hypothesis	1st Order Serial correlation is present
5	DSLRSD	0.00	Reject Null Hypothesis	1st Order Serial correlation is present
6	DSPSD	0.00	Reject Null Hypothesis	1st Order Serial correlation is present

Table 30: Wooldridge Autocorrelation test for all regression models – Consolidated Sample

From this point onwards, all remaining CLRM assumptions require the regression output to be present in order to test if they have been respected. Conducting them beforehand is not possible because they require the estimation of the error term.

4.3. Choice of the Model

The next step will be to determine the exact estimator approach that should and will be used to investigate the relationship between diversification and bank performance (proxied by ROE, ROA and ASLR) and between diversification and bank risk (proxied by NPL, DSLRSD and DSPSD), while controlling for size (SIZE), growth (GRTA), capital structure (DER), liquidity (LTDR), and competition differences present between banks (NIM).

4.3.1. FEM versus REM

There are broadly two types of estimator approaches that can be employed in the case of panel data: fixed effects models (FEM) and random effects models (REM) (Brooks, 2008). To check which one provides more reliable estimates for this study, the Hausman test was employed and the summary of results is presented in Table 31 for the 6 regressions in the consolidated sample and the 3 potential sub-samples: GCC Only, Levant Only, Levant & North Africa. It is important to note that North Africa is not studied as an independent sub-sample due to its small number of observations in this study (N<30).

Sample, Type & # of Observations	Dependent Variable	Hausman Test Statistic	P-Value	Conclusion	Recommended model to use
Consolidated, Balanced, N= 245	ROA	5.36	0.62	Can't Reject H0	Random Effect
	ROE	6.63	0.47	Can't Reject H0	Random Effect
	ASLR	22.26	0.0023	Reject H0	Fixed Effect
	NPL	3.53	0.83	Can't Reject H0	Random Effect
	DSLRSD	31.98	0.000	Reject H0	Fixed Effect
	DSPSD	10.05	0.19	Can't Reject H0	Random Effect
GCC Only Balanced N= 161	ROA	17.93	0.012	Reject H0 at ≥5%	Fixed Effect
	ROE	14.92	0.037	Reject H0 at ≥5%	Fixed Effect
	ASLR	16.09	0.024	Reject H0 at ≥5%	Fixed Effect
	NPL	5.20	0.64	Can't Reject H0	Random Effect
	DSLRSD	14.06	0.050	Reject H0 at ≥5%	Fixed Effect
	DSPSD	10.46	0.16	Can't Reject H0	Random Effect
Levant Only Balanced N= 56	ROA	8.49	0.29	Can't Reject H0	Random Effect
	ROE	5.62	0.585	Can't Reject H0	Random Effect
	ASLR	3.25	0.861	Can't Reject H0	Random Effect
	NPL	191.72	0.00	Reject H0	Fixed Effect
	DSLRSD	320.12	0.00	Reject H0	Fixed Effect
	DSPSD	27.39	0.00	Reject H0	Fixed Effect

Levant and North Africa Balanced N= 84	ROA	14.35	0.045	Reject H0 at ≥5%	Fixed Effect
	ROE	6.56	0.476	Can't Reject H0	Random Effect
	ASLR	7.52	0.376	Can't Reject H0	Random Effect
	NPL	7.84	0.347	Can't Reject H0	Random Effect
	DSLRSD	28.89	0.00	Reject H0	Fixed Effect
	DSPSD	30.11	0.00	Reject H0	Fixed Effect

Table 31: Hausman test summary for all samples

The null hypothesis of the Hausman test is that the random effect model is the preferred regression method. Table 31 shows that 50% (12/24) of all regression models should be estimated using the fixed effect because the p-value was less than 5%, while the remaining models should be estimated using the random effect. However, further testing is needed in the case of random effect models.

4.3.2. REM vs OLS

To choose between the random effects regression model and the pooled ordinary least square regression model (OLS), the Breusch-Pagan Lagrange multiplier test (LM) will be used. The LM test has a built in null hypothesis that the variance across entities is zero, so no significant difference across units (no panel effect) exists. If the p-value is great than 0.05, this means that the model should be estimated using pooled OLS. A summary of the results is presented in Table 32.

Sample, Type & # of Observations	**Dependent Variable**	**LM Test Statistic**	**P-Value**	**Conclusion**	**Recommended model to use**
Consolidated, Balanced, N= 245	ROA	140.52	0.00	Reject H0	Random Effect
	ROE	139.10	0.00	Reject H0	Random Effect
	NPL	186.51	0.00	Reject H0	Random Effect
	DSPSD	224.80	0.00	Reject H0	Random Effect
GCC Only Balanced, N= 161	NPL	59.35	0.00	Reject H0	Random Effect
	DSPSD	118.62	0.00	Reject H0	Random Effect

Levant Only, Balanced, N= 56	ROA	0.00	1.00	Can't Reject H0	Pooled OLS
	ROE	0.00	1.00	Can't Reject H0	Pooled OLS
	ASLR	0.00	1.00	Can't Reject H0	Pooled OLS
Levant and North Africa, Balanced, N= 84	ROE	55.70	0.00	Reject H0	Random Effect
	ASLR	0.00	1.00	Can't Reject H0	Pooled OLS
	NPL	22.98	0.00	Reject H0	Random Effect

Table 32: LM test summary for all samples

Results reported in Table 32 show that the p–value is smaller than 0.05 in all samples except in the Levant region, concluding that the pooled OLS is the appropriate method for these regressions. Also, ASLR in the L&NA sample will be estimated using pooled OLS regression because its p-value was greater than 0.05. Random effect will be used as the appropriate method for all remaining variables in their respective samples. Next, the remaining CLRM assumptions will be tested for the consolidated sample.

4.3.3. Normality

Whether errors are normally distributed can be assessed either graphically using the histogram or statistically using Shapiro Wilk or Jarque-Bera tests. According to Brooks (2008), if the residuals are normally distributed, the p-value of Shapiro-Wilk test should be greater than 0.05 supporting the null hypothesis that errors are normally distributed. A summary of results for all 6 regression models using Shapiro Wilk test for the consolidated sample is presented in Table 33, while the full Stata output can be found in **Appendix G.**

Sample, Type & # of Observations	**Dependent Variable**	**Model Used**	**Shapiro Wilk z Statistic**	**P-Value**	**Conclusion**
Consolidated, Balanced,	ROA	Random Effect	4.46	0.00	Not Normally Distributed

N= 245	ROE	Random Effect	3.45	0.00	Not Normally Distributed
	ASLR	Fixed Effect	2.34	0.01	Not Normally Distributed
	NPL	Random Effect	7.26	0.00	Not Normally Distributed
	DSLRSD	Fixed Effect	4.68	0.00	Not Normally Distributed
	DSPSD	Random Effect	9.60	0.00	Not Normally Distributed

Table 33: Shapiro Wilk test summary for normality of residuals and combined residuals– Consolidated Sample

From the results in Table 33, we can see that all our residuals are not normally distributed which is a violation of the CLRM assumption. Although the model residuals are assumed to be normally distributed and homogeneous, there could easily be country-specific heteroskedasticity or autocorrelation in the sample which over time would plague this estimation (Yaffee, 2003). Furthermore, the strictness of the assumption can be smoothened when sample size is greater than 200 (Statistics Solution, 2013). Moreover, normality of residuals may exist in some of the sub-samples such as GCC only or Levant only since less heterogeneity is expected to be found between countries which ultimately reflects on their respective banks. Tables 34-36 will test the normality of residuals for each sub-sample in the hopes of achieving normality for residuals.

Sample, Type & # of Observations	**Dependent Variable**	**Model Used**	**Shapiro Wilk z Statistic**	**P-Value**	**Conclusion**
GCC, Balanced, N= 161	ROA	Fixed Effect	0.43	0.33	Normally Distributed
	ROE	Fixed Effect	0.11	0.46	Normally Distributed
	ASLR	Fixed Effect	-0.457	0.68	Normally Distributed

	NPL	Random Effect	6.79	0.00	Not Normally Distributed
	DSLRSD	Fixed Effect	4.00	0.00	Not Normally Distributed
	DSPSD	Random Effect	9.18	0.00	Not Normally Distributed

Table 34: Shapiro Wilk test summary for normality of residuals and combined residuals – GCC Sample

Sample, Type & # of Observations	**Dependent Variable**	**Model Used**	**Shapiro Wilk z Statistic**	**P-Value**	**Conclusion**
Levant and North Africa, Balanced, N= 84	ROA	Fixed Effect	4.30	0.00	Not Normally Distributed
	ROE	Random Effect	-0.38	0.65	Normally Distributed
	ASLR	Pooled OLS	1.48	0.07	Normally Distributed
	NPL	Random Effect	3.27	0.00	Not Normally Distributed
	DSLRSD	Fixed Effect	4.43	0.00	Not Normally Distributed
	DSPSD	Fixed Effect	1.92	0.03	Not Normally Distributed

Table 35: Shapiro Wilk test summary for normality of residuals and combined residuals – L&NA Sample

Sample, Type & # of Observations	**Dependent Variable**	**Model Used**	**Shapiro Wilk z Statistic**	**P-Value**	**Conclusion**
Levant, Balanced, N= 56	ROA	Pooled OLS	-0.56	0.71	Normally Distributed
	ROE	Pooled OLS	0.19	0.42	Normally Distributed

	ASLR	Pooled OLS	-0.03	0.51	Normally Distributed
	NPL	Fixed Effect	1.73	0.042	Not Normally Distributed
	DSLRSD	Fixed Effect	3.89	0.00	Not Normally Distributed
	DSPSD	Fixed Effect	2.12	0.02	Not Normally Distributed

Table 36: Shapiro Wilk test summary for normality of residuals and combined residuals – Levant Sample

The results of Tables 34-36 indicate an improvement by almost 50% for all subsamples with respect to normality of residuals. This is aligned with our previous intuition that heterogeneity was present in the consolidated sample which may be causing the residuals to be not normally distributed.

4.3.4. Heteroskedasticity Test

Although the presence of heteroskedasticity can be tested visually using the residual scatterplot or histogram, graphical methods are more informative (less assertive) in nature (Williams, 2017). Thus, a more formal statistical test known as the modified Wald test for group wise heteroskedasticity in fixed effect regression models will be used in order to determine whether or not the residuals are homoscedastic. However, when dealing with random effects model, no test is available to our knowledge that determines the presence of heteroskedasticity, thus, the informative (not assertive) graphical method is used, which may give us an indication or hint on whether or not errors are heteroskedastic. Moreover, we will run all the random effect regressions with robust standard errors to correct for potential heteroskedasticity (if any) (Williams, 2017).
When dealing with pooled OLS regression models (for potential subsamples like Levant) we will run the Breusch-Pagan/Cook-Weisberg test to check the presence of heteroskedasticity. The null hypothesis of the Modified Wald test and Breusch-Pagan is

that errors are homoscedastic. Thus, any p-value less than 5% implies heteroskedasticity. A summary of our findings for the consolidated sample is presented in Table 37.

Sample, Type & # of Observations	Dependent Variable	Model Used	Test Statistic	P-Value	Conclusion
Consolidated, Balanced, N= 245	ROA	Random Effect	Robust Standard Errors used	N/A	Use Graphical Method
	ROE	Random Effect	Robust Standard Errors used	N/A	Use Graphical Method
	ASLR	Fixed Effect	Modified Wald = 580.7	0.00	Reject H0. Errors are heteroskedastic
	NPL	Random Effect	Robust Standard Errors used	N/A	Use Graphical Method
	DSLRSD	Fixed Effect	Modified Wald = 3865.7	0.00	Reject H0. Errors are heteroskedastic
	DSPSD	Random Effect	Robust Standard Errors used	N/A	Use Graphical Method

Table 37: Heteroskedasticity Tests - Consolidated Sample

From the results in Table 37, it is clear that the two fixed effect models have heteroskedastic errors. However, they will be corrected for in the regression using Driscoll-Kray standard errors if panels are found to have cross-sectional dependence between the residuals. To check for the presence of cross sectional dependence, Pesaran test on Stata will be used and findings are reported in Table 38. If no cross-sectional dependence was found, the fixed effects models will be estimated using robust standard errors to correct for 1st order autocorrelation and heteroskedasticity only.

Sample, Type & # of Observations	Dependent Variable	Model Used	Pesaran Test Statistic	P-Value	Conclusion
Consolidated, Balanced, N= 245	ASLR	Fixed Effect	18.34	0.00	Reject Null Hypothesis. Cross-Sectional Dependence exists.

	DSLRSD	Fixed Effect	9.87	0.00	Reject Null Hypothesis. Cross-Sectional Dependence exists.

Table 38: Cross-sectional dependence test results - Consolidated Sample

The results in table 38 suggest that fixed effect models need to be estimated using Driscoll Kray standard errors which correct for heteroskedasticity, 1st order autocorrelation and cross-sectional dependence. Moving on, Tables 39-41 present cross-sectional dependence test results for the sub-samples where the null hypothesis of the test is that no cross-sectional dependence exists.

Sample, Type & # of Observations	**Dependent Variable**	**Model Used**	**Pesaran Test Statistic**	**P-Value**	**Conclusion**
GCC, Balanced, N= 161	ROA	Fixed Effect	-1.19	1.76	Can't Reject Null Hypothesis. Cross sectional independence exists.
	ROE	Fixed Effect	-0.98	1.67	Can't Reject Null Hypothesis. Cross sectional independence exists.
	ASLR	Fixed Effect	17.63	0.00	Reject Null Hypothesis. Cross-Sectional Dependence exists.
	DSLRSD	Fixed Effect	9.67	0.00	Reject Null Hypothesis. Cross-Sectional Dependence exists.

Table 39: Cross-sectional dependence test results - GCC Sample

Sample, Type & # of Observations	Dependent Variable	Model Used	Pesaran Test Statistic	P-Value	Conclusion
Levant and North Africa, Balanced, N= 84	ROA	Fixed Effect	-0.20	1.16	Can't Reject Null Hypothesis. Cross sectional independence exists.
	DSLRSD	Fixed Effect	1.06	0.29	Can't Reject Null Hypothesis. Cross sectional independence exists.
	DSPSD	Fixed Effect	2.00	0.04	Reject Null Hypothesis. Cross-Sectional Dependence exists.

Table 40: Cross-sectional dependence test results – L&NA Sample

Sample, Type & # of Observations	Dependent Variable	Model Used	Pesaran Test Statistic	P-Value	Conclusion
Levant, Balanced, N= 56	NPL	Fixed Effect	3.62	0.00	Reject Null Hypothesis. Cross-Sectional Dependence exists.
	DSLRSD	Fixed Effect	1.14	0.25	Can't Reject Null Hypothesis. Cross sectional independence exists.
	DSPSD	Fixed Effect	0.71	0.48	Can't Reject Null Hypothesis. Cross sectional independence exists.

Table 41: Cross-sectional dependence test results – Levant Sample

The results from tables 39-41 indicate that almost 50% of all fixed effect models possess cross sectional dependence. Thus, for those particular models, we will estimate Driscoll Kray standard errors which correct for the phenomenon of heteroskedasticity, 1st order autocorrelation, and cross-sectional dependence to achieve more reliable results.

