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FINANCIAL STRUCTURE AND SYSTEMIC RISK: EVIDENCE FROM SELECTED MENA REGION COUNTRIES

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Abstract

Against the context of the consecutive world financial crisis, this paper aims to evaluates the merits of market-based against bank-based financing by analyzing the correlation between financial structure and systemic risk of eleven countries within the MENA region. Within the study three hypotheses are tested; first, if financial structure and systemic risk are significantly related, second, if this relation is non-linear relationship and the third one is if bank financing doesn't contribute to systemic risk above the threshold financial structure value. To our knowledge no paper has addressed this issue in the selected countries. This paper uses a balanced panel of 253 observations for the period between 1995 and 2018 to perform the empirical analysis. Our results from the fixed effect panel regression, confirm that this relation is significant between financial structure and systemic risk, supports a non-linear relationship and has an inflection point as proved by the cubic model regression. In light of these results, stock-markets are more resilient to systemic risk and non-interest income activities offered by the banks are considered to be a source of risk.

Keywords

Financial Structure, Systemic Risk, Bank-based system, Market-based sysetm, Non-linear, MENA

1. INTRODUCTION

Both the financial intermediaries and the financial market play an instrumental role within the financial system. Both are considered to be essential for economic growth due to their capacity to stabilize the financial system through reinforcing diversity and improving resource allocation (Beck & Levine, 2004). Moreover, it has been recognized that countries with efficient financial systems have experienced increased economic development (Levine, 2005). However, despite this, the financial system is prone to systemic risks which in turn pose threats of a possible financial crisis.

It has been noted that financial markets and intermediaries are considered to be fragile in their nature and have historically contributed to speculative bubbles and failures. This is demonstrated when a "shock" has the potential to facilitate a contagion effect and as a result destabilizes the financial system, domestically or internationally. In turn, these crises had and still have a negative and substantial impact on the development of the financial sector and thus economic growth.

Various economists have expressed concerns in regards to the stability of the financial system with emphasis on risks generated through financial system participants, particularly on banks, stocks and bond markets (Taylor, 2009). Although a comprehensive theory related to systemic risks does not currently exist, there are various theories including agency, legitimacy, proprietary costs and resource dependence which give forth to the explanation of the impact of the financial system on the level of systemic risk.

Moreover, there is scarce empirical research which addresses the relationship between the financial structure and systemic risk (Bats and Houben, 2020). Suggestions made by analysts assume that the normal state of the financial system is not to exhibit such instabilities. Once something emerges and in turn triggers a change in the way markets or banks interact with each other, this essentially leads to a shift in the system from a stable to an unstable state. Furthermore, once the system surpasses a threshold that pushes it into instability a much wider range of outcomes become possible, including some that have unfavorable consequences for the wider economy (Schiavo, 2016 and Kemp, 2017). Therefore, how this relationship is formed is still considered to be inconclusive.

Even though economists and theorists argue that a diversified financial system has the potential to reduce the impact of a liquidity crunch and in turn promote swift recovery (Duisenberg, 2001), such debates prove to provide no middle ground as a result of the minimal research which has been published in the field.

It was apparent that in the Middle East and North African (MENA) region, much of the financial progress which was exhibited by the banking sector was also followed by equities (despite it being underdeveloped) and then by government bonds (Hamadi and Bassil, 2015). In depth, it is both the prominent role of government as well as the banks control over the financial system which are considered to be obstacles in regards to the development of the market system and the financial system as a whole, this is a critical reason for the financial system instability (Levine, 2005 and Taylor, 2009). The aim of this study is to test the hypotheses which intend to investigate the relationship between both the financial structure and systemic risk through the employment of panel data from the MENA region. The paper is structured as follows: section two is the literature review, section three is the presentation of both the methodology and data, section four is the discussion of the empirical results, and finally the conclusion is presented in section five.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

According to Allan and Gale (2001), the historical events of the Mississippi Bubble (France, 1917) and the South Sea Bubble (England, 1911) were fundamental in shaping contemporary financial systems and the different long-term proceedings in the two countries brought forth the development of two distinctly different types of financial based systems. This was in line with what was proposed by Levine, who split the diversification of the financial system into two based systems: market- based and bank- based. Despite this distinction, both have the potential to lead to economic growth (Levine, 2002).

