BANK DIVERSIFICATION & THE SYSTEMATIC RISK OF EQUITY PORTFOLIO

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Abstract

The paper aims at identifying the potentials of decreasing the systematic risks of banking equity portfolio through changes in the diversification nature of banks activities. We analyzed the financial statements of (13) Jordanian banks on parallelism with market index of Amman stock exchange (ASE) for the period (2006-2012). We used Herfindahl Hirschmann index (HHI) to measure the diversification degree of revenue, credit, and deposits activities.The study concluded that (a) stock market has evaluated the changes in revenue diversification more efficiently than changes in the structure of credit or deposits regarding the systematic risks of bank equity portfolio.(b) The concentration of interest income in the bank's revenue portfolio was high and was positively correlated with changes in the systematic risks of trading. (c) The Jordanian banks were more diversified regarding credit and deposit activities, but this diversification was not evaluated by market. And finally, the study showed that there is a decline in the value of systemic risk over the period of study.

Keywords: Diversification, banking, systematic risk, interest income, HHI index

Introduction

Should bank activities be concentrated or be diversified? (Acharya et al. , 2002), is there any role of diversification strategies in improving the bank performance? Or they do not provide any added value over banks that adopt concentration of functional activities (Turkmen et al., 2012). Furthermore, if the stock markets appeared not interested about diversification strategies, Are banks have to worry about that? (Baele et al, 2006).

Diversificationaims to reduce the variability of bank operations by decreasing the concentrationof the sources(deposits) and uses(credit) of funds and also the income that generated by these funds (Berger etal., 2010).

Diversification of deposits aims to protect banks against liquidity risk exposures especially when their borrowing capacity is relatively weak or costly or both, this risk can be associated with unforeseen customer's withdrawals or increased acceptable loans requests.(Rose &Hudgins, 2010).Deposits diversification may be realized by decreasing the ratio of acquiring deposits from one specific source (individuals, business, public sector) at local and foreign levels, or it might be achieved through reorienting customers deposits to specific accounts (demand, saving, time deposits) or by issuing certificates backed by those deposits. Regardless , these techniques intended to improve the efficiency of bank borrowing, and consequently this will decrease the weighted average cost of capital(Ross et al., 2011).

Credit diversification activities aims at reducing the probabilities of default risk in the side of borrowers through allocation of deposit and non-deposit borrowing funds over different groups of customers in new sectors or in new geographical locations or by introducing new types of credit facilities.(Jahn &ets 2013).The reduction of credit risk could be also achieved through specialization of lending. This specialization can be achieved by lowering the ratio of diversification either in credit types or the diversity of customers who are qualified for loans, which enhances of bank ability and experience to screen out doubtful loans requests.

The diversification of banks revenues can be achieved by increasing the weight of non-interest income on the account of interest income. Or by diversifying the sources of both interest and non- interest income in the bank's revenue portfolio (in the line diversification)(DE Young et al., 1999).The sources of banks non-interest income may include commissions,fees, investing on money market instruments,and other revenues that are related with the specialization nature of bank activities (Stiroh, 2002). Nevertheless, decreasing of revenue dispersion and enhancing the quality of income generating channels could be also achieved through revenues concentration. (Mercieca et al., 2007).

But are diversification strategies free of cost? The banking literature indicates that low concentration will debilitate the banks control over more diverse activities, and lowers their functional expertise. And will increase the direct as well as indirect costs that may encompass the decrease of bank competitive power, and the rising costs of agency and bankruptcy that may occur or coincide with diversification activities(Winton ,1999, Stiroh,2002).

On the other hand, investment portfolio diversification aims to eliminate the non- systematic risk component of individual investment through reallocating resources over wide asset classes. (Brown & Reilly 2012). Furthermore, portfolio diversification could be achieved by altering of the investment strategy, by taking a long position in given investment and a

short position in other investments that are expected to be adversely correlated with long ones. This strategy could be successful in offsetting the systematic risks of investments but not discarding them. (Hull , 2009). But it should not be concluded that this type of risks cannot be controlled or altered. the systematic risks, that is measured by the covariance between stock returns and market returns could be lowered by decreasing the stock price volatility, and this achieved, according to efficient market hypothesis, by decreasing earnings fluctuations that might be also achieved through diversification of bank activities.The reflection of revenues stability in the stock prices is considered as evidence of the efficiency of the equity market (Fama, 1965). In addition, the reductions in the systematic risks will lead to decrease the required rate of return and increases the intrinsic value of the bank's stock according to CAPM (capital asset pricing model) model (Fama, 2004).