Next, we present the graphs for the residuals of all random effect models in the consolidated sample only. This presentation will help us explore the structure of residuals in a graphical manner to gain a sense if heteroskedasticity exists. It should be noted that this method is informative in nature and we cannot infer with statistical significance if

errors are homoscedastic or not. Figures 3 and 6 seem to strongly indicate the errors are heteroskedastic due to their concentration towards one quadrant in the plane, meaning they are not random. Figures 4 and 5 seem to have homoscedastic errors due to the random dispersion of points in the plane but we cannot be certain either. As a result of the inconclusiveness, regressions will be corrected for 1st order autocorrelation and heteroskedasticity in all random effect models by estimating robust standard errors.

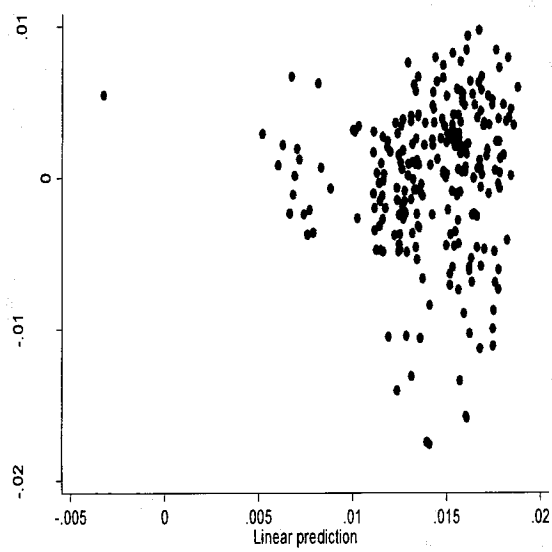

Figure 3: Predicted vs Fitted Residuals (when y=ROA – Consolidated Sample)

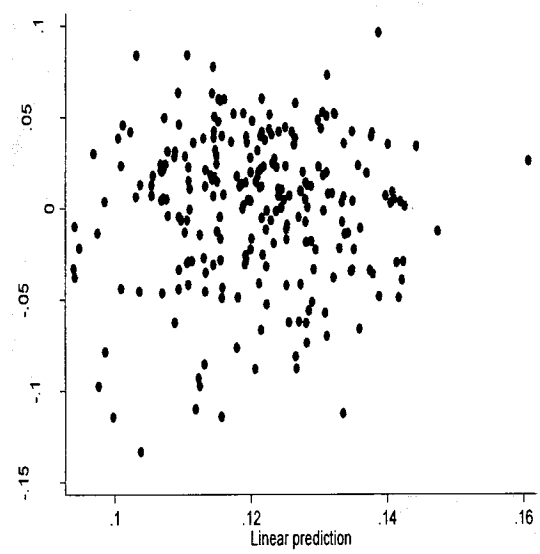

Figure 4: Predicted vs Fitted Residuals (when y=ROE – Consolidated Sample)

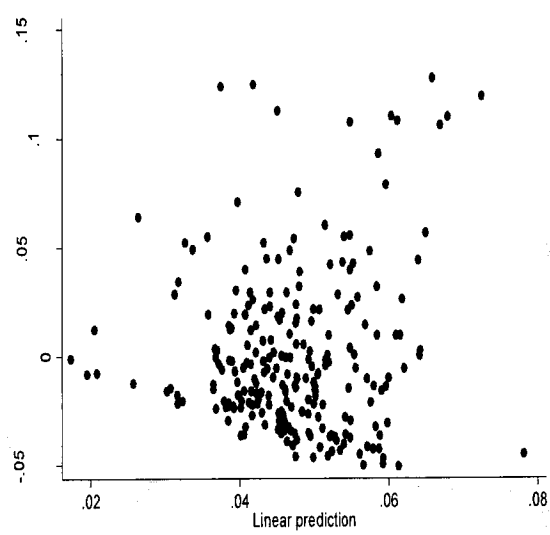

Figure 5: Predicted vs Fitted Residuals (when y=NPL – Consolidated Sample)

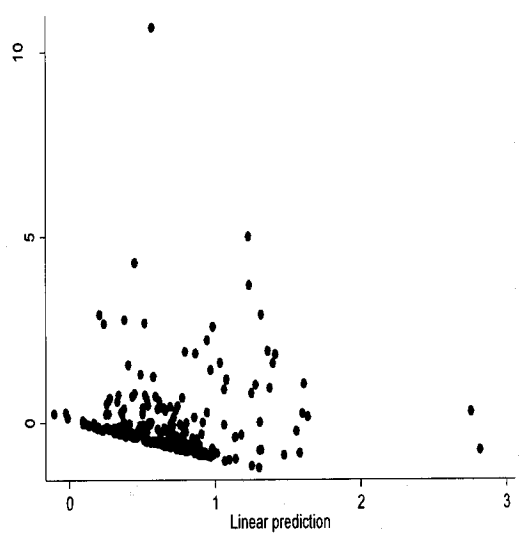

Figure 6: Predicted vs Fitted Residuals (when y=DSPSD – Consolidated Sample)

Residual graphs will not be displayed for the sub-samples due to the inconclusiveness of the graphical method in random effect models. Thus, all random models will be estimated using robust standard errors to remain on the safe side with respect to reliability of results.

4.4. Regression Results

This part will present the regression results for the consolidated sample followed by the chosen subsamples and will interpret them in order to answer the posed research questions. All regression results will be corrected for heteroskedasticity and 1st order autocorrelation (where needed) to ensure more robust results and a better interpretation.

4.4.1 Impact of diversification on performance

The first set of results will explore the impact of sectoral and geographical diversification on the performance of bank returns on an accounting level (ROA and ROE) and on a market level (ASLR). Full outputs from STATA are presented below.

4.4.1.1. Consolidated

From Tables 42-43 we can see that neither sectoral nor geographical diversification has a significant impact on ROA or ROE in the consolidated sample despite correcting for heteroskedasticity and autocorrelation. All independent control variables were significant at the ≥0.05 level when ROA is the dependent variable while only DER was found to be insignificant when ROE was the dependent variable. However, Table 44 shows us that a significant relationship exists between sectoral diversification (SHHI) and the annual stock log-returns (ASLR). The positive relationship seems to indicate that sectoral *concentration* increases the annual stock log returns of banks in the sample while sectoral *diversification* decreases them, since a higher HH index translates into an increase in concentration. It should be noted that independent control variables SIZE and DER were not significant when ASLR was the dependent variable.

We also suspected a nonlinear relationship between diversification measures and performance proxies, but there was no significant nonlinear relationship when ROA and

ROE were the dependent variables. The reasons behind this insignificance may be highly attributed to the country wise differences present in the sample. As a result, further dissection of the consolidated sample will be conducted. However, Table 45, shows us that a non-linear relationship exists between ASLR and sectoral diversification (SHHI and SHHI2) at the 5% and 10% levels respectively. Consistent with the results of Table 45, the positive sign of SHHI and the negative sign of SHHI2 indicate that sectoral concentration improves annual stock log-returns (ASLR) until a certain point/threshold where additional concentration will start to reduce them.

Figure 7 shows us that the optimal point is roughly at an SHH index of 0.1. This means that concentration up till 0.1 will improve returns (positive sign of SHHI) while any further concentration will reduce returns (negative sign of SHHI2). Overall, this shows that market returns in the MENA region favor sectoral diversification (since the optimal point is near 0.1).

```
. xtreg ROA SHHI GHHI SIZE DER GRTA LTDR NIM, re cluster(NameofBank)

Random-effects GLS regression                   Number of obs      =       245
Group variable: NameofBank                      Number of groups   =        35

R-sq:                                           Obs per group:
     within  = 0.1844                                         min =         7
     between = 0.4131                                         avg =       7.0
     overall = 0.3288                                         max =         7

                                                Wald chi2(7)       =     25.06
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0007

                                (Std. Err. adjusted for 35 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
         ROA |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |   -.000357   .0115976    -0.03   0.975    -.023088    .0223739
        GHHI |   .0008037   .0040077     0.20   0.841   -.0070512    .0086586
        SIZE |   .0017605   .0008286     2.12   0.034    .0001365    .0033845
         DER |  -.0010033   .0002136    -4.70   0.000   -.0014219   -.0005846
        GRTA |   .0084699   .0035109     2.41   0.016    .0015887    .0153511
        LTDR |  -.0083839    .003664    -2.29   0.022   -.0155652   -.0012026
         NIM |   .4487815   .2072396     2.17   0.030    .0425995    .8549636
       _cons |  -.0252527   .0227154    -1.11   0.266    -.069774    .0192686
-------------+----------------------------------------------------------------
     sigma_u |   .0035853
     sigma_e |  .00356854
         rho |  .50234247   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 42: Results for diversification vs ROA – Consolidated Sample

```
. xtreg ROE SHHI GHHI SIZE DER GRTA LTDR NIM, re cluster(NameofBank)

Random-effects GLS regression                   Number of obs      =       245
Group variable: NameofBank                      Number of groups   =        35

R-sq:                                           Obs per group:
     within  = 0.1484                                         min =         7
     between = 0.1183                                         avg =       7.0
     overall = 0.1244                                         max =         7

                                                Wald chi2(7)       =     21.38
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0032

                                (Std. Err. adjusted for 35 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
         ROE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |   .0546581   .0897842     0.61   0.543    -.1213156    .2306318
        GHHI |  -.0061736   .0291012    -0.21   0.832     -.063211    .0508637
        SIZE |   .0136713   .0066676     2.05   0.040     .0006031    .0267395
         DER |    .000176   .0018041     0.10   0.922    -.0033599     .003712
        GRTA |   .0677735   .0282978     2.40   0.017     .0123109    .1232362
        LTDR |  -.0794248   .0286582    -2.77   0.006    -.1355938   -.0232557
         NIM |   3.416878   1.597788     2.14   0.032     .2852713    6.548485
       _cons |  -.2439436   .1848335    -1.32   0.187    -.6062105    .1183234
-------------+----------------------------------------------------------------
     sigma_u |  .02910115
     sigma_e |  .02926404
         rho |  .49720926   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 43: Results for diversification vs ROE – Consolidated Sample

```
. xtscc ASLR SHHI GHHI SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors  Number of obs      =       245
Method: Fixed-effects regression                Number of groups   =        35
Group variable (i): NameofBank                  F(  7,     34)     =     10.03
maximum lag: 2                                  Prob > F           =    0.0000
                                                within R-squared   =    0.1100

------------------------------------------------------------------------------
             |             Drisc/Kraay
        ASLR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |   .4196561   .1706825     2.46   0.019     .0727876    .7665247
        GHHI |   .0484389   .1810347     0.27   0.791    -.3194679    .4163457
        SIZE |   -.206328   .1307912    -1.58   0.124    -.4721278    .0594718
         DER |  -.0131112    .011272    -1.16   0.253    -.0360186    .0097963
        GRTA |   .7580784   .1330454     5.70   0.000     .4876975    1.028459
        LTDR |  -.1745295   .0398549    -4.38   0.000    -.2555243   -.0935346
         NIM |    7.38661   3.641148     2.03   0.050    -.0130934    14.78631
       _cons |   4.737691   3.152726     1.50   0.142    -1.669418    11.1448
------------------------------------------------------------------------------
```

Table 44: Results for diversification vs ASLR – Consolidated Sample

```
. xtscc ASLR SHHI SHHI2 GHHI GHHI2 SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =       245
Method: Fixed-effects regression                 Number of groups   =        35
Group variable (i): NameofBank                   F(  9,     34)     =     19.37
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.1185
```

ASLR	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	6.673234	3.244354	2.06	0.047	.0799124	13.26656
SHHI2	-11.2881	5.86628	-1.92	0.063	-23.20982	.6336148
GHHI	-.971153	1.085987	-0.89	0.377	-3.178144	1.235838
GHHI2	.783246	.7122827	1.10	0.279	-.6642866	2.230778
SIZE	-.2066699	.1287185	-1.61	0.118	-.4682574	.0549176
DER	-.0133512	.0104211	-1.28	0.209	-.0345294	.007827
GRTA	.7359631	.1229956	5.98	0.000	.4860061	.9859201
LTDR	-.1257161	.0603782	-2.08	0.045	-.2484194	-.0030129
NIM	8.911029	3.034996	2.94	0.006	2.743174	15.07888
_cons	4.145004	3.348197	1.24	0.224	-2.659352	10.94936

Table 45: Results for Non-Linear diversification vs ASLR – Consolidated Sample

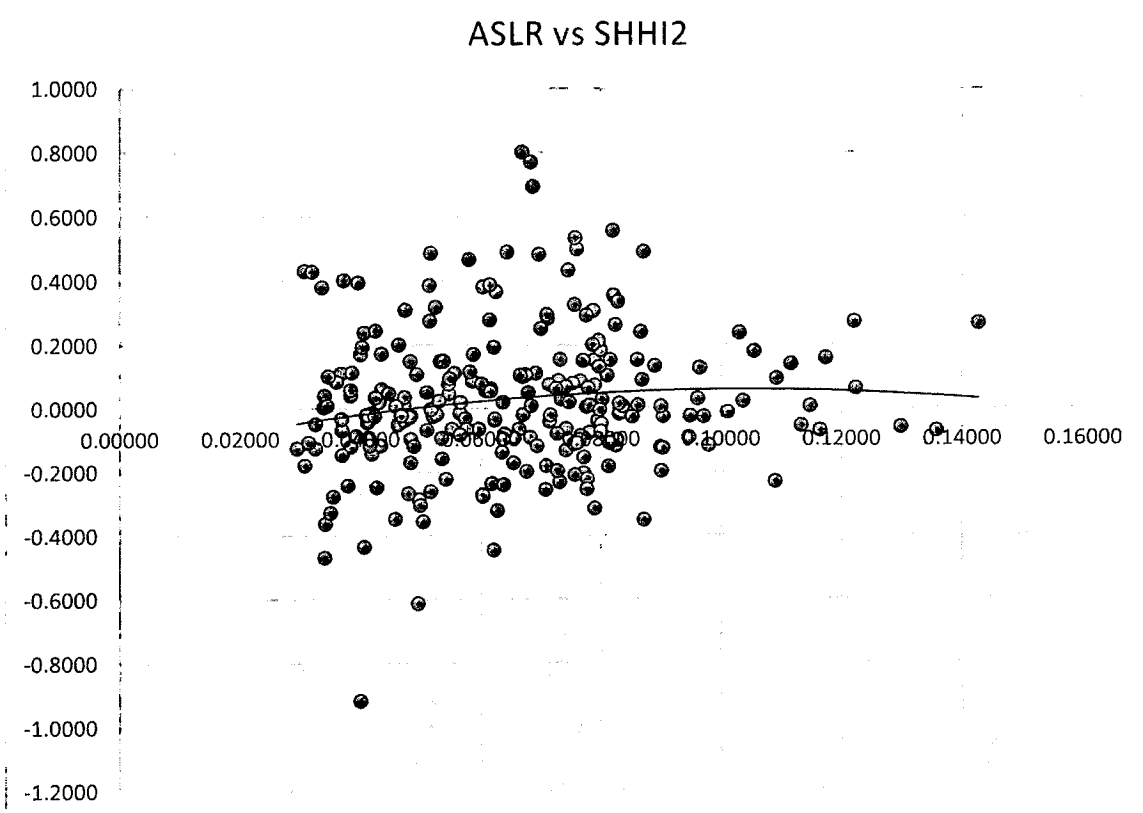

Figure 7: ASLR vs SHHI2 – Consolidated Sample

4.4.1.2. GCC

Table 46 reports the results using ROA as a dependent variable. Diversification is still not significant in explaining the variations of ROA for the GCC sample despite using robust standard errors to correct for heteroskedasticity and 1st order autocorrelation. All remaining independent control variables were significant at ≥0.05 excpet LTDR.

```
. xtreg ROA SHHI GHHI SIZE DER GRTA LTDR NIM, fe robust

Fixed-effects (within) regression               Number of obs      =       161
Group variable: NameofBank                      Number of groups   =        23

R-sq:                                           Obs per group:
     within  = 0.3740                                         min =         7
     between = 0.1716                                         avg =       7.0
     overall = 0.1811                                         max =         7

                                                F(7,22)            =      4.87
corr(u_i, Xb)  = -0.7580                        Prob > F           =    0.0019

                                (Std. Err. adjusted for 23 clusters in NameofBank)
```