The bank-based system is when banks play a leading role and serve a base for economic development, and facilitate the execution of transactions (Goldsmith, 1969 and Levine, 2005). While a market-based system depends on the financial market. Some studies suggest that a well-developed stock market would implement an efficient allocation of resources which in turn lead to high economic expansion and economic growth through the innovation of products and services (Majid, 2007 and Enisan and Olufisayo, 2009). Thus, this separation serves as a necessary comparison between these two types of bodies and them being a systemic risk contributor.

Systemic risk is defined as the risks associated with the collapse of a financial institution, markets or even entire economies and the geographical reach can be regional, national or international. Essentially, it is composed of two important stages; idiosyncratic or systematic shocks and propagation mechanism or spill-over impact. This is in line with the definition by Cummins & Weiss (2014), who identified systemic risk as a contagious risk which causes a loss of economic value or trust in a substantial segment of the financial system and also has a high possibility to catalyze harmful effects on the real economy.

To the best of the researcher's knowledge, the only paper which has investigated the impact of financial structure on systemic risk was conducted by Bats and Houben (2020). This study integrated a panel data of 22 OECD countries and it was concluded that market-based countries are linked with lower systemic risk than bank-based countries. Accordingly, there are various propagation chains in the banking and financial markets which must be probed into further.

2.1 Systemic Risk within the Banking Sector

Banks have been considered to be at the center of financial activities, such as; taking deposits, granting loans as well as equity securities and underwriting debt. In spite of their share of financial intermediation being reduced through growth of capital markets and mutual funds they are still considered to play a pivotal role in the financial sector.

With time, economic forces have led to financial innovations which have increased the level of competition in financial markets. Consequently, traditional banking has lost profitability, and banks have begun to diversify into new activities such as non-interest income which may result in higher returns.

The correlation between these non-interest income activities and systemic risk has not been considered to be conclusive within any empirical studies. Researchers such as De Young and Torna (2013) and Engle et al. (2014), have suggested that they are not positively correlated, while others such as Sedunov (2016) have noted that certain implementations have naturally resulted in an increased systemic risk contribution. In addition, there are certain factors which give rise to systemic risks within the banking system such as; size, idiosyncratic risk, leverage, common risk exposure and global activity (Walter, 2011and Schwerter, 2011)

It is important to note that bank stability is positively correlated with its lending behavior. When market activity fosters greater economic growth, banks generate more profit (via net worth) and in turn are able to lend borrowers more money. However, should a failure occur, the increased lending pattern could potentially result in great risks. Besides, banks are very dependent on other banks as intermediaries for various functions, such as the distribution of liquefied assets to banks that are at loss or in a deficit (Bruche and Suarez, 2010). As a result, they are interconnected with one another and this interconnection may predict losses (Drehmann and Tarashev, 2013).

Conversely, this interconnectedness has the potential to lead to increased market concentration and in turn restricts competition. This is problematic as a reduction in competition leads to larger loans, higher probability of failure and less credit rationing if loans are subjected to multiplicative uncertainty (Caminal and Matutes, 2002). Irresberger et al. (2017) propose that the systemic risk contribution intensifies as bank size grows, hence the "too-big-to-fail" notion.

Moreover, not only does systemic risk increase with bank size it also decreases with capital ratio (Laeven et al. 2016). Gai et al. (2011) have analyzed the influence of financial networks' degree of complexity and concentration on systemic risk. They contest that network interconnectedness and complexity increase systemic risk, while macro-prudential regulations and strict liquidity policies can improve a network's ability to protect it against potential risk. Therefore, this interconnection may seriously cause financial instability that will trigger systemic risk which essentially leads to a financial crisis (Brunnermeier, 2009).

2.2 Systemic Risks in Financial Markets

Within the last two decades not only have financial markets significantly evolved, but their role has also come to be considered the most complex element in the analysis of systemic risk. This is as a result of their significant growth within the last decade in countries were banks were considered to provide more than 20% of the cooperate financing within its respective economy (bank-based countries). Moreover, their role in systemic events hasn't really been explored in a systematic manner and that theoretical models which focus on market contagion are particularly scarce.

Since the nature of financial markets are different from financial institutions, there isn't potential for them to experience bankruptcy and their primary focus is then on the "shocks" related to a market price volatility or temporary liquidity crises, be they contagious or not. In case they are contagious, they may lead to a "pseudo financial crises" or burst of a bubble (Schwartz, 1987 and Bordo et al.,1998).