The study was applied on the Jordanian banks listed on Amman Stock Exchange for the period from (2006-2012). I've been re-arranging some data which are derived from banks' financial statements. And those data are related with three types of banking activities and that are revenue portfolio, credit facilities, and deposit types .the study used Herfindahl Hirschmann Index in order to determine their diversification ratios (Choi & Kotrozo, 2006).

This study aims to determine the diversification nature of banks activities (revenue, credit, and deposits) , and the extent of market evaluation of these efforts in relation with stock prices movements; this will lead us to explore the role of banks in decreasing the systematic risks related with their stock trading in market. In addition, we will also try to assess the degree of stock market efficiency in Jordan.

Finally, the study tried to prove whether diversification is strategic option for banks or it was a random result of overlapped activities. As a result, if diversification was a strategy, which type of diversification strategies has the most significant effect on the riskiness of bank operations?

Literature review

I've been reviewing a lot of literature on the subject of banks' diversification. Much of this work talks about the costs and benefits of diversification and concentration in banks' activities.

It's observed in the last three decades that most banks around the world became more diversified either in functional activities or geographical sites. This trend was caused by the increased competition that banks faces from other financial institutions in local and international markets, or to improve their risk-adjusted performance, or both. Evidence from nine countries (1996-2003) showed that revenue diversification has a positive

effect on banks' profitability and their market value, and their performance. (Elas et al., 2006).

Another important issue regarding bank diversification is how stock market evaluates this activity, or in another words whether the more diversified banks has any comparative advantage over specialized ones. It has been found that non-interest income concentration has a positive effect on bank's competitive power. Nevertheless, revenue diversification was negatively correlated with the systematic risks of European banks (1989-2004), which is a contrary implication to the expectations of both investors and banks managers. (Baele et al., 2006).In addition, it was found that diversification has no direct benefit on the performance of small banks in Europe. Furthermore, there is a negative relationship between non-interest income diversification and risk-adjusted performance for these banks; besides, the presence of economic of scale was only circumstantial. So, it required that banks should take a special attention to their diversification strategies since they guarantee neither profitability nor long term stability (Mercieca et al., 2006).

Despite of all what preceded, diversification benefits were appeared in the risk -adjusted performance for small community banks. These benefits were achieved within the broad activity classes but not between them. Furthermore, the risk-adjusted performance of these banks was negatively correlated with the concentration of non- interest income. Nevertheless, the diversification activity enhances the competitive power of community banks compared with money center banks. (Stiroth, 2002).

Another issue concerning with diversification alternatives is the choice between specialization and diversification in lending activities. A contrary to what is expected, it was found that expanding lending activities to different groups of customer was more risky, since banks will lack of expertise in lending, and they will exercise less control over new types of loans. But on the other hand, the specialization in lending could also lead to increase the exposure to credit risk and may impair banks' performance. The reason behind this negative result is that the similarity of borrowers operations may expose their activities to common systematic risks, which cannot be eliminated through diversification (Winton, 1999).

In a study applied on German banks (2013), it has been found that the specialization in loan portfolio contributed to reduce the credit risk to be less than average. This specialization will lead to enhance the banks abilities in selection and monitoring loans more efficiently by getting more knowledge in specific industries, and identifying   the types of risks that they are facing in specific. Nevertheless, it should not be understood that the specialized loans are not risk free. Therefore, banks should make a tradeoff between the

benefits and the costs of offering diversified or specialized credit facilities (Jahn, 2013).

Geographical diversification is considered as an alternative option, which can be adopted by large banks. Besides, these banks might adopt this strategy in parallel with more internal diversified activities. Conversely to this, small banks tended to be more concentrated both in location and activities offered. By using Herfindahl index, a comparison was done between the two types of banks to identify the effect of their diversification strategies on bank value and risks associated to their operations. The findings showed that the revenues' concentration has positive effect on the market value of bank which is measured using TopinQ ratio than banks that are more diversified. Moreover, the banks that are more geographically concentrated have experienced lower stocks returns by a higher percentage than banks that are not widespread geographically. (Choi,2006).

Bank diversification maybe correlated with banks financial ratios. In a study of 50 Turkish banks aimed to identify whether performance ratios like ROA and ROE can be explained through credit diversification on sectorial and geographical levels. This relation was significant and 28.6% of variations in these ratios were interpreted through credit diversifications for the period 2007-2011. So, banks can control for their credit strategies by adjusting the degree of credit concentration or diversification in order to manage the risks that are associated with their performance measures, and also banks should evaluate the costs and benefits of these choices in a continuous manner (Turkman et al., 2012). Another evidence of diversification implications, Spanish publicly traded banks showed a positive relationship between the size of the bank and the level of diversification. Moreover, credit diversification increased the profitability of lending, but the probabilities of credit risk exposure had increased also. (Gascon &Gonzalez, 2000).