ROA	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	-.0063632	.0229755	-0.28	0.784	-.0540115	.0412852
GHHI	.0016222	.0083018	0.20	0.847	-.0155948	.0188392
SIZE	.0060138	.002326	2.59	0.017	.00119	.0108377
DER	-.002069	.000693	-2.99	0.007	-.0035062	-.0006318
GRTA	.0149563	.0041033	3.64	0.001	.0064466	.0234659
LTDR	-.0074956	.0078502	-0.95	0.350	-.0237759	.0087847
NIM	1.015964	.3149727	3.23	0.004	.3627504	1.669177
_cons	-.1324696	.0573831	-2.31	0.031	-.251475	-.0134643
sigma_u	.00621384					
sigma_e	.00366692					
rho	.74170532	(fraction of variance due to u_i)				

Table 46: Results for diversification vs ROA – GCC Sample

Table 47 reports the results using ROE as the dependent variable. Diversification remains insignificant in explaining the variations of ROE for the GCC sample despite using robust standard errors to correct for heteroskedasticity and 1st order autocorrelation. All remaining independent control variables were significant at ≥0.05 except for DER and LTDR.

```
. xtreg ROE SHHI GHHI SIZE DER GRTA LTDR NIM, fe robust

Fixed-effects (within) regression               Number of obs      =       161
Group variable: NameofBank                      Number of groups   =        23

R-sq:                                           Obs per group:
     within  = 0.2486                                         min =         7
     between = 0.0150                                         avg =       7.0
     overall = 0.0379                                         max =         7

                                                F(7,22)            =      3.14
corr(u_i, Xb)  = -0.8051                        Prob > F           =    0.0186

                                (Std. Err. adjusted for 23 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
         ROE |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |    .000861   .1799673     0.00   0.996    -.3723682    .3740903
        GHHI |   .0037094   .0621128     0.06   0.953    -.1251048    .1325235
        SIZE |   .0542733   .0190103     2.85   0.009     .0148483    .0936982
         DER |   .0000132   .0056038     0.00   0.998    -.0116084    .0116347
        GRTA |   .1148478   .0335183     3.43   0.002     .0453351    .1843604
        LTDR |  -.0603549   .0654054    -0.92   0.366    -.1959975    .0752876
         NIM |   7.787635   2.518511     3.09   0.005     2.564563    13.01071
       _cons |  -1.323117   .4683991    -2.82   0.010    -2.294517   -.3517171
-------------+----------------------------------------------------------------
     sigma_u |  .05186639
     sigma_e |  .02964399
         rho |   .7537703   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 47: Results for diversification vs ROE – GCC Sample

Table 48 reports the results for ASLR using Driscoll-Kray standard errors. SHHI was significant at the ≥0.05 level since its p-value was 0.017, with a positive coefficient, suggesting a positive relationship between SHHI and Annual Stock Log-Returns (ASLR) for banks in the GCC sample. Since a higher Herfindahl-Hirschman index is translated into a higher concentration, the results suggest that sectoral diversification is translated into lower market returns. GHHI was not significant in explaining ASLR along with some independent control variables such as SIZE, DER and LTDR.

```
. xtscc ASLR SHHI GHHI SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =       161
Method: Fixed-effects regression                 Number of groups   =        23
Group variable (i): NameofBank                   F(  7,     22)     =     55.84
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.1299
```

ASLR	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	1.427092	.5549807	2.57	0.017	.2761325	2.578052
GHHI	.0484303	.2156871	0.22	0.824	-.3988773	.495738
SIZE	-.2023221	.1752366	-1.15	0.261	-.5657406	.1610963
DER	-.0304568	.0328098	-0.93	0.363	-.0985001	.0375865
GRTA	.8928169	.300087	2.98	0.007	.2704746	1.515159
LTDR	-.2312329	.2262144	-1.02	0.318	-.7003729	.237907
NIM	17.75644	6.338644	2.80	0.010	4.610899	30.90199
_cons	4.376211	4.072719	1.07	0.294	-4.070091	12.82251

Table 48: Results for diversification vs ASLR – GCC Sample

The insignificance of diversification with ROA and ROE might signal the presence of a nonlinear relationship between diversification and performance. Thus, tests are rerun for the GCC sample by including squared terms for SHHI and GHHI as shown in Tables 49 and 50.

The results in Table 49 indicate that neither SHHI nor SHHI2 are significant in explaining the variations of ROA. However, GHHI and GHHI2 are both significant in explaining the variations confirming that a non-linear relationship exists between geographical diversification and performance. It should be noted that control variable LTDR was also not found to be significant. While GHHI has a positive coefficient, GHHI2 has a negative coefficient, meaning that geographical concentration until a certain threshold improves ROA, and geographical diversification from a certain point also improves ROA. This threshold is roughly at a GHH index of 0.49-0.5 based on Figure 8 which means that GCC returns favor geographical diversification. An increasing GHHI index between 0.1 and 0.45 will improve bank performance, while a GHHI index above 0.5 (lower diversification) will reduce bank performance. The threshold of 0.45-0.5 indicates that

GCC banks achieve highest returns when they have almost equally balanced portfolios locally and internationally.

It should be noted that no significant non-linear relationship was found between diversification and ROE in the GCC sample. Finally, Table 50 reports the results between diversification and ASLR in the GCC sample.

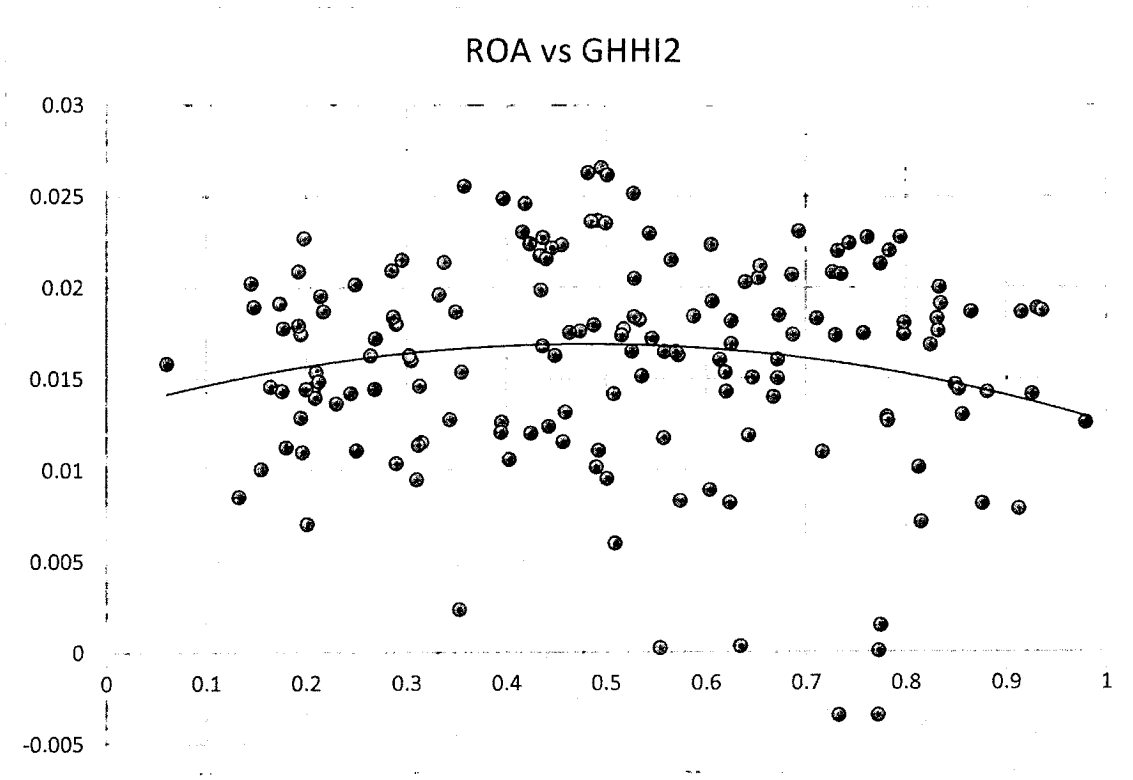

Figure 8: ROA vs GHHI2 – GCC Sample

```
. xtreg ROA SHHI SHHI2 GHHI GHHI2 SIZE DER GRTA LTDR NIM, fe robust

Fixed-effects (within) regression               Number of obs      =       161
Group variable: NameofBank                      Number of groups   =        23

R-sq:                                           Obs per group:
     within  = 0.3954                                         min =         7
     between = 0.1440                                         avg =       7.0
     overall = 0.1536                                         max =         7

                                                F(9,22)            =      5.54
corr(u_i, Xb)  = -0.8239                        Prob > F           =    0.0005

                                (Std. Err. adjusted for 23 clusters in NameofBank)
```

ROA	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	-.0285412	.1712781	-0.17	0.869	-.3837503	.326668
SHHI2	.0352193	.2947499	0.12	0.906	-.5760547	.6464933
GHHI	.0553699	.0242428	2.28	0.032	.0050934	.1056464
GHHI2	-.0403672	.0213542	-1.89	0.072	-.084653	.0039187
SIZE	.0065982	.0023706	2.78	0.011	.0016819	.0115146
DER	-.0021444	.0007069	-3.03	0.006	-.0036104	-.0006784
GRTA	.0154101	.004233	3.64	0.001	.0066314	.0241889
LTDR	-.0044457	.0070935	-0.63	0.537	-.0191566	.0102652
NIM	.9679213	.2892343	3.35	0.003	.3680861	1.567757
_cons	-.1607341	.0643686	-2.50	0.020	-.2942263	-.0272418
sigma_u	.00743567					
sigma_e	.00363159					
rho	.80740496	(fraction of variance due to u_i)				

Table 49: Non-Linear diversification vs ROA results – GCC Sample

Table 50 runs the same regression using the market performance proxy (ASLR) as the dependent variable and with Driscoll Kray standard errors. While GHHI and GHHI2 are not significant, SHHI is positive and significant at 5% (at a p-value of 0.041) which is consistent with our linear results from Table 47. However, SHHI2 is negative, and significant at only 10%. The results of SHHI suggest that sectoral diversification is translated into lower market returns. However, the negative sign of SHHI2 indicates that sectoral diversification beyond a certain threshold starts to yield positive returns. A graphical representation between SHHI2 and ASLR is not presented because the approximate threshold could not be established from the graph due to the low significance level of the variable (at 10%).

```
. xtscc ASLR SHHI SHHI2 GHHI GHHI2 SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =       161
Method: Fixed-effects regression                 Number of groups   =        23
Group variable (i): NameofBank                   F(  9,     22)     =     42.94
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.1393
```

ASLR	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	11.42742	5.27023	2.17	0.041	.4976308	22.35721
SHHI2	-19.16668	10.00274	-1.92	0.068	-39.9111	1.577732
GHHI	-.9562874	1.10751	-0.86	0.397	-3.253123	1.340548
GHHI2	.7720554	.7407616	1.04	0.309	-.7641901	2.308301
SIZE	-.2019375	.181169	-1.11	0.277	-.577659	.1737841
DER	-.0285929	.0315764	-0.91	0.375	-.0940784	.0368925
GRTA	.8969431	.3084626	2.91	0.008	.2572307	1.536655
LTDR	-.2018219	.2593373	-0.78	0.445	-.7396546	.3360107
NIM	20.56251	7.453395	2.76	0.011	5.105109	36.0199
_cons	3.295671	4.781296	0.69	0.498	-6.620131	13.21147

Table 50: Non-linear diversification vs ASLR results – GCC Sample

4.4.1.3. Levant and North Africa

The same regressions will be run for L&NA, and results are reported in Tables 51, 52, and 53 for ROA, ROE, and ASLR respectively. First, Table 51 reported that diversification is not significant in explaining the variations in ROA. Also, all independent control variables were found to be significant except for SIZE. We did not find a significant non-linear relationship between diversification and ROA in this sample.

```
. xtreg ROA SHHI GHHI SIZE DER GRTA LTDR NIM, fe robust

Fixed-effects (within) regression               Number of obs      =        84
Group variable: NameofBank                      Number of groups   =        12

R-sq:                                           Obs per group:
     within  = 0.2440                                         min =         7
     between = 0.1437                                         avg =       7.0
     overall = 0.1353                                         max =         7

                                                F(7,11)            =     16.28
corr(u_i, Xb)  = -0.7928                        Prob > F           =     0.0001

                                (Std. Err. adjusted for 12 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
         ROA |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |  -.0058577   .0135458    -0.43   0.674    -.0356718    .0239564
        GHHI |   .0033616   .0047842     0.70   0.497    -.0071684    .0138917
        SIZE |  -.0030682   .0024404    -1.26   0.235    -.0084395    .0023032
         DER |  -.0003778   .0001108    -3.41   0.006    -.0006216   -.0001339
        GRTA |   .0044984   .0022403     2.01   0.070    -.0004324    .0094292
        LTDR |  -.0103295   .0043546    -2.37   0.037     -.019914    -.000745
         NIM |   .3174362   .0879472     3.61   0.004     .1238658    .5110066
       _cons |   .0821358   .0549823     1.49   0.163    -.0388794    .2031511
-------------+----------------------------------------------------------------
     sigma_u |  .00661009
     sigma_e |  .00209519
         rho |   .9087038   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 51: Diversification vs ROA results – L&NA Sample

The results from Tables 52 and 53 also indicate that diversification is not significantly related with ROE and ASLR. Furthermore, no significant non-linear relationship between diversification and both dependent variables (ROE and ASLR) was found in this sample. This means that diversification is not significant (Linearly and non-linearly) in explaining the variations of any dependent variables related to performance in the L&NA region.

```
. xtreg ROE SHHI GHHI SIZE DER GRTA LTDR NIM, re cluster(NameofBank)

Random-effects GLS regression                   Number of obs      =        84
Group variable: NameofBank                      Number of groups   =        12

R-sq:                                           Obs per group:
     within  = 0.2076                                         min =         7
     between = 0.2944                                         avg =       7.0
     overall = 0.2661                                         max =         7

                                                Wald chi2(7)       =     65.11
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                (Std. Err. adjusted for 12 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
         ROE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |   .0696408   .1322623     0.53   0.599    -.1895886    .3288701
        GHHI |  -.0139705   .0349864    -0.40   0.690    -.0825426    .0546016
        SIZE |  -.0002344   .0106825    -0.02   0.982    -.0211717    .0207029
         DER |   .0025242   .0031865     0.79   0.428    -.0037212    .0087697
        GRTA |   .0367433    .020677     1.78   0.076    -.0037829    .0772695
        LTDR |  -.1060856   .0394843    -2.69   0.007    -.1834735   -.0286977
         NIM |    2.95156   1.344263     2.20   0.028     .3168532    5.586268
       _cons |   .0683975   .2525281     0.27   0.787    -.4265486    .5633435
-------------+----------------------------------------------------------------
     sigma_u |  .04290056
     sigma_e |  .02432716
         rho |  .75668361   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 52: Diversification vs ROE results – L&NA Sample