As suggested by Sornette (2003) a bubble is considered to be a "period of time going from a pronounced minimum to a large maximum through prolonged price acceleration which is followed by a crash or a large decrease" (p.286); moreover, whilst each bubble is considered to have its own set of specific features, they do share general global characteristics. The developmental stages of a bubble begin with it starting smoothly with an increase of production and sale in a relatively optimistic market, which is then followed by an attraction to investments with good potential gain and that essentially leads to increased investments, possibly with leverage being derived from novel sources. Then price appreciation which is followed by the attraction of less sophisticated investors and in turn leveraging is further developed with minor down-payments (which have small margins) and this leads to demand for stock increasing quicker than the rate at which real money is put in the market. By this stage, the market's behavior becomes weakly coupled or practically uncoupled from real wealth (industrial and services) production. As prices skyrocket, the number of new investors joining the speculative market declines and the market gets in a phase of larger nervousness, until instability is revealed and the market collapses (Sornette, 2017).

It should be emphasized that in "bubbles" and "crashes" are considered to be significant events in economics and various factors drive their formation such as political, economic, technological and psychological aspects (Shiller, 2005). Moreover, Shiller (2005) identified various precipitating factors which form the skin of a bubble which include; new information technology, cultural and political changes favoring business success, supportive monetary policy, the capitalist explosion and the ownership society, the growth of mutual funds, an expansion in media reporting of business news, analysts' optimistic forecasts, and the decrease in inflation and the outcomes of money illusion, and the increase of gambling opportunities.

Not only are the cross-asset market price propagations considered to be a problem within the financial market, but the issue of asymmetric information problem may also arise (Vogel, 2018). This phenomenon illustrates how a financial predicament can accumulate over an extended period of time before any inefficient/efficient crisis occurs, in other words the systemic event is the outcome of a more fundamental underlying problem. An example of this would be when stock prices may have stayed overvalued for an extended period until eventually certain news bursts the bubble.

Based on the previously mentioned arguments, the researcher purposed the following hypotheses:

H1: Financial structure and systemic risk are negatively related.

H2: The relationship between financial structure and economic growth is a non-monotonic relationship.

H3: The impacts of a different financial structure on systemic risk may depend on the degree of bank financing in that financial structure.

3. METHODOLOGY AND DATA

The methodology of this study consists of two statistical specifications and several equations. Essentially there will be a linear and nonlinear statistical specification. Under these two specifications different econometric techniques are used: fixed effect for linear estimation whereas cubic model and threshold regression were used to test the non-linear relationship.

3.1 Linear Estimation

The benchmark model in this study will be a modified version of a model constructed by Bats and Houben (2020). The baseline risk model is based on the linear relationship between the financial structure and systemic risk equation:

$$RISK_{j,t} = \alpha_0 + \beta_1 NFS_{j,t} + \beta_2 NI_{j,t} + \beta_3 CN_{j,t} + \mu_j + \eta_t + \varepsilon_{j,t} \quad (1)$$

- Subscript (j) represents each unit of analysis i.e. country, j ϵ {1,…11}.
- Subscript (t) represents the time period, t ϵ {1,….23}.
- α is a constant variable
- β is the regression coefficients
- $RISK_{it}$, the dependent variable, is assigned for the country credit rating for a country chosen under variable j and t for the time period.
- $NFS_{j,}$ represents the financial structure indicator
- $NI_{j,t}$ represents the banks' noninterest income
- $CN_{j,t}$ represents the banking concentration
- u_j represents the unobserved country-specific factors
- η_t represents the unobserved time–invariant
- $\varepsilon_{j,t}$ is the error term.

3.2 Non-Linear Estimations

Under the non-linear regression two different estimation techniques are used to test the remaining two hypotheses, respectively. The first is the cubic model and its results will be illustrated graphically to see the inflection point of the curve, whilst the second will be a panel threshold model.

The cubic model equation will be written as the following:

$$RISK_{j,t} = \alpha_0 + \beta_1 NFS_{j,t} + \beta_2 NFS^2{}_{j,t} + \beta_3 NFS^3{}_{j,t} + \beta_4 NI_{j,t} + \beta_5 CN_{j,t} + \mu_j + \eta_t + \varepsilon_{j,t} \quad (2)$$

Finally, after confirming the nonlinear relationship panel between financial structure and systemic risk, a threshold regression is applied. The results that are derived are based on the threshold view which should essentially provide additional insight on the behavior of the banks and stock markets and how potential levels of systemic risk are considered to be direct signals of an upcoming crisis. The coefficients "$\beta_{j,t}$" for each variable are estimated independently to indicate the impact below and above the estimated thresholds, this threshold value is a financial structure variable and calculated by the statistical software STATA based on Hansen's (1996) bootstrap procedure.