Methodology
Data
The study depended on secondary data sources that were obtained from the websites of Jordanian banks and Amman stock exchange (www.ase.com.jo) ,which encompass the financial reports, stock prices, market index, and trade bulletins for listed banks for the period (2006-2012).

Population
The reasons behind selection of banking sector stem from its main role in supporting economic growth through intermediation between the users and the suppliers of funds. Consequently, the efficiency in operating

these funds will affect banks' specific and systematic risks, this efficiency could be attained through diversification of activities such as interest and non - interest revenues, credit facilities, or the sources of deposits, unlike non-banking firms which face restrictions in relation with diversification choices. Besides, banking sector firms dominates the Jordanian stock market and their influence is obvious on market index and the financial economy as a whole.

Study sample
        The study sample consists of all Jordanian banks that are listed in Amman Stock Exchange for the period from 2006 to 2012. Some banks were excluded from this sample due to the missing data or to lack of continuity for some financial reports and trade data. Accordingly, 3 banks were excluded out of 17 banks represents the study population.

Study period
    The period from 2006-2012 were selected according to:
    i.   it represents the most recent years for the study
    ii.   its overlap with the recent world financial crisis in 2009
    iii.   information availability

Dependent variable
        Of the objectives of this study is to identify how banks' activities are diversified and how market evaluates of these activities in respect with stock prices movements, and systematic risks of trading. Accordingly we assumed that systematic risks are correlated with banks' diversification activities.
        The systematic risk (beta) for stock was measured through calculating the covariance between monthly stock prices and market returns for each unit of variance ($\sigma^2 m$) of market index for each year of study period. Beta for each bank was calculated on yearly basis to be consistent with other independent variables that were calculated annually during the study period.The value of beta (β) is expressed by this statistical equation:

$$\beta i = \frac{Covariance\ (i\,,m)}{\sigma^2 m}$$

        Where (βi) denote to the systematic risk of bank (i), and (m) denotes market index(market return), and ($\sigma^2 m$)denotes the variance of market returns

Independent variables
        Banks depend mainly on interest income, but recently, non-interest income like commissions and financial securities, became more regular and more concentrated in revenue portfolio. This diversification tends to reduce

the variability of banks revenues in the long term. Measuring the degree of revenue diversification requires at first the rearrangement of the bank's revenues portfolio into specific components, then calculating the concentration of each component in the portfolio.

The study adopted ***Herfindahl Hirschman index*** (HHI) to measure the diversification values of bank activities. HHI index values range from 0 to 1 where values below 0.5 means that the activity is diversified, and if the value is more than 0.5, the activity becomes more concentrated and less diversified.

1- Revenue diversification (HHRrev)

In order to estimate the diversification degree of revenue portfolio, we used HHI index on three major types of income which are interest,commissions, other income (includeless frequent income items) according the following model.

$$HHIrev = \left(\frac{interest\ income}{\sum revenues}\right)^2 + \left(\frac{commssion\ income}{\sum revenues}\right)^2 + \left(\frac{other\ income}{\sum revenues}\right)^2$$

2-Credit diversification (HHIcr)

In order to estimate the diversification degree of credit (HHIcr), bank loans were separated into five credit classes which are individual, mortgage, small business, large business, and public (government) loans according the following model :

$$HHIcr = \left(\frac{indv.\ loans}{\sum loans}\right)^2 + \left(\frac{mortgage\ loans}{\sum loans}\right)^2 + \left(\frac{S.\ busines\ loans}{\sum loans}\right)^2 + \left(\frac{pub.\ loans}{\sum loans}\right)^2 + \left(\frac{L.\ business\ loans}{\sum loans}\right)^2$$

Note : (indv: individual, S: small , pub: public, L: large)

3- Deposits diversification(HHIdep)

In this study we adopted the following deposit types as diversification factors, these types are demand deposit, saving deposits, time deposits, certificate of deposits CDs, and the deposits by other financial institutions, and according to this model:

$$HHIdep = \left(\frac{demnad}{\sum deposits}\right)^2 + \left(\frac{saving}{\sum deposits}\right)^2 + \left(\frac{time}{\sum deposits}\right)^2 + \left(\frac{CD,s}{\sum deposits}\right)^2 + \left(\frac{banks}{\sum deposits}\right)^2$$

4-Time effect

The study period was overlapped with the recent world financial crisis, thus, it is useful to examine time effect on the systematic risk. Consequently, we can identify direction and magnitude of this relation which is vital to evaluate the effect of this crisis on the stock markets.