```
. regress ASLR SHHI GHHI SIZE GRTA DER LTDR NIM

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(7, 76)      =    2.57
       Model |  .534555657     7  .076365094           Prob > F      =  0.0197
    Residual |  2.25741565    76  .029702838           R-squared     =  0.1915
-------------+------------------------------           Adj R-squared =  0.1170
       Total |  2.79197131    83  .033638209           Root MSE      =  .17235

------------------------------------------------------------------------------
        ASLR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |   .2304152   .4455377     0.52   0.607     -.65695     1.11778
        GHHI |  -.1214617   .1367827    -0.89   0.377    -.3938881    .1509647
        SIZE |   -.006807   .0163279    -0.42   0.678    -.0393268    .0257128
        GRTA |   .5531878   .1619843     3.42   0.001     .2305681    .8758074
         DER |   .0040393   .0061674     0.65   0.514    -.0082442    .0163229
        LTDR |  -.0496469   .1261516    -0.39   0.695    -.3008996    .2016058
         NIM |   3.142316   3.614455     0.87   0.387    -4.056496    10.34113
       _cons |   .0464346   .4272531     0.11   0.914    -.8045137    .8973828
------------------------------------------------------------------------------
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ASLR

         chi2(1)      =      0.18
         Prob > chi2  =    0.6673
```

Table 53: Diversification vs ASLR Results – L&NA sample

The second part of Table 53 shows the results of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity. Since the p-value is greater than 0.05, we cannot reject the null hypothesis which states that errors are homoscedastic, meaning that the regression does not need heteroskedasticity corrections.

4.4.1.4 Levant

Tables 54-56 report the results for the Levant Sample alone. Using ROA as the dependent variable in Table 54, diversification is found to be significant in predicting the variations of ROA in the Levant sample. While SHHI has a positive coefficient, GHHI has a negative one, suggesting that sectoral concentration improves bank performance as measured by ROA, while geographical diversification improves bank performance. The impact of SHHI is bigger than the impact of GHHI as shown by the size of the coefficient (0.0277 for SHHI versus -0.008 for GHHI). It should also be noted that no significant non-linear relationship exists between diversification measures and ROA.

```
. regress ROA SHHI GHHI SIZE DER GRTA LTDR NIM
```

Source	SS	df	MS	Number of obs	=	56
				F(7, 48)	=	34.68
Model	.001078524	7	.000154075	Prob > F	=	0.0000
Residual	.000213268	48	4.4431e-06	R-squared	=	0.8349
				Adj R-squared	=	0.8108
Total	.001291792	55	.000023487	Root MSE	=	.00211

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	.0277265	.0064526	4.30	0.000	.0147527	.0407004
GHHI	-.0080669	.0028563	-2.82	0.007	-.0138098	-.002324
SIZE	.0011151	.0004315	2.58	0.013	.0002476	.0019826
DER	-.0001288	.0002032	-0.63	0.529	-.0005374	.0002798
GRTA	.0120157	.0042707	2.81	0.007	.003429	.0206025
LTDR	-.0195525	.002714	-7.20	0.000	-.0250095	-.0140956
NIM	.7441205	.0638748	11.65	0.000	.6156916	.8725495
_cons	-.0246492	.0134572	-1.83	0.073	-.0517067	.0024083

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =     1.06
         Prob > chi2  =   0.3025
```

Table 54: Diversification vs ROA results – Levant sample

The second part of Table 54 shows the results of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity. Since the p-value is greater than 0.05, we cannot reject the null hypothesis which states that errors are homoscedastic meaning that the regression does not need heteroskedasticity corrections.

The results for ROE shown in Table 55, which are in line with ROA results in Table 54, show that there is a significant positive relationship between SHHI and ROE and a negative significant relationship between GHHI and ROE. Similarly, the coefficient of SHHI is 0.26, while that of GHHI is -0.09, indicating that *sectoral concentration* is more important *than geographical diversification.* The second part of Table 55 shows the results of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity. Since the p-value is greater than 0.05, the null hypothesis which states that errors are homoscedastic is not rejected, suggesting no further correction is needed. We also did not find any significant non-linear relationship between diversification and ROE in the Levant sample.

```
. regress ROE SHHI GHHI SIZE GRTA DER LTDR NIM
```

Source	SS	df	MS	Number of obs	=	56
				F(7, 48)	=	38.91
Model	.103394662	7	.014770666	Prob > F	=	0.0000
Residual	.018220183	48	.000379587	R-squared	=	0.8502
				Adj R-squared	=	0.8283
Total	.121614845	55	.002211179	Root MSE	=	.01948

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	.2597159	.0596416	4.35	0.000	.1397984	.3796335
GHHI	-.0929142	.0264004	-3.52	0.001	-.1459958	-.0398326
SIZE	.0067834	.0039881	1.70	0.095	-.0012352	.014802
GRTA	.0835107	.0394737	2.12	0.040	.0041436	.1628778
DER	.0098647	.0018785	5.25	0.000	.0060877	.0136416
LTDR	-.1603701	.0250859	-6.39	0.000	-.2108088	-.1099315
NIM	5.857648	.5903953	9.92	0.000	4.670578	7.044717
_cons	-.212435	.1243849	-1.71	0.094	-.4625276	.0376575

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROE

         chi2(1)      =     0.02
         Prob > chi2  =   0.9010
```

Table 55: Diversification vs ROE results – Levant sample

The results when the dependent variable used is ASLR are reported in Table 56. No significant (linear and non-linear) relationship exists between diversification and ASLR, suggesting that market performance is not affected by sectoral and geographical diversification achieved by banks in the Levant region. Also, the second part of Table 56 shows that the results of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity. Since the p-value is greater than 0.05, we cannot reject the null hypothesis which states that errors are homoscedastic meaning that the regression does not need heteroskedasticity corrections.

```
. regress ASLR SHHI GHHI SIZE GRTA DER LTDR NIM
```

Source	SS	df	MS	Number of obs	=	56
				F(7, 48)	=	4.30
Model	.674714276	7	.096387754	Prob > F	=	0.0009
Residual	1.07696666	48	.022436805	R-squared	=	0.3852
				Adj R-squared	=	0.2955
Total	1.75168094	55	.031848744	Root MSE	=	.14979

ASLR	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	.2972198	.4585369	0.65	0.520	-.6247305	1.21917
GHHI	-.0603605	.2029718	-0.30	0.767	-.4684626	.3477416
SIZE	.0404057	.0306613	1.32	0.194	-.0212429	.1020543
GRTA	1.281125	.3034814	4.22	0.000	.670935	1.891316
DER	.004765	.0144422	0.33	0.743	-.0242731	.033803
LTDR	-.1378283	.1928658	-0.71	0.478	-.525611	.2499544
NIM	12.0205	4.539078	2.65	0.011	2.894071	21.14693
_cons	-1.335444	.9562961	-1.40	0.169	-3.258206	.5873186

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ASLR

         chi2(1)      =     2.39
         Prob > chi2  =   0.1222
```

Table 56: Diversification vs ASLR results – Levant sample

4.4.2. Impact of diversification on risk

The second set of results will explore whether or not sectoral and geographical diversification have an impact on the risk of banks on an accounting level (NPL) and on market level (DSLRSD and DSPSD). Full outputs from STATA are presented below.

4.4.2.1. Consolidated

Results in Tables 57 and 59 shows that diversification is not significant in predicting any variation in accounting risk proxy (NPL) and in market risk proxy (DSPSD). Furthermore, no significant non -linear relationship was found between diversification and NPL or DSPSD. However, the results in Table 58 show a significant linear relationship between geographical diversification (GHHI) and DSLRSD. The negative coefficient of GHHI and DSLRSD suggests that geographical diversification increases the daily volatility of stock returns. This means that geographical concentration

is favored in reducing the bank's risk measured as the volatility of its stock log-returns. It should also be noted that no significant non-linear relationship was found between diversification and DSLRSD.

```
. xtreg NPL SHHI GHHI SIZE DER GRTA LTDR NIM, re cluster(NameofBank)

Random-effects GLS regression                   Number of obs      =       245
Group variable: NameofBank                      Number of groups   =        35

R-sq:                                           Obs per group:
     within  = 0.0470                                         min =         7
     between = 0.1843                                         avg =       7.0
     overall = 0.1203                                         max =         7

                                                Wald chi2(7)       =      7.95
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.3368

                                (Std. Err. adjusted for 35 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
         NPL |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |  -.1267724   .0798977    -1.59   0.113     -.283369    .0298243
        GHHI |   .0164833    .035803     0.46   0.645    -.0536893    .0866558
        SIZE |  -.0028024   .0066945    -0.42   0.676    -.0159234    .0103187
         DER |   .0006332   .0012004     0.53   0.598    -.0017196     .002986
        GRTA |  -.0455705   .0216125    -2.11   0.035    -.0879302   -.0032109
        LTDR |  -.0147725   .0280091    -0.53   0.598    -.0696692    .0401243
         NIM |   .5465048   .8750512     0.62   0.532    -1.168564    2.261574
       _cons |   .1301605   .1717729     0.76   0.449    -.2065081    .4668292
-------------+----------------------------------------------------------------
     sigma_u |  .02928845
     sigma_e |  .02541138
         rho |  .57052478   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 57: Diversification vs NPL results – Consolidated Sample

```
. xtscc DSLRSD SHHI GHHI SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =       245
Method: Fixed-effects regression                 Number of groups   =        35
Group variable (i): NameofBank                   F(  7,     34)     =     36.85
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.1429
```

DSLRSD	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	.0164709	.0111778	1.47	0.150	-.0062452	.0391871
GHHI	-.0107661	.0051094	-2.11	0.043	-.0211496	-.0003826
SIZE	-.0139033	.0037399	-3.72	0.001	-.0215038	-.0063029
DER	.0004913	.0002044	2.40	0.022	.0000759	.0009067
GRTA	-.0028958	.0037181	-0.78	0.441	-.0104519	.0046603
LTDR	.0011627	.0037421	0.31	0.758	-.0064422	.0087676
NIM	-.0499329	.2148228	-0.23	0.818	-.4865053	.3866395
_cons	.3457955	.084073	4.11	0.000	.1749386	.5166523

Table 58: Diversification vs DSLRSD results – Consolidated Sample

```
. xtreg DSPSD SHHI GHHI SIZE DER GRTA LTDR NIM, re robust

Random-effects GLS regression                    Number of obs      =       245
Group variable: NameofBank                       Number of groups   =        35

R-sq:                                            Obs per group:
     within  = 0.0720                                          min =         7
     between = 0.0850                                          avg =       7.0
     overall = 0.0798                                          max =         7

                                                 Wald chi2(7)       =     22.53
corr(u_i, X)   = 0 (assumed)                     Prob > chi2        =    0.0021

                                (Std. Err. adjusted for 35 clusters in NameofBank)
```

DSPSD	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
SHHI	-.1176377	2.205038	-0.05	0.957	-4.439432	4.204157
GHHI	.2670861	.6144593	0.43	0.664	-.937232	1.471404
SIZE	.0424092	.1013722	0.42	0.676	-.1562767	.241095
DER	.1179207	.0390581	3.02	0.003	.0413683	.1944731
GRTA	.2720215	.3033304	0.90	0.370	-.3224952	.8665382
LTDR	1.249922	.7028364	1.78	0.075	-.1276121	2.627456
NIM	-23.87343	25.32283	-0.94	0.346	-73.50526	25.75841
_cons	-1.773688	2.4694	-0.72	0.473	-6.613624	3.066248
sigma_u	.92422378					
sigma_e	.70858029					
rho	.62980532	(fraction of variance due to u_i)				

Table 59: Diversification vs DSPSD results – Consolidated Sample

Again, we proceed to dissect our consolidated sample in an attempt to eliminate the potential country wise heteroskedasticity which may be distorting the results of NPL and DSPSD.

4.4.2.2. GCC

Table 60 shows no significant relationship between diversification and NPL despite splitting the sample. Also, there is no significant non-linear relationship between diversification and NPL.

```
. xtreg NPL SHHI GHHI SIZE DER GRTA LTDR NIM, re robust

Random-effects GLS regression                   Number of obs      =       161
Group variable: NameofBank                      Number of groups   =        23

R-sq:                                           Obs per group:
     within  = 0.0970                                         min =         7
     between = 0.0356                                         avg =       7.0
     overall = 0.0610                                         max =         7

                                                Wald chi2(7)       =     11.65
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.1127

                                (Std. Err. adjusted for 23 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
         NPL |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |  -.1561409   .1328787    -1.18   0.240    -.4165784    .1042966
        GHHI |   .0361522     .04775     0.76   0.449     -.057436    .1297405
        SIZE |   .0052951   .0067273     0.79   0.431    -.0078901    .0184804
         DER |   .0059236   .0033632     1.76   0.078    -.0006681    .0125153
        GRTA |  -.0577329    .037637    -1.53   0.125    -.1315001    .0160343
        LTDR |  -.0191576   .0290381    -0.66   0.509    -.0760712    .0377561
         NIM |   .5616255   1.464897     0.38   0.701    -2.309519     3.43277
       _cons |  -.1078122   .1894236    -0.57   0.569    -.4790756    .2634513
-------------+----------------------------------------------------------------
     sigma_u |  .02241336
     sigma_e |  .02603442
         rho |  .42567367   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 60: Diversification vs NPL results – GCC Sample

While Table 61 shows no significant linear relationship exists between diversification and DSLRSD, Table 62 shows the presence of a significant non-linear relationship between sectoral diversification and DSLRSD. The positive coefficient of SHHI indicates that sectoral concentration increases the daily volatility of returns suggesting that sectoral diversification is favored in reducing risk. However, the negative coefficient of SHHI2

suggests that sectoral diversification beyond a certain level starts increasing the volatility of returns. Figure 9 indicates the threshold level to roughly be at an SHHI of 0.12. Thus, while a low level of sectoral diversification reduces risk, a high level of sectoral diversification increases risk.

```
. xtscc DSLRSD SHHI GHHI SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =       161
Method: Fixed-effects regression                 Number of groups   =        23
Group variable (i): NameofBank                   F(  7,     22)     =     12.21
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.1575
```

DSLRSD	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	.0221977	.0295826	0.75	0.461	-.0391528	.0835483
GHHI	-.014157	.0101214	-1.40	0.176	-.0351476	.0068336
SIZE	-.0163647	.0045214	-3.62	0.002	-.0257415	-.0069878
DER	-.0006029	.0007456	-0.81	0.427	-.0021491	.0009434
GRTA	-.0213431	.0054388	-3.92	0.001	-.0326223	-.0100638
LTDR	-.0138824	.0101295	-1.37	0.184	-.0348896	.0071248
NIM	-.556626	.2954686	-1.88	0.073	-1.16939	.0561383
_cons	.446053	.1042128	4.28	0.000	.2299289	.6621771

Table 61: Diversification vs DSLRSD results – GCC Sample

```
. xtscc DSLRSD SHHI SHHI2 GHHI GHHI2 SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =       161
Method: Fixed-effects regression                 Number of groups   =        23
Group variable (i): NameofBank                   F(  9,     22)     =     44.29
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.1651
```

DSLRSD	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	.3891927	.1236814	3.15	0.005	.1326932	.6456921
SHHI2	-.7096634	.2138902	-3.32	0.003	-1.153245	-.2660823
GHHI	-.0066386	.0680153	-0.10	0.923	-.1476936	.1344165
GHHI2	-.0049725	.0437651	-0.11	0.911	-.0957358	.0857907
SIZE	-.0158463	.0047902	-3.31	0.003	-.0257806	-.0059121
DER	-.0005958	.00074	-0.81	0.429	-.0021305	.0009388
GRTA	-.0207927	.0046996	-4.42	0.000	-.030539	-.0110463
LTDR	-.0101191	.009065	-1.12	0.276	-.0289188	.0086806
NIM	-.4896804	.3198485	-1.53	0.140	-1.153005	.1736448
_cons	.3799813	.1155693	3.29	0.003	.1403052	.6196574

Table 62: Non-Linear Diversification vs DSLRSD results – GCC Sample

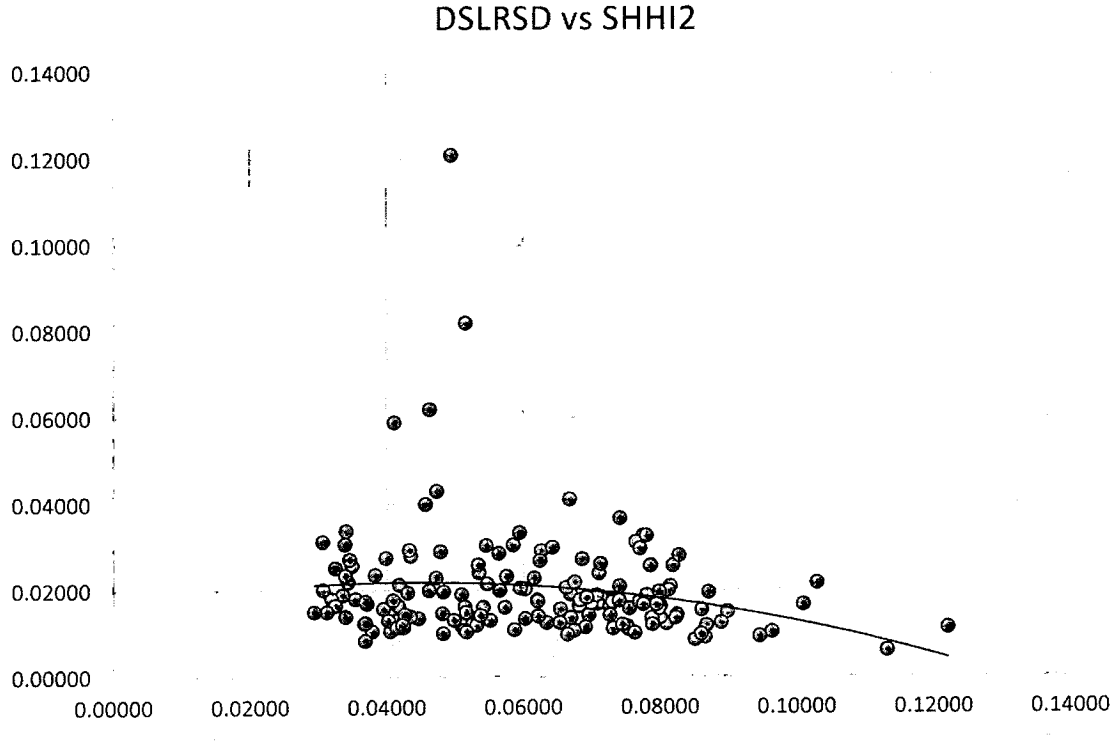

Figure 9: DSLRSD vs SHHI2 – GCC Sample

When measuring risk using DSPSD, Table 63 indicates that no significant relationship exists between diversification and DSPSD. Also, there is no significant non-linear relationship between diversification and DSPSD.

```
. xtreg DSPSD SHHI GHHI SIZE DER GRTA LTDR NIM, re robust

Random-effects GLS regression                   Number of obs      =       161
Group variable: NameofBank                      Number of groups   =        23

R-sq:                                           Obs per group:
     within  = 0.0508                                         min =         7
     between = 0.0026                                         avg =       7.0
     overall = 0.0004                                         max =         7

                                                Wald chi2(7)       =     16.35
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0221

                                (Std. Err. adjusted for 23 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
       DSPSD |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |  -3.001077   2.859631    -1.05   0.294    -8.60585    2.603697
        GHHI |     .89292    .757118     1.18   0.238    -.591004    2.376844
        SIZE |   .2398448   .1277198     1.88   0.060   -.0104813     .490171
         DER |   .0762204   .0902227     0.84   0.398   -.1006129    .2530536
        GRTA |  -.3915747   .3082906    -1.27   0.204   -.9958131    .2126636
        LTDR |   .1857677   .5026603     0.37   0.712   -.7994285    1.170964
         NIM |  -12.50251   26.93086    -0.46   0.642   -65.28603    40.28101
       _cons |  -5.384089   3.405201    -1.58   0.114   -12.05816    1.289982
-------------+----------------------------------------------------------------
     sigma_u |  .95678458
     sigma_e |  .74553131
         rho |  .62221543   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 63: Diversification vs DSPSD results – GCC Sample

4.4.2.3 Levant and North Africa

Tables 64-67 rerun the same regression for Levant and North Africa. First, using NPL as the dependent variable, Table 6 reports no significant linear relationship between diversification and risk. However, Table 65 shows that a significant non-linear relationship exists between NPL and geographical diversification. The positive coefficient of GHHI indicates that geographical concentration contributes negatively to the percentage of non -performing loans (i.e. increases the percentage of NPL) meaning that geographical diversification is favored. However, the negative coefficient of GHHI2 indicates that, after a certain level, geographical diversification also contributes to increasing the percentage of non-performing loans. Figure 10 shows that the level at which

additional geographical diversification may start to increase banks' risk is roughly at a GHH index between 0.9 – 0.6 thus favoring concentration. It also shows that a GHH index between 0.1 and 0.59 will contribute to an increase in the percentage of NPL.

```
. xtreg NPL SHHI GHHI SIZE DER GRTA LTDR NIM, re robust

Random-effects GLS regression                   Number of obs      =        84
Group variable: NameofBank                      Number of groups   =        12

R-sq:                                           Obs per group:
     within  = 0.1317                                         min =         7
     between = 0.4397                                         avg =       7.0
     overall = 0.3323                                         max =         7

                                                Wald chi2(7)       =     58.90
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                (Std. Err. adjusted for 12 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
         NPL |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |  -.2032689   .1243717    -1.63   0.102    -.447033    .0404952
        GHHI |   .0060491    .042182     0.14   0.886   -.0766262    .0887243
        SIZE |  -.0029024   .0084297    -0.34   0.731   -.0194243    .0136195
         DER |  -.0022874   .0012282    -1.86   0.063   -.0046947    .0001199
        GRTA |  -.0292099   .0222614    -1.31   0.189   -.0728414    .0144216
        LTDR |   .0255629   .0546551     0.47   0.640    -.081559    .1326849
         NIM |   .1926591   .9090813     0.21   0.832   -1.589107    1.974426
       _cons |   .1823741   .2174469     0.84   0.402    -.243814    .6085623
-------------+----------------------------------------------------------------
     sigma_u |  .02735938
     sigma_e |  .02202649
         rho |  .60673947   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 64: Diversification vs NPL results – L&NA Sample

```
Random-effects GLS regression                   Number of obs      =        84
Group variable: NameofBank                      Number of groups   =        12

R-sq:                                           Obs per group:
     within  = 0.0927                                         min =         7
     between = 0.9106                                         avg =       7.0
     overall = 0.5826                                         max =         7

                                                Wald chi2(9)       =    182.87
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                  (Std. Err. adjusted for 12 clusters in NameofBank)
```

NPL	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
SHHI	-1.597638	1.293582	-1.24	0.217	-4.133012	.9377356
SHHI2	2.128141	2.299319	0.93	0.355	-2.378442	6.634725
GHHI	.5271079	.2413014	2.18	0.029	.0541659	1.00005
GHHI2	-.342887	.1659921	-2.07	0.039	-.6682255	-.0175485
SIZE	.0008545	.0040181	0.21	0.832	-.0070208	.0087299
DER	-.0042947	.0014148	-3.04	0.002	-.0070676	-.0015217
GRTA	.0084884	.0286137	0.30	0.767	-.0475935	.0645703
LTDR	.036936	.0374618	0.99	0.324	-.0364876	.1103597
NIM	-1.161413	.8451219	-1.37	0.169	-2.817821	.4949956
_cons	.1771423	.2235614	0.79	0.428	-.26103	.6153146
sigma_u	.00775336					
sigma_e	.02127149					
rho	.1172759	(fraction of variance due to u_i)				

Table 65: Non-Linear diversification vs NPL results – L&NA Sample

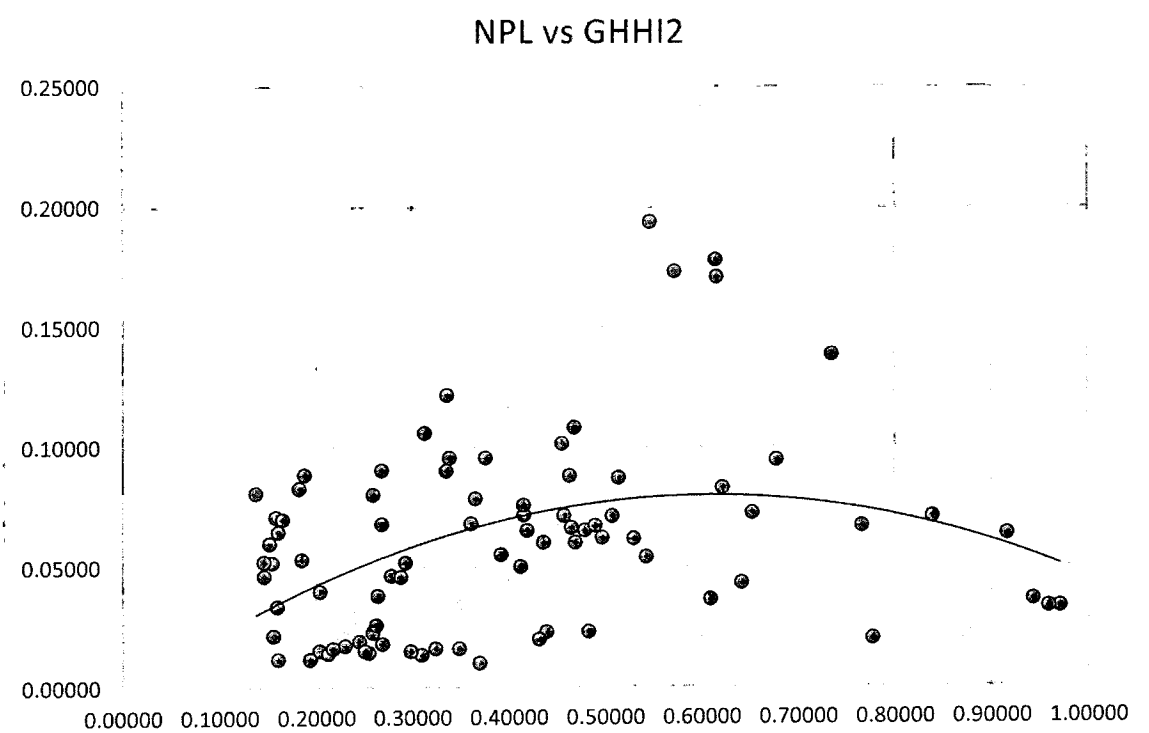

Figure 10: NPL vs GHHI2 – L&NA Sample

Table 66 shows that diversification is not significant in explaining the variations of DSLRSD. It should also be noted that there is no significant non-linear relationship between diversification and DSLRSD.

```
. xtreg DSLRSD SHHI GHHI SIZE DER GRTA LTDR NIM, fe robust

Fixed-effects (within) regression               Number of obs      =        84
Group variable: NameofBank                      Number of groups   =        12

R-sq:                                           Obs per group:
     within  = 0.4052                                         min =         7
     between = 0.0940                                         avg =       7.0
     overall = 0.0710                                         max =         7

                                                F(7,11)            =      4.31
corr(u_i, Xb)  = -0.9672                        Prob > F           =    0.0157

                                (Std. Err. adjusted for 12 clusters in NameofBank)
```

DSLRSD	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	-.0111521	.0198262	-0.56	0.585	-.0547892	.0324851
GHHI	-.0067192	.005163	-1.30	0.220	-.0180828	.0046445
SIZE	-.0129713	.0030462	-4.26	0.001	-.0196759	-.0062667
DER	.0003465	.0001939	1.79	0.101	-.0000803	.0007734
GRTA	.0080049	.0053581	1.49	0.163	-.0037882	.0197981
LTDR	.0120744	.0085622	1.41	0.186	-.0067708	.0309196
NIM	-.1681177	.1281277	-1.31	0.216	-.4501249	.1138895
_cons	.3126399	.0690586	4.53	0.001	.1606429	.4646368
sigma_u	.01847224					
sigma_e	.00419699					
rho	.95091187	(fraction of variance due to u_i)				

Table 66: Diversification vs DSLRSD results – L&NA Sample

Finally, Table 67 shows no significant relationship between diversification and DSPSD. Furthermore, there is no significant non-linear relationship between diversification and DSPSD. Our findings in this sample indicate that diversification is not significant (Linearly and non-linearly) in explaining the variations of market risk proxies (DSLRSD and DSPSD) for the L&NA sample. However, diversification is only found to be non-linearly significant in explaining the variations of accounting risk proxy NPL for the L&NA sample.

```
. xtscc DSPSD SHHI GHHI SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =        84
Method: Fixed-effects regression                 Number of groups   =        12
Group variable (i): NameofBank                   F(  7,     11)     =    347.66
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.2726
```

DSPSD	Drisc/Kraay Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	-.6339839	1.522164	-0.42	0.685	-3.984244	2.716276
GHHI	1.329666	.9681065	1.37	0.197	-.8011222	3.460454
SIZE	-.7364108	.4426234	-1.66	0.124	-1.710618	.2377966
DER	.0340595	.0464444	0.73	0.479	-.068164	.136283
GRTA	2.002698	.6025502	3.32	0.007	.6764936	3.328902
LTDR	1.551368	.5951882	2.61	0.024	.2413671	2.861368
NIM	-48.95303	30.57344	-1.60	0.138	-116.2447	18.33866
_cons	16.94694	9.344137	1.81	0.097	-3.619366	37.51325

Table 67: Diversification vs DSPSD results – L&NA Sample

4.4.2.4 Levant

Finally, Tables 68-70 report the results of diversification on risk in the Levant region only. Table 68 shows that geographical diversification (GHHI) is linearly significant in explaining the variation of NPL in the Levant sample. Also, sectoral diversification (SHHI) is found to be linearly significant, but at the ≥0.1 level only. There is a significant negative relationship between GHHI and NPL meaning that additional geographical diversification increases NPL. The same negative relationship was found between SHHI and NPL, suggesting that increased sectoral diversification also leads to a higher percentage of NPL. A significant non-linear relationship is found between geographical diversification (GHHI) and NPL at the ≥0.1 level only. Table 69 shows that a positive relationship exists between GHHI and NPL meaning that geographical diversification decreases NPL. However, the negative sign of GHHI2 indicates that excessive geographical diversification beyond a certain threshold will start to increase NPL. However, a graphical representation between GHHI2 and NPL is not presented

because the approximate threshold could not be established from the graph due to the low significance level of the variable (at 10%).

```
. xtscc NPL SHHI GHHI SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =        56
Method: Fixed-effects regression                 Number of groups   =         8
Group variable (i): NameofBank                   F(  7,     7)      =    221.43
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.2790
```

NPL	Drisc/Kraay Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	-.2015113	.1047569	-1.92	0.096	-.4492221	.0461994
GHHI	-.0513713	.0156214	-3.29	0.013	-.0883102	-.0144325
SIZE	.0092346	.0104674	0.88	0.407	-.0155169	.0339862
DER	-.0071208	.0012576	-5.66	0.001	-.0100946	-.004147
GRTA	-.1494206	.0125802	-11.88	0.000	-.1791681	-.1196731
LTDR	.0324208	.0242921	1.33	0.224	-.0250209	.0898624
NIM	-3.269219	.6765766	-4.83	0.002	-4.869068	-1.669369
_cons	.0819681	.2212646	0.37	0.722	-.4412395	.6051757

Table 68: Diversification vs NPL results – Levant Sample

```
. xtscc NPL SHHI SHHI2 GHHI GHHI2 SIZE DER GRTA LTDR NIM, fe

Regression with Driscoll-Kraay standard errors   Number of obs      =        56
Method: Fixed-effects regression                 Number of groups   =         8
Group variable (i): NameofBank                   F(  9,     7)      =    493.56
maximum lag: 2                                   Prob > F           =    0.0000
                                                 within R-squared   =    0.3781
```

NPL	Drisc/Kraay Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHHI	1.370545	1.170576	1.17	0.280	-1.397428	4.138517
SHHI2	-3.054736	2.092012	-1.46	0.188	-8.001559	1.892086
GHHI	.6346729	.2933537	2.16	0.067	-.0589983	1.328344
GHHI2	-.5353093	.2546926	-2.10	0.074	-1.137561	.066943
SIZE	.002263	.0122803	0.18	0.859	-.0267752	.0313013
DER	-.0051117	.0022637	-2.26	0.058	-.0104645	.0002411
GRTA	-.1224077	.0272038	-4.50	0.003	-.1867346	-.0580809
LTDR	.0699246	.0208122	3.36	0.012	.0207116	.1191375
NIM	-1.998326	1.189935	-1.68	0.137	-4.812075	.8154239
_cons	-.2347913	.3528635	-0.67	0.527	-1.069181	.5995982

Table 69: Non-Linear diversification vs NPL results – Levant Sample

Table 70 shows that diversification is not significant in explaining the variation in DSLRSD. Also, no significant non-linear relationship is found to exist between diversification and DSLRSD. Finally, Table 71 shows that diversification is also not significant in explaining the variations in DSPSD. Also no significant non-linear relationship is found to exist.

```
. xtreg DSLRSD SHHI GHHI SIZE DER GRTA LTDR NIM, fe robust

Fixed-effects (within) regression               Number of obs      =        56
Group variable: NameofBank                      Number of groups   =         8

R-sq:                                           Obs per group:
     within  = 0.5481                                         min =         7
     between = 0.0892                                         avg =       7.0
     overall = 0.0655                                         max =         7

                                                F(7,7)             =     16.80
corr(u_i, Xb)  = -0.9837                        Prob > F           =    0.0007

                                    (Std. Err. adjusted for 8 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
      DSLRSD |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |  -.0541714    .030523    -1.77   0.119    -.1263468    .0180039
        GHHI |   .0036935   .0059025     0.63   0.551    -.0102636    .0176507
        SIZE |   -.018366   .0061877    -2.97   0.021    -.0329975   -.0037345
         DER |   .0025983   .0013958     1.86   0.105    -.0007023    .0058989
        GRTA |   .0195023   .0075791     2.57   0.037     .0015805     .037424
        LTDR |   .0202872   .0094796     2.14   0.070    -.0021285     .042703
         NIM |   .1969226    .264184     0.75   0.480    -.4277734    .8216185
       _cons |    .402167   .1265541     3.18   0.016     .1029141      .70142
-------------+----------------------------------------------------------------
     sigma_u |  .03282576
     sigma_e |  .00419952
         rho |  .98389655   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 70: Diversification vs DSLRSD results – Levant Sample

```
. xtreg DSPSD SHHI GHHI SIZE DER GRTA LTDR NIM, fe robust

Fixed-effects (within) regression               Number of obs      =        56
Group variable: NameofBank                      Number of groups   =         8

R-sq:                                           Obs per group:
     within  = 0.2734                                         min =         7
     between = 0.6813                                         avg =       7.0
     overall = 0.3791                                         max =         7

                                                F(7,7)             =      3.96
corr(u_i, Xb)  = -0.9894                        Prob > F           =    0.0449

                                    (Std. Err. adjusted for 8 clusters in NameofBank)
------------------------------------------------------------------------------
             |               Robust
      DSPSD |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SHHI |  -.6599902   1.009463    -0.65   0.534    -3.046991    1.727011
        GHHI |   .6610164   .5460434     1.21   0.265    -.6301712    1.952204
        SIZE |  -.5557582   .2983945    -1.86   0.105    -1.261349    .1498327
         DER |   .0704293   .0411935     1.71   0.131    -.0269778    .1678364
        GRTA |   .5881322   .4296973     1.37   0.213    -.4279403    1.604205
        LTDR |   .3740091   .2281878     1.64   0.145    -.1655693    .9135876
         NIM |   1.749257   8.236521     0.21   0.838    -17.72702    21.22553
       _cons |   11.68107   6.093051     1.92   0.097    -2.726702    26.08885
-------------+----------------------------------------------------------------
     sigma_u |  1.2615012
     sigma_e |  .17972851
         rho |  .98010557   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table 71: Diversification vs DSPSD results – Levant Sample

Our overall results from the Levant sample indicate that diversification is only significant (linearly & non-linearly) in explaining the variation of the accounting risk proxy NPL. Diversification is not significant (linearly and non-linearly) when it comes to market risk proxies such as DSLRSD and DSPSD.

4.5 Final Summary and Analysis of Results

This section will provide a neat and comprehensive summary of the results across all samples and try to connect results with the literature theories and previous empirical studies.

4.5.1 Diversification vs Return Results

Table 72 summarizes the impact of diversification on performance as measured by three dependent variables (ROA, ROE, and ASLR) and in all samples. It is important to keep in mind that a positive coefficient of SHHI and GHHI indicates that additional concentration increases the value of dependent variables, while a negative coefficient indicates that additional diversification increases the value of the dependent variables.

Sample Type & Size	Dependent Variable (DV)	Reg. Method/ Relation	R^2	SHHI Effect/ Sign	SHHI2 Effect/ Sign	GHHI Effect/Sign	GHHI2 Effect/Sign
Consolidated N=245	**ROA**	Random Effect Linear	0.18	N/S	N/A	N/S	N/A
	ROE	Random Effect Linear	0.15	N/S	N/A	N/S	N/A
	ASLR	Fixed Effect Linear	0.11	**Significant**/ Positive**	N/A	N/S	N/A
	ASLR	Fixed Effect Non-Linear	0.12	**Significant**/ Positive**	**Significant*/ Negative**	N/S	N/S
GCC N=161	**ROA**	Fixed Effect Non-Linear	0.40	N/S	N/S	**Significant**/ Positive**	**Significant*/ Negative**
	ROE	Fixed Effect Linear	0.25	N/S	N/A	N/S	N/A
	ASLR	Fixed Effect Linear	0.13	**Significant**/ Positive**	N/A	N/S	N/A

	ASLR	Fixed Effect Non-Linear	0.14	**Significant**/ Positive**	**Significant*/ Negative**	N/S	N/S
Levant and North Africa N=84	**ROA**	Fixed Effect Linear	0.24	N/S	N/A	N/S	N/A
	ROE	Random Effect Linear	0.21	N/S	N/A	N/S	N/A
	ASLR	Pooled OLS Linear	0.19	N/S	N/A	N/S	N/A
Levant N=56	**ROA**	Pooled OLS Linear	0.83	**Significant**/ Positive**	N/A	***Significant**/ Negative***	N/A
	ROE	Pooled OLS Linear	0.85	**Significant**/ Positive**	N/A	***Significant**/ Negative***	N/A
	ASLR	Pooled OLS Linear	0.38	N/S	N/A	N/S	N/A

Table 72: Summary of Diversification vs Performance – All Samples

N/S = Not Significant, N/A= Not Applicable in Linear Models, **Significant at 5% Level, *Significant at 10% Level

Table 72 is further summarized in Table 73, which displays only the significant findings and connects them to the literature and previous studies (where possible).

Sample Type & Size	**Dependent Variable (DV)**	**Magnitude of Effect on DV (per 0.1 increase)**				**Connection to Previous Literature and Empirical Studies**
		SHHI	**SHHI2**	**GHHI**	**GHHI2**	
Consolidated N=245	**ASLR Linear**	0.42%**	N/A	N/S	N/A	**Corporate Finance Theory, Agency Theory.**
	ASLR Non-Linear	6.67%**	-11.29%*	N/S	N/S	**Baele (2007)**
GCC N=161	**ROA Non-Linear**	N/S	N/S	0.05%**	-0.04%*	**Crouzille et al. (2016), Hayden (2007)**
	ASLR Linear	1.43%**	N/A	N/S	N/A	**Corporate Finance Theory, Agency Theory**
	ASLR Non-Linear	11.42%**	-19.16%*	N/S	N/S	**Baele (2007)**
Levant N=56	**ROA Linear**	0.027%***	N/A	-0.01%***	N/A	**Acharya (2006), Hayden (2007), Berger (2010), Tabak (2011), Mulwa (2016), Yildirim (2017)**

						Corporate Finance Theory, Agency Theory, Traditional Banking Theory.
	ROE Linear	0.26%***	N/A	-0.09%***	N/A	**Hayden (2007), Kamp (2007), Tabak (2011), Mulwa (2016), Yildirim (2017), Corporate Finance Theory, Agency Theory, Traditional Banking Theory**

Table 73: Summary of Significant Findings for Diversification vs Performance – All samples

N/A = Not Applicable in Linear Models, N/S = Not Significant

*** Significant at 1% Level, **Significant at 5% Level, * Significant at 10% Level

We now breakdown our significant findings into their respective regions and elaborate on the links between our results and previous empirical studies and theories.

Starting with the consolidated sample we find that our linear results are consistent with the corporate finance theory which claims that a firm should focus its activities on its core strengths so as to obtain the greatest possible benefit from management's expertise and to reduce agency problems. The agency problems arise from the agency theory which hypothesizes that separation between the owners and managers of a bank may create a divergence of interests. Managers with free cash flows may pursue value destroying sectorial diversification strategies to grow the size of their business territories, which benefit their personal positions and power in the market. Our non-linear results are closely linked with Baele's (2007) empirical study which found that "the stock market anticipates that diversification of income sources (in our case from different economic sectors) has the potential to improve future banks' profits" (Baele, 2007, p.2020). However, Baele (2007) stressed that those results do not imply that unlimited diversification should be implemented. Instead, there exists a certain diversification threshold (on average) where the revenue and cost benefits of diversification are expected to exceed the agency and complexity costs which arise as a result of such strategies. In our consolidated sample we found this threshold to be at an SHH index of 0.1, favoring diversification.

The GCC sample yielded significant results with respect to both accounting and market performance proxies. Starting with the accounting performance proxy ROA, our results were similar to Crouzille et al. (2016) who found that geographical diversification carries a non-linear relationship which is beneficial in terms of small banks' risk-adjusted returns on assets RA-ROA (which is highly correlated with ROA in our case). The positive coefficient of GHHI indicates that concentration improves banks' ROA until a certain point where additional concentration will start to harm it as shown by the negative sign of GHHI2. In other words, diversifying activities across neighboring countries improves banks' ROA until a certain point/threshold where additional diversification will harm them. A minor difference between the study of Crouzille et al. (2016) and our findings is that our results can apply on very large banks (total assets >$10 billion) while their results (with respect to ROA) applied on small U.S. banks only (total assets <$1 billion). This may be attributed to the fact that our study was done on banks in emerging countries since the findings of Yildirim (2017) suggest that "the value impact of international diversification depends on a bank's home country: higher levels of diversification are associated with changes in valuations only for banks originating from emerging countries" (Yildirim et al., p.18, 2017). The majority of GCC countries (UAE, Qatar and very soon KSA & Kuwait) are classified as emerging markets by either Morgan Stanley's Capital International Emerging markets index MSCI or FTSE Russell while the USA is a developed market by all indices. Thus, it would be logical to place small US banks and large emerging GCC banks on the same pedestal with respect to extrapolation of results. Furthermore, Hayden (2007) found that geographical concentration has a positive but decreasing effect on German bank returns, which is consistent with our findings with respect to the positive sign of GHHI and the negative sign of GHHI2. Based on our findings for the GCC sample, the threshold by which additional focus will harm ROA is roughly at a GHH index of 0.5.

Moving on to the market performance proxy ASLR, the results closely matched the consolidated sample with the presence of both a linear and non-linear relationship between sectoral diversification SHHI and annual stock log returns ASLR. The GCC stock market seems to appreciate sectoral concentration in banks up to a certain threshold where further concentration will be detrimental for shareholders. This can also be rephrased by saying

that sectoral diversification beyond a certain threshold starts yielding positive returns. As justified before in the consolidated sample results, this is in line with both the corporate finance theory and the agency theory for the linear results and Baele's (2007) study for the non-linear results.

The Levant sample yielded significant and relevant results with respect to performance accounting proxies. Sectoral diversification (SHHI) is negatively related to performance proxies (ROA & ROE) which is consistent with Acharya (2006) who found that diversification of bank assets on a sectoral level does not lead to better performing banks in Italy. Hayden (2007) also found that diversification is associated with a reduction in returns of German banks even after controlling for risk. Our study is also in line with Kamp (2007) who found that specialized banks have a slightly higher return than diversified banks. Even Berger (2010) who used new and conventional measures to measure diversification found that diversification, regardless of how it is measured, yielded reduced profits and more costs for Chinese banks. Perhaps the most aligned study with our results is Tabak's (2011) study who employed a high frequency monthly panel data for Brazilian banks and found that sectoral concentration increases bank returns. Theoretically, this is in line with both the corporate finance theory and the agency theory which advocate concentration for better performance. With respect to geographical diversification, our results are consistent with Mulwa (2016) who found that geographical diversification improves the performance of Kenyan banks. This is further supported by the study of Yildirim (2017) who found that bank values are positively associated with intra-regional diversification activities in emerging countries which coincides with our Levant sample. However, it is worth mentioning that another outcome of Yildirim's (2017) study is that banks in emerging countries do not seem to benefit much from diversifying geographically into far away regions from their base country. In addition to the empirical studies, which converged with our findings, it is imperative to mention the theories that support diversification (in our case geographical). The traditional portfolio and banking theory suggests that banks should be as diversified as possible to reduce risks and improve returns. This is backed by the notion of "don't put all your eggs in one basket" (Winton, 1999). When firms diversify their portfolios into uncorrelated business lines/sectors and geographies, their risk of failure in one line is financially backed by the

anticipated success in another. Another interesting theory which may support diversification is the market power theory that is based on Porter (1980) which claims that firms in general use diversification as a strategy to overcome competition and with time allow them "to build market power which grants them access to conglomerate powers" (Mulwa, p.46, 2016). Mulwa (2016) adds that when firms diversify, they gain competitive advantage from their positions in different markets rather than one market. Once a firm attains market power, it can control market prices by offering discounts and cross subsidizing to prevent new small competitors from entering the market easily (Palich et al. 2000). In summary, market power theory advocates the pursuit of diversification as a strategy or tool to enhance the profitability of a firm (which is applicable only for geographical diversification in Levant region).

Another widely accepted theory as a driver for diversification is the resource-based view (RBV). This theory advocates firms to build on their existing resources capacities to enter new markets and reduce costs on the firm (Mulwa, 2015). This ultimately can create economies of scope by sharing resources or transferring them when needed to create a sustainable competitive advantage. Therefore, diversification based on RBV focuses on resource allocation and sharing competencies across different business lines to enhance performance by either cost reduction or by taking competitors out of the market (Mulwa, 2015).

4.5.2 Diversification vs Risk Results

Table 74 summarizes the impact of diversification proxies on risk as measured by the three dependent variables (NPL, DSLRSD, and DSPSD) and in all samples. It is important to keep in mind that a positive coefficient for SHHI and GHHI indicate that additional concentration increases the value of dependent variables/risk, while a negative coefficient indicates that additional diversification increases the value of the dependent variables/risk.

Sample	Dependent Variable	Reg. Method	R^2	SHHI Effect	SHHI2 Effect	GHHI Effect	GHHI2 Effect
Consolidated N=245	**NPL**	Random Effect Linear	0.05	N/S	N/A	N/S	N/A
	DSLRSD	Fixed Effect Linear	0.14	N/S	N/A	***Significant **/ Negative***	N/A
	DSPSD	Random Effect Linear	0.07	N/S	N/A	N/S	N/A
GCC N=161	**NPL**	Random Effect Linear	0.09	N/S	N/A	N/S	N/A
	DSLRSD	Fixed Effect Linear	0.16	N/S	N/A	N/S	N/A
	DSLRSD	Fixed Effect Non-Linear	0.17	**Significant ***/ Positive**	***Significant ***/ Negative***	N/S	N/S
	DSPSD	Random Effect Linear	0.05	N/S	N/A	N/S	N/A
Levant and North Africa N=84	**NPL**	Random Effect Linear	0.13	N/S	N/A	N/S	N/A
	NPL	Random Effect Non-Linear	0.09	N/S	N/S	**Significant **/ Positive**	***Significant**/ Negative***
	DSLRSD	Fixed Effect Linear	0.41	N/S	N/A	N/S	N/A
	DSPSD	Fixed Effect Linear	0.27	N/S	N/A	N/S	N/A
Levant N=56	**NPL**	Fixed Effect Linear	0.28	***Significant */ Negative***	N/A	***Significant **/ Negative***	N/A
	NPL	Fixed Effect Non-Linear	0.38	N/S	N/S	**Significant */ Positive**	***Significant*/ Negative***
	DSLRSD	Fixed Effect Linear	0.55	N/S	N/A	N/S	N/A
	DSPSD	Fixed Effect Linear	0.32	N/S	N/A	N/S	N/A

Table 74: Summary of Diversification vs Risk – All Samples

N/A = Not Applicable in Linear Models, N/S = Not Significant,
*** Significant at 1% Level, ** Significant at 5% Level, * Significant at 10% Level

Table 74 is further summarized in Table 75 by displaying only the significant findings and connecting them to the literature and previous studies (where possible).

Sample	Dependent Variable (DV)	Magnitude of Effect on DV (per 0.1 increase)				Connection to Previous Literature and Empirical Studies
		SHHI	SHHI2	GHHI	GHHI2	
Consolidated N=245	**DSLRSD Linear**	N/S	N/A	-0.01%**	N/A	**Crouzille (2016), Deng (2008)**
GCC N=161	**DSLRSD Non-Linear**	0.39%***	-0.71%***	N/S	N/S	**Baele (2007)**
Levant and North Africa N=84	**NPL Non-Linear**	N/S	N/S	0.53%**	-0.34%**	**Crouzille (2016)**
Levant N=56	**NPL Linear**	-0.2%*	N/A	-0.05%**	N/A	**Acharya (2006), Kamp (2007), Agency Theory.**
	NPL Non-Linear	N/S	N/S	0.63%*	-0.54%*	**Crouzille (2016)**

Table 75: Summary of Diversification Vs Risk – All subsamples

N/A = Not Applicable in Linear Models, N/S = Not Significant
*** Significant at 1% Level, **Significant at 5% Level, *Significant at 10% Level

We also breakdown our significant findings into their respective regions and elaborate on the links between our results and previous relevant empirical studies and theories.
Starting with the consolidated sample we find that our linear results are not consistent with Crouzille (2016) and Deng (2008) who found that geographical diversification results in reduced default risk and stock return volatility for large and small US bank holding companies. Geographical diversification seems to slightly increase the fluctuation in daily stock log returns. While some investors may argue that the magnitude of increase is negligible (at 1%), others may view it as a warning sign to eject/dump their shares if a bank undergoes heavy/additional geographical diversification.

The GCC sample yielded results that showed an appreciation by the market towards sectoral diversification up to a certain point or threshold where additional diversification

may lead to an increase in the fluctuations of daily returns. This is similar to Baele (2007) who found that heavy diversification from distinct financial activities increases the systematic risk of banks. The threshold for this sample was around an SHH index of 0.12, favoring diversification.

The Levant and North Africa sample had different results than the GCC. Diversification was not significant in reducing market risk proxies (DSLRSD & DSPSD). However, geographical diversification was significant in reducing accounting risk proxy NPL up to a certain point or threshold. This is in parallel with Crouzille (2016) who found that geographical diversification helps reducing the default risk in US holding banks.

Finally, the Levant sample yielded linear results which closely matched Acharya (2006) in the sense that sectoral diversification leads to higher NPLs and thus higher risk. Indeed, this was also in line with Kamp (2007) who found that specialized banks in Germany have lower shares of NPLs. Theoretically, this converges with the lack of expertise theory as presented by Rossi (2009) which claims that when banks diversify into new sectors, their staff may lack the proper expertise to carefully assess the potential risks associated with lending them. Also, the agency theory applies since managers may be undertaking risky endeavors for more power. While some managers argue that diversification has long term strategic merits, many shareholders are impatient and fear that the impact on the short and medium term will harm them. The non-linear results which were only significant at the 10% level showed that a certain threshold of geographical diversification exists which yielded the minimum level for the percentage of NPLs. However, a larger sample and a higher significance level is needed to determine the GHH index accurately. Nevertheless, our non-linear results are closely aligned with Crouzille (2016) who found that large banks benefit from geographical diversification in terms of less default risk which is highly correlated with NPL in our case.

Chapter 5

Conclusions and Recommendations

5.1 Introduction

The corporations of the MENA region are moving at a very rapid pace and banks are naturally finding themselves at the intersection of most local and international business transactions. This has pushed many banks in the region to contemplate strategic endeavors on how to best diversify their activities in order to grow amidst the soaring competition and ailing margins. The literature seemed to be divided on the matter with many empirical studies citing that diversification does not improve bank returns nor reduces their risks. On the other hand, some studies cited that diversification indeed results in an efficient risk-return tradeoff for banks that are willing to diversify their scope of services sectorally and geographically. Theoretically, two opposing schools of thought dominated the literature on the subject. Classical/traditional finance theory and supported the notion of pursuing diversification to reduce risk and overcome competition by penetrating new markets. On the other side, the corporate finance theory and agency theory claim that concentration should be pursed in order for firms to focus more on their core competencies and reduce agency problems which may arise as a result of divergence of interests between managers and shareholders.

As a result, this thesis aimed to add a valuable piece of information to the body of empirical knowledge by examining the impact of sectorial and geographical diversification on banks' performance in the emerging MENA region. To do so, the researcher sprouted from a positivist paradigm mainly backed by a quantitative approach to answer the posed research questions deductively. Secondary data from trusted sources was obtained to form a balanced panel as the study encompassed 35 prominently listed commercial banks from 11 countries in the MENA region during 2009-2015. To achieve homogeneity and rational results, 3 subsamples were created and 6 models were formed. We also added non-linear models where we suspected that a non-linear relationship may exist. Multiple linear regression was employed as the parametrical statistical tool to test the impact of diversification on banks' performance in the MENA region. The dependent

and independent variables used to proxy risk and return were derived from standard accounting and market measures while controlling for bank-specific characteristics/attributes. The following sections will summarize the main findings and answer the research questions initially raised, followed by mentioning the limitations of the research, discussing the managerial implications and offering mild recommendations for bank managers and insight for aspiring researchers.

5.2 Main findings

Table 76 will summarize all the hypotheses and results related to diversification and bank returns (for each subsample) and show the relevant theories which supported them (if applicable). Tale 77 will summarize all the hypotheses and results related to diversification and bank risk (for each subsample) and show the relevant theories which supported them (if applicable). Table 78 will summarize the results relating to research questions 5 and 6 on non-linearity from Chapter 3.

Sample	Research Question	Hypothesis being tested	Result	Links to theory
Consolidated N=245	Can sectoral diversification impact bank returns?	H0: Sectoral diversification improves accounting returns.	Reject H0. Not significant.	N/A
		H0: Sectoral diversification improves market returns.	Reject H0. *Concentration to a certain limit does.*	Corporate Finance Theory. Agency Theory. Intrinsic Limit.
	Can geographical diversification impact bank returns?	H0: Geographical diversification improves accounting returns.	Reject H0. Not significant.	N/A
		H0: Geographical diversification improves market returns.	Reject H0. Not significant.	N/A
GCC N=161	Can sectoral diversification impact bank returns?	H0: Sectoral diversification improves accounting returns.	Reject H0. Not significant.	N/A
		H0: Sectoral diversification improves market returns.	Reject H0. *Concentration to a certain limit does.*	Corporate Finance Theory. Agency Theory Intrinsic Limit.

	Can geographical diversification impact bank returns?	H0: Geographical diversification improves accounting returns.	Reject H0. *Concentration to a certain limit does*.	Corporate Finance Theory. Agency Theory Intrinsic Limit.
		H0: Geographical diversification improves market returns.	Reject H0. Not significant.	N/A
L&NA N=84	Can sectoral diversification impact bank returns?	H0: Sectoral diversification improves accounting returns.	Reject H0. Not significant.	N/A
		H0: Sectoral diversification improves market returns.	Reject H0. Not significant.	N/A
	Can geographical diversification impact bank returns?	H0: Geographical diversification improves accounting returns.	Reject H0. Not significant.	N/A
		H0: Geographical diversification improves market returns.	Reject H0. Not significant.	N/A
Levant N=56	Can sectoral diversification impact bank returns?	H0: Sectoral diversification improves accounting returns.	Reject H0. *Concentration improves accounting returns*	Corporate Finance Theory. Agency Theory.
		H0: Sectoral diversification improves market returns.	Reject H0. Not significant.	N/A
	Can geographical diversification impact bank returns?	H0: Geographical diversification improves accounting returns.	Can't reject H0.	Traditional portfolio theory.
		H0: Geographical diversification improves market returns.	Reject H0. Not significant.	N/A

Table 76: Summary of hypotheses and results for diversification vs returns

Sample	**Research Question**	**Hypothesis being tested**	**Result**	**Links to theory**
Consolidated N=245	Can sectoral diversification impact bank risk?	H0: Sectoral diversification reduces accounting risk.	Reject H0. Not significant.	N/A
		H0: Sectoral diversification reduces market risk.	Reject H0. Not significant.	N/A
	Can geographical diversification impact bank risk?	H0: Geographical diversification reduces accounting risk.	Reject H0. Not significant.	N/A

		H0: Geographical diversification reduces market risk.	Reject H0. *Concentration reduces market risk.*	Corporate Finance theory
GCC N=161	Can sectoral diversification impact bank risk?	H0: Sectoral diversification reduces accounting risk.	Reject H0. Not significant.	N/A
		H0: Sectoral diversification reduces market risk.	Can't Reject H0. *Diversification to a certain limit reduces market risk.*	Traditional portfolio Theory
	Can geographical diversification impact bank risk?	H0: Geographical diversification reduces accounting risk.	Reject H0. Not significant.	N/A
		H0: Geographical diversification reduces market risk.	Reject H0. Not significant.	N/A
L&NA N=84	Can sectoral diversification impact bank risk?	H0: Sectoral diversification reduces accounting risk.	Reject H0. Not significant.	N/A
		H0: Sectoral diversification reduces market risk.	Reject H0. Not significant.	N/A
	Can geographical diversification impact bank risk?	H0: Geographical diversification reduces accounting risk.	Can't reject H0. *Diversification to a certain limit reduces accounting risk.*	Traditional portfolio theory
		H0: Geographical diversification reduces market risk.	Reject H0. Not significant.	N/A
Levant N=56	Can sectoral diversification impact bank risk?	H0: Sectoral diversification reduces accounting risk.	Reject H0. *Concentration reduces accounting risk.*	Corporate Finance Theory
		H0: Sectoral diversification reduces market risk.	Reject H0. Not significant.	N/A
	Can geographical diversification impact bank risk?	H0: Geographical diversification reduces accounting risk.	Can't reject H0. *Diversification to a certain limit reduces accounting risk*	Traditional portfolio theory
		H0: Geographical diversification reduces market risk.	Reject H0. Not significant.	N/A

Table 77: Summary of hypotheses and results for diversification vs risk

Sample	Research Question	Hypothesis being tested	Result	Links to theory
Consolidated	Is the relationship between diversification and return non-linear?	H0: The relationship between sectoral diversification and returns is not non-linear.	Reject H0. Sectoral diversification and market return (ASLR) have a significant non-linear relationship.	Intrinsic Limit Theory
		H0: The relationship between geographical diversification and returns is not non-linear.	Can't reject H0. Not significant.	N/A
	Is the relationship between diversification and risk non-linear?	H0: The relationship between sectoral diversification and risk is not non-linear.	Can't reject H0. Not significant.	N/A
		H0: The relationship between geographical diversification and risk is not non-linear	Can't reject H0. Not significant.	N/A
GCC	Is the relationship between diversification and return non-linear?	H0: The relationship between sectoral diversification and returns is not non-linear.	Can't reject H0. Not significant	N/A
		H0: The relationship between geographical diversification and returns is not non-linear	Reject H0. Geographical diversification and ROA have a significant non-linear relationship. Also, sectoral diversification and ASLR have a significant non-linear relationship.	All theories favoring geographical diversification since optimal point is approximately near 0.49 (<0.5). Intrinsic Limit Theory
	Is the relationship between diversification and risk non-linear?	H0: The relationship between sectoral diversification and risk is not non-linear.	Reject H0. Sectoral diversification and daily stock log return standard deviation have a significant non-linear relationship.	Intrinsic Limit Theory
		H0: The relationship between geographical diversification and risk is not non-linear.	Can't reject H0. Not significant.	N/A

L&NA	Is the relationship between diversification and return non-linear?	H0: The relationship between sectoral diversification and returns is not non-linear.	Can't reject H0 Not significant	N/A
		H0: The relationship between geographical diversification and returns is not non-linear	Can't reject H0 Not significant	N/A
	Is the relationship between diversification and risk non-linear?	H0: The relationship between sectoral diversification and risk is not non-linear.	Can't reject H0 Not significant	N/A
		H0: The relationship between geographical diversification and risk is not non-linear	Reject H0. Geographical diversification and NPL have a significant non-linear relationship	All theories favoring concentration since optimal point is near 0.6 (>0.5). Intrinsic Limit Theory
Levant	Is the relationship between diversification and return non-linear?	H0: The relationship between sectoral diversification and returns is not non-linear.	Can't reject H0 Not significant	N/A
		H0: The relationship between geographical diversification and returns is not non-linear	Can't reject H0 Not significant	N/A
	Is the relationship between diversification and risk non-linear?	H0: The relationship between sectoral diversification and risk is not non-linear.	Can't reject H0 Not significant	N/A
		H0: The relationship between geographical diversification and risk is not non-linear	Reject H0. Geographical diversification and NPL have a significant non-linear relationship.	Intrinsic Limit Theory

Table 78: Summary of hypotheses and results for non-linear diversification vs return and risk.