$$Ln(RISK_{j,t}) = \begin{cases} \alpha_0 + \beta_1 BK_{j,t} + \beta_2 DM_{j,t} + \beta_3 SM_{j,t} + \beta_4 CN_{j,t} + \beta_5 NI_{j,t} + \mu_j + \eta_t + \varepsilon_{j,t}, & NFS_{j,t} \leq \lambda \\ \alpha_0 + \beta_1 BK_{j,t} + \beta_2 DM_{j,t} + \beta_3 SM_{j,t} + \beta_4 CN_{j,t} + \beta_5 NI_{j,t} + \mu_j + \eta_t + \varepsilon_{j,t}, & NFS_{j,t} > \lambda \end{cases} \quad (3)$$

This study derived data from eleven countries within the MENA region which include: Egypt, Jordan, Kingdom of Bahrain, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia and the United Arab Emirates. It is important to note that these countries were selected based on the availability of stock market and bank credit data and they are not currently in the midst of any war or military confrontation. In respect to the empirical analysis, a balance panel of annual observations between the periods starting from 1995 to 2018 were utilized. This time frame was selected due to their being an abundance in the number of observations available.

The assessment of systemic risk is considered to be considerably challenging due to its large scale and the fact that it is composed of various contributors. With respect to this study, It was concluded that the sovereign credit rating is considered to be the best measure of systemic risk and the three major credit rating agencies that were used consisted of: Fitch IBCA, Moody's Investor Service, and Standard and Poor's (S&P) which list numerous social, economic and political factors that underlie their sovereign credit ratings. Despite the fact all three of the agencies work in correspondence with each other, the rating of the qualitative codes is done differently. In regards to the qualitative codes, they will be transferred into quantitative numbers using a linear transformation tool coined by Cantor and Packer in 1996. In addition to the qualitative codes, the three agencies used both “Outlook” and “Credit Watch” tools that provide signals which cause permanent changes to the market for the likelihood of possible imminent upgrades or downgrades. In this context, they must be taken into consideration and to be quantitively transferred by following the work of Monfort and Mulder (2001).

Within the study, the variable of interest is considered to be the financial structure indicator “NFS”, this is estimated using the following three variables: the first is the domestic credit to private sector by banks (% GDP) which was obtained from the World Bank’s Global Financial Development Database (GFDD) and the remaining two which represents the financial markets: Market capitalization (% GDP) which was retrieved from PASSPORT database, and the non-financial debt market (% GDP) which was derived from the Bank for International Settlements (BIS). The NFS is calculated by dividing the first variable over the sum of the two remaining variables.

In regards to the control variables, the data related to the concentration percentages of the bank assets held by the top three banks and governmental debt (as percentages) was obtained from the Global Economy database. Moreover, Bankscope, Bureay van Dijk (Bvd) were used to collect the non-interest income to total income percentage of these banks.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The descriptive statics will provide a summary of the dataset regarding the mean, standard deviations, and variable abbreviations of the 253 observations used form the period starting from 1995 to 2018, as shown in Table 1. It also reports the characteristics of these variables, as well the abbreviation of each variable. The table reveals the presence of a significant heterogeneity within countries in all variables, which is shown in the large magnitude between the variable’s minimum value and its maximum value. These large variations within the variables are due to the different developments in the financial sector within the countries integrated in this study.

Table 1: Descriptive Statistics of Data (253 Observation)

Variable	Variable Abbreviation	Mean	Std. Dev.	Min	Max
Country sovereign credit rating	RISK	59.862	19.439	20	90
Financial structure indicator	NFS	0.621	.376	.188	3.37
Domestic credit to private sector by banks (% GDP)	BK	54.921	19.033	20.792	105.84
Non-financial debt market capitalization (% of GDP)	DM	54.298	42.24	1.6	183
Market capitalization of listed domestic companies (% of GDP)	SM	55.905	38.971	6.926	238.674
Banks’ noninterest income	NI	32.401	9.194	13.51	61.76
Bank concentration	CN	65.585	16	34.66	93.13

4.2 The Diagnostic Tests Results

To begin with, the stationarity process of the variables was examined through the unit root test utilizing the Augmented Dickey- Fuller (ADF). After proceeding with the ADF for each variable series, the outcomes of these tests did in fact confirm that all series are stationary. Once the Hausman test was implemented, the fixed effect was considered to be more appropriate than a random effect at a significant p-value of 10% (by rejecting the null hypothesis) since the equation displays a p-value equal to 0.09 (table 2).