Study model

We adopted the multiple regression model, and bivariate statistical tests to evaluate the effect of independent variables on the systematic risk (dependent variable).The model depends on the calculated values of beta and HHI of each bank for the period (2006-2012 and according to this model:

Systematic risk (βeta) = λo + λ1(HHI$_{rev}$) + λ2(HHI$_{cr}$)+ λ3(HHI$_{dep}$) + λ4(Time) + Ʒ

Notes :

λo: the value of the systematic risk holding all independent variables effect is zero
λ(1-4) : the sensitivity of systematic risk to change in each independent variable.
Ʒ: denotes to other variables not examined in this study.

Diversification scale

We developed the following scale which adopted as reference to judge HHI values, as shown in Table 1:

Table 1 (Diversification scale)

The HHI value		Activity judgment
From	*To*	
0.00	*0.25*	*High diversified*
0.26	*0.50*	*Diversified*
0.51	*0.75*	*Low diversified*
0.76	*1.00*	*High concentrated*

Resultsanalysis

Five types of statistical tests were used to examine the direction and the significance effect of independent variables (revenuediversification, credit diversification, and the deposit diversification. in addition to the time frame of study) on the dependent variable (the systematic risk of bank equity portfolio), andthesetestswere as follows:

A- <u>*Descriptive statistics:*</u>

Table 2:sample statistics

Variable	Values		Mean		Std. Deviation Statistic	Variance Statistic
	Minimum	Maximum	Statistic	Std. Error		
Systematic risk (Beta)	-1.01	2.56	0.6082	0.06780	0.61766	0.382
Revenuediversification	0.43	0.71	0.5444	0.00688	0.06271	0.004
credit diversification	0.21	0.76	0.4220	0.01384	0.12609	0.016
deposits diversification	0.28	0.73	0.4083	0.01045	0.09523	0.009
Time frame	1.00	7.00	3.988	0.20889	1.90310	3.622

1- Systematic risk (beta)

The average systematic risk of the banking sector was 0.6082 which is less than the market risk (the systematic risk for the market is always equal one*). This result means that the banking sector has stock price sensitivity less than the market, and therefore the investing in banking sector portfolio will require lower risk premium. The standard deviation of this average was relatively high (0.61766) which means that there is dispersion inside the sample.

2- Revenue diversification

According to diversification scale, in (*table1*),the banking sector revenues were less diversified, and in specific, the concentration of interest income in revenue portfolio was very high. (*Mean = 0.544, STD = 0.0627, range: highest 0.43 - lowest 0.71*). This supports that banks rely heavily on interest as a primary source of income.

$*\beta m = \frac{covariance\ (m,m)}{\sigma^2 m} = \frac{\sigma^2 m}{\sigma^2 m} = 1$

3- Credit portfolio diversification :

The results showed that the Jordanian banks were more credit diversified (*mean =0.422, STD = 0.12609*), the highest diversification value was 0.21. It can be inferred from this that credit diversification is a steady activity by Jordanian banks.

4- Deposit diversification :

According to table 2, the Jordanian banks deposits were more diversified, (mean =0.4083, STD = 0.0952). Therefore, it can be inferred that those banks have the ability to orient customers' funds into different types of

deposits. Nevertheless the deposits structure was more stable but this does not contradict with the previous results.

B- Bivariate correlation

Table 3 :Bivariate correlation(Pearson, 2-tailed)

Variable	Beta	Revenue diversification	credit diversification	deposits diversification	Time frame
Systematic risk (Beta)	1	-.305(**)	.089	.021	-.349(**)
		.005	.421	.849	.001
Revenue diversification	-.305(**)	1	.062	.011	.257(*)
	.005		.578	.918	.019
credit diversification	.089	.062	1	-.056	-.164
	.421	.578		.615	.138
deposits diversification	.021	.011	-.056	1	-.019
	.849	.918	.615		.863
Time frame	-.349(**)	.257(*)	-.164	-.019	1
	.001	.019	.138	.863	
Number of observations	83	83	83	83	83

** Correlation is significant at the 0.01 level (2-tailed).* Correlation is significant at the 0.05 level (2-tailed).

The systematic risk and revenue diversification was negatively correlated ($\rho= -$ 0.305, sig =0.005). This means that the decrease in the systematic risk can be interpreted partially through the decrease on the concentration of interest income. The relationship was significant but weak. Consequently, since the Jordanian banking sector concentrates on interest income as shown previously, we can say that the increase in the systematic risk is positively correlated with lower diversification. Therefore, Jordanian banks can exert a role in influencing the systemic risk of trading, by increasing the weights of non-interest income in their revenue portfolio. Moreover, the systematic risk was negatively correlated with time ($\rho=-$ 0.349, sig =0.001), this means that systematic risk is decreasing over time. This result may attributed to either that the stock prices of Jordanian banks on average became less volatile or that the market risks, that is measured through variance of market index , were more volatile over time.