5.3 Managerial implications

The managerial implications drawn out from this research vary depending on the sub-sample results. However, a general birds' eyes view on the potential implications raised from the consolidated sample will be provided for researchers and managers who are interested in understanding MENA banks collectively and how they fit globally with respect to diversification.

For the Consolidated Sample: Return-wise, sectoral concentration (within limits) has its merits, but only from a market return perspective (year on year). If managers over concentrate their portfolios to limited sectors in the economy, they will harm returns. Managers, who ultimately should be working in favor of a bank's shareholders to maximize their wealth, will find this research useful to help them find the optimal point of sectoral concentration. Risk-wise, geographical diversification seems to linearly and significantly increase the fluctuations of daily stock log returns. While some risk averse investors prefer that banks stay local and reduce potential market risks associated with expanding, risk-taking investors may view this as a short term acceptable cost for the greater good of expanding foothold and tapping new markets which may generate promising future returns. Thus, bank managers need to carefully assess the potential market risks which may arise from diversifying their loan portfolio geographically.

For GCC: Return-wise, geographical concentration (within limits) has its merits, but from an accounting perspective. Geographical concentration helps improve a banks ROA to a certain extent, but managers should be cautious not to over concentrate their portfolio or over-narrow their geographical reach since that will reflect badly on ROA. Also, sectoral concentration (within limits) has its merits, but only from a market return perspective (year on year). If managers over concentrate the sectors they serve, they will harm bank returns. GCC bank managers, who ultimately should be working in favor of a bank's shareholders to maximize their wealth, will find this research useful to find the optimal point of sectoral concentration. Risk-wise, sectoral diversification (within limits) seems to help reduce the fluctuations in the daily stock returns of investors. Thus, sectoral diversification/concentration results in an efficient risk-return tradeoff (from a market perspective) for managers based on their risk-appetite or minimum acceptable returns for

shareholders. This implies that if managers want to improve market/stock returns of their bank, they will incur higher risk (due to concentration) and if they want to reduce risk they will sacrifice higher market/stock returns (due to diversification).

For Levant and North Africa: Return wise, diversification (sectoral & geographical) has no significant impact on bank performance. Risk-wise, geographical concentration (within limits) seems to only increase risk as measured by accounting ex-ante proxy NPL. This implies that managers need to explore neighboring credit worthy countries to expand their portfolio geographically and reduce risk of increasing NPL. Also, this research will be helpful for managers to find the optimal point of geographical diversification which yields the smallest NPL.

For Levant: Return wise, sectoral concentration results in improved returns as measured by standard accounting proxies ROA and ROE. Thus, managers of Levant region banks are enticed to focus on sectors within their respective economies that are aligned with their staffs' core competencies instead of diversifying into unknown sectors and risking profitability. However, geographical concentration seems to reduce ROA and ROE. This implies that managers of banks in Levant area are encouraged to focus on sectors within their core competencies locally and expand geographically (within their core sectors only) to reap maximum returns. Risk wise, sectoral concentration seems to reduce NPL. This implies that managers are encouraged furthermore to focus on lending specific sectors which are aligned with their staffs' competencies to reduce the risk of low quality loans issued to new sectors. On the other hand, geographical concentration seems to reduce NPLs. This implies that an efficient risk-return trade off exists for managers when contemplating to diversify geographically - the higher the risk the higher the return. However, the non-linear results indicated that an optimal point (which results in lowest NPL) of geographical concentration exists. This threshold will help managers establish an acceptable baseline to guide their geographical concentration/diversification strategies with respect to their acceptable risk tolerance levels (when proxied by accounting ex-ante measures).

5.4 Limitations of the research

The research faced some limitations which need to be mentioned before any extrapolation of results can take place.

1- Heterogeneity of sample: The MENA region comprises of countries which are not homogenous due to different macro and microeconomic environments. Thus, caution should be exercised before extrapolating the significant results pertaining to the consolidated sample. The researcher mitigated this limitation to a certain extent by dissecting the consolidated sample into less heterogeneous subsamples based on geographical proximity and similar macro-economic conditions within countries.

2- Sample Size: In some sub-samples such as Levant, the number of observations was small-medium. This affects the accuracy of results and statistical power of the model. It is usually recommended to have more than 100 observations for each sub-sample.

3- Data Availability: The MENA region is considered an emerging one and consists of many 3rd world countries which do not share financial information or lack efficient financial stock exchanges. This impacted data availability and lead the researcher to lose valuable observations which affected the statistical power of the model.

4- Political Environment: Although the research focused on a recent time-frame (2009-2015) to study the impact of diversification on bank performance, many countries in the MENA region were suffering the aftermath or shockwaves of the Arab spring which sprouted in Tunis during 2011 and spread to many neighboring countries such as Egypt, Syria, Yemen, Libya, etc. The researcher mitigated this to an extent by excluding most of the affected countries from the research and exploiting those events in this research as a silver lining to investigate whether diversification (sectorial or geographical) helps neighboring banks mitigate political risks in the region.

5.5 Recommendations

This paper yielded valuable results for the banking literature of emerging countries and executive bank managers. It also answered controversial questions, which need to constantly be addressed amidst the continuously changing business landscape. However, the researcher feels that this paper only scratched the tip of the iceberg due to the limitations presented above. Academically and theoretically, future aspiring researchers are recommended to re-investigate this topic using additional diversification tactics which banks may opt to employ such as product, income sources, client organization structures, etc. The MENA region is a promising one and requires more empirical studies of this type to help its banks grow strategically and lead the region to emerge into a developed one. Practically and professionally, executive bank managers are gently urged to examine some of the threshold levels established from this paper and use them as a rough benchmark to know where their banks stand. They are also recommended to be cautious before implementing any diversification strategies and use this study as a source of inspiration for their future endeavors.

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Appendix A

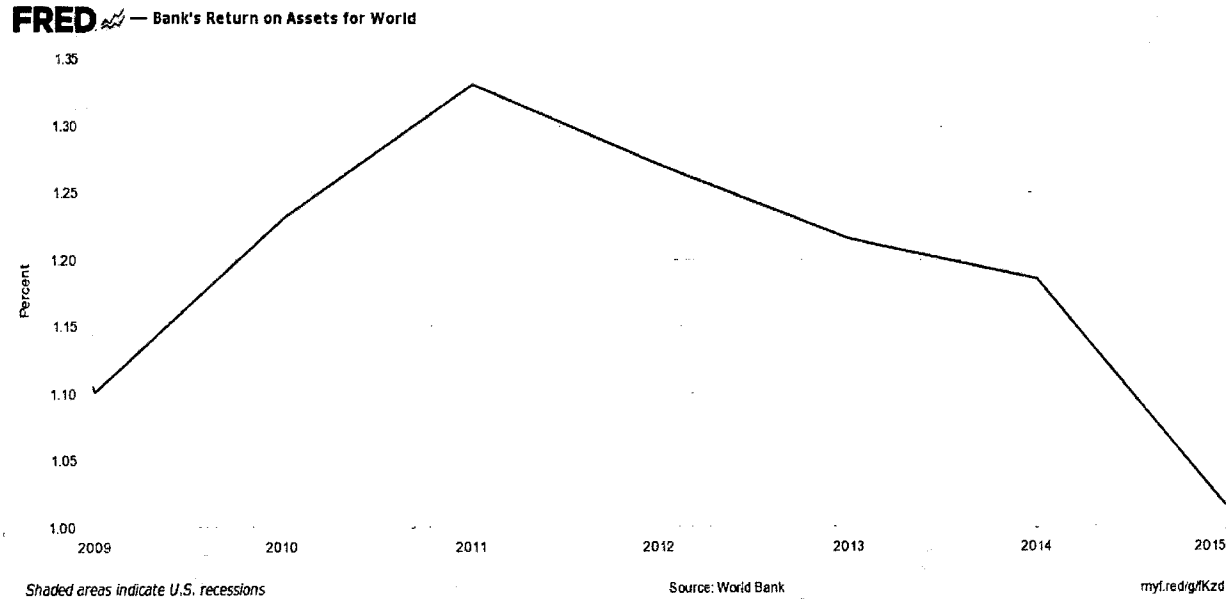

Figure A: Global Banks ROAs between 2009-2015

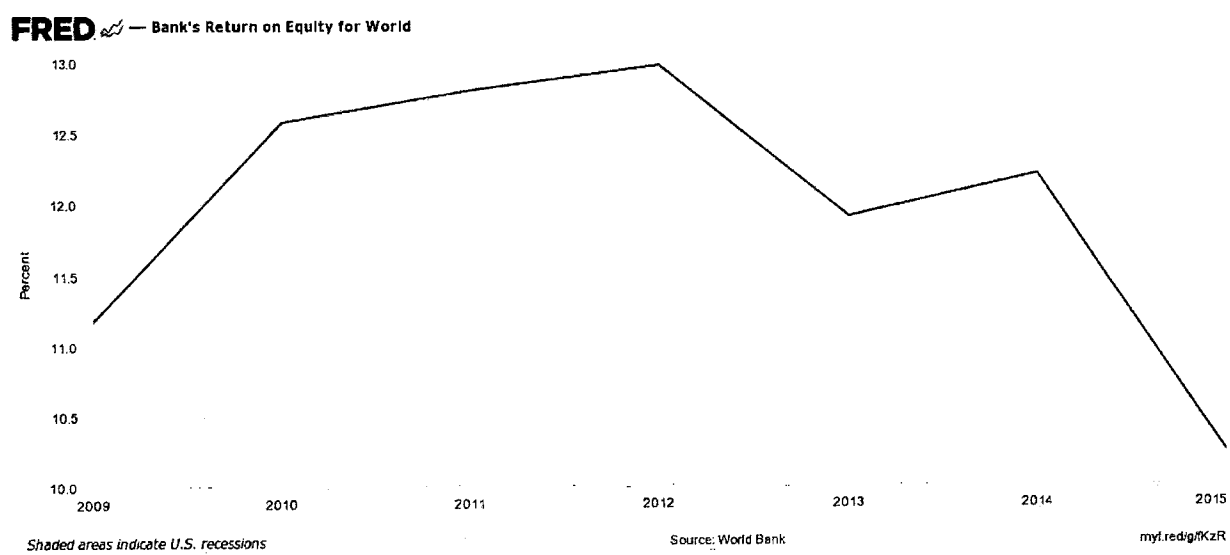

Figure B: Global Banks ROEs between 2009-2015

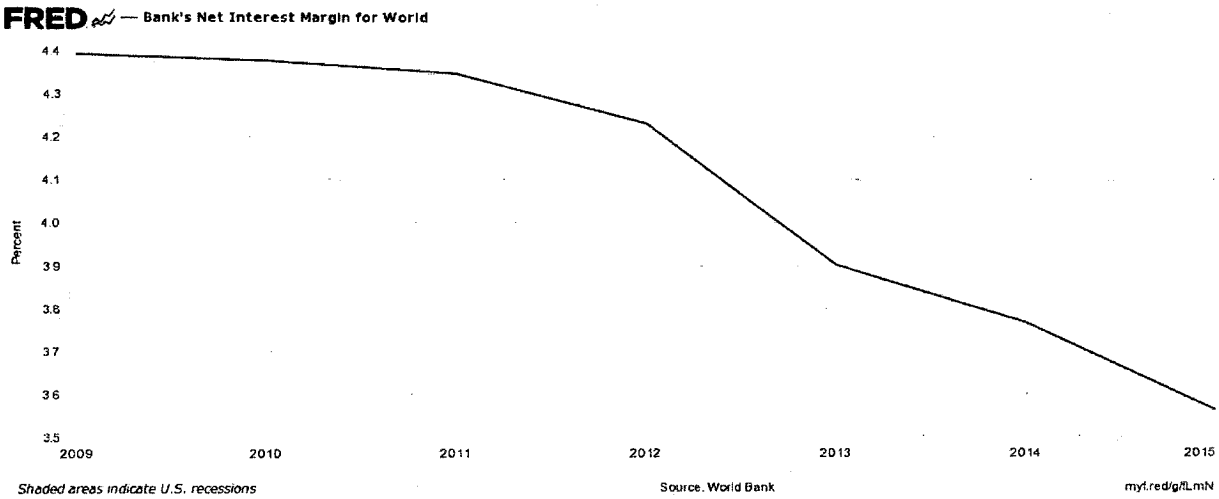

Figure C: Global Banks NIMs between 2009-2015

Descriptive Statistics

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
ROA	56	.044	.319	.173	.628
Annual Stock LOG Returns	56	.247	.319	1.198	.628
Non-Performing Loans	56	1.052	.319	.977	.628
Daily STOCK LOG RETURN Standard DEVIATION	56	1.384	.319	3.321	.628
Daily STOCK PRICE Standard DEVIATION	56	1.753	.319	2.194	.628
SHHI	56	.424	.319	-.606	.628
GHHI	56	.458	.319	-.930	.628
Size	56	-.199	.319	-1.498	.628
Debt - Equity Ratio	56	.005	.319	-1.163	.628
Growth Rate of TA	56	.567	.319	-.372	.628
Loan To Deposit Ratio	56	-.113	.319	-.481	.628
Net Interest Margin	56	.442	.319	-.625	.628
ROE	56	-.462	.319	-.429	.628
Valid N (listwise)	56				

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix G

Appendix H