Table 2: Hausman Test Results

	---- COEFFICIENTS ---- (B) FIXED	(B) RANDOM	(B-B) DIFFERENCE	SQRT(DIAG(V_B-V_B)) S.E.
NFS	1.654463	1.887208	-.2327453	.1349921
NI	.3557329	.3504032	.0053297	.0056625
CN	.0782513	.1285459	-.0502946	.0426732

```
TEST:  HO:  DIFFERENCE IN COEFFICIENTS NOT SYSTEMATIC
              CHI2(3) = (B-B)'[(V_B-V_B)^(-1)](B-B)
                      =        6.41
            PROB>CHI2 =      0.0932
```

Next, testing for heteroscedasticity is undertaken using the Breusche-Pagan test. After the test was conducted it was confirmed that heteroscedasticity was identified within the equation and that it displayed a p-value of 0.2 which is greater than 0.1 in turn resulting in the rejection of the null hypothesis (table 3). It should be noted that the heteroscedasticity predicament was corrected using the robust standard error performed by STATA software.

Table 3: Heteroskedasticity Test Results

SOURCE	SS	DF	MS
MODEL	19477.0502	3	6492.35008
RESIDUAL	75743.1079	249	304.189188
TOTAL	95220.1581	252	377.85777

NUMBER OF OBS	=	253
F(3, 249)	=	21.34
PROB > F	=	0.0000
R-SQUARED	=	0.2045
ADJ R-SQUARED	=	0.1950
ROOT MSE	=	17.441

RISK	COEF.	STD. ERR.	T	P>|T|	[95% CONF. INTERVAL]	
NFS	12.12045	2.172202	5.58	0.000	7.842221	16.39869
NI	.0619742	.1215155	0.51	0.610	-.177355	.3013034
CN	.4818936	.0700983	6.87	0.000	.3438325	.6199547
_CONS	18.06974	6.577308	2.75	0.006	5.11549	31.02399

```
.BREUSCH-PAGAN / COOK-WEISBERG TEST FOR HETEROSKEDASTICITY
         HO: CONSTANT VARIANCE
         VARIABLES: FITTED VALUES OF RISK
              CHI2(1)      =     1.56
              PROB > CHI2  =   0.2114
```

4.3 Linear analysis

Table 4 demonstrates the results of model 1 which indicates a significant relationship between both financial structure and systemic risk. It was identified that NFS decreases the possibility of systemic risk at a 1% significance level since the coefficient value of NFS registered a value of 5.079 which reflects an increase in the country credit rating; subsequently, systemic risk decreases once this rating increases. Moreover, bank based financial structures are associated with lower systemic risk whilst market based financial structures are associated with higher systemic risk. Such results deeply contrasted with findings of both Bats and Houben, (2020).

In regards to the control variables, it is important to note that banking sector concentration is not significant while the noninterest income is positively significant at 10%. In addition, the banks' noninterest income results support the literature in which nontraditional banking activities don't generate systemic risks (DeYoung and Torna, 2013 and Engle et al., 2014). Finally, through checking the model's significance it was confirmed that the overall regression is highly significant by the value of F-statistic, relatedly the R-squared was equal to 85%.

Table 4: The Linear Relationship between Financial Structure and Systemic Risk (model 1)

RISK	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
NFS	5.079	1.511	3.36	0.001	2.101	8.058	***
NI	0.258	0.081	3.19	0.002	0.099	0.418	***
CN	0.119	0.096	1.23	0.219	-0.071	0.309	
Constant	48.224	6.357	7.59	0	35.694	60.754	***

Mean dependent var	59.862	SD dependent var	19.439
R-squared	0.847	Number of obs	253
F-test	67.856	Prob > F	0

This table reports empirical results from estimating model 1 using fixed-effects (within-groups estimator) method, the results are based on robust standard errors corrected for potential heteroskedasticity and time-series autocorrelation within each country.

*** *p<.01*, ** *p<.05*, * *p<.1*

4.4 Nonlinear analysis

Based on the second hypothesis, the nature of the relationship between both the NFS and systemic risk is examined to identify whether the relationship is either linear or non-linear. Table 5 includes the regression outcomes of model two. The aim of this estimation is not to identify the value of the coefficient