The relation between the systematic risk and credit diversification was weak positive but insignificant ($\rho=+0.089$, sig =0.211). The relation with deposit diversification were also weak positive but also not significant ($\rho=+0.021$, sig =0.424). Consequently, this may be considered as indifference of market concerning the diversification or concentration of credit and deposits activities.

The relation between revenue diversification and time was weak positive but significant ($\rho= - 0.257$, sig =0.019). This means, that the ratio of interest income concentration decreased over timeor the Jordanian banks

have adopted policies to diversify the sources of their earnings as a result of increasing competition. The mutual relationship between deposits, credit and revenue diversification was positive, but weak and insignificant (table 3). Moreover, the relationship between credit diversification and deposit diversification with time factor was weak negative, and insignificant. Also, the relationship between deposit diversification and credit diversification was weak negative, and also insignificant. These results denote that the diversification strategies of Jordanian banks were not interrelated with each other's and no multicollinearly problem in the regression model. Despite all, it is not surprising that the relation between revenue diversification and credit diversification was weak positive because the income generated from all credit types is mainly interest income.

C- Analysis of variations (ANOVA)and econometric model
1- Analysis of variations (ANOVA)

According to *table 4* , only 17.7% of variations in the systematic risk can be explained by changes on the independent variables together (F= 4.205 , sig = 0.004), this low percentage ratio means thatthese variations can be also interpreted by other independent variables which are not examined in this study, or that the stock price movement were random .

Table 4(analysis of variations ANOVA)

Model		Sum of Squares	Df	Mean Square	R square	F	Sig.
1	Regression	5.470	4	1.367	0.177	4.132	.004(a)
	Residual	25.814	78	.331			
	Total	31.284	82				

a Predictors: (Constant), time, depositsdiv, creditdiv, revenuediv , b Dependent Variable: beta

2- Regression model*

Table 5(model coefficients)

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	2.058	0.646		3.183	0.002		
	Revenuediversification	-2.337	1.055	-0.237	-2.216	0.030	0.922	1.084
	credit diversification	0.293	0.515	0.060	0.569	0.571	0.958	1.044
	deposits diversification	0.143	0.669	0.022	0.213	0.832	0.995	1.005
	Time	-0.090	0.035	-0.277	-2.560	0.012	0.900	1.111

Systematic risk (βeta) = 2.058 – 2.337(HHI $_{rev}$) + 0.293(HHI$_{cr}$)+ 0.143(HHI$_{dep}$) - 0.09(Time) + ʒ

According to this regression model, we can see that change by 1% in the value of *HHIrev* will decrease the systematic risk by 2.337%, while the other variables affect in value of this risk by less than 0.3%. while, other variables that are not examined are expected to have significant effect on systematic risk of bank equity portfolio.

3- Collinearly statistics

TheMulticollinearity problem is a statistical phenomenon in which two or more independent variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a non-trivial degree of accuracy.As we see in table 5 , all the VIF(Variance Inflation Factor) values of study variables are less than 3 which means this model is not suffering of multicollinearly problem.

Conclusion

The empirical results which were previously mentioned could permit us to conclude that stock market has evaluated the changes in revenue diversification more efficiently than changes in the structure of credit or deposits regarding the systematic risks of bank equity portfolio. The concentration of interest income in the bank's revenue portfolio was high and was positively correlated with changes in the systematic risks of trading. Nevertheless we found that the revenue portfolios for Jordanian banks were less diversified. The Jordanian banks were more diversified regarding credit and deposit activities, but this diversification was not evaluated by market.

Only 17.7% of variations in the systematic risk of banking equity portfolio can be explained by the variations in diversification activities. So it's vital for subsequent research to asses other variablesthat are not examined in this study.

The study revealed that Jordanian banks have adopted organized diversification strategies regarding their credit and deposits activities during the study period. While they concentrated on interest income because it the primary source of income for banks. Despite of all this, these policies seemed did not to receive the required attention by the stock market, which may be regarded as an evidence of market inefficiency .or stock price movements were random.

The systematic risk of bank equity portfolio was correlated negatively time factor (2006-2012). this means, that systemic risks decreased over time and were on average less than market. This result implies that, the banking sector was less influenced by recent financial crisis (2009) than other market sectors; consequently this will enhance the bank ability to acquire additional capital with low required rate of return of investing in bank stock.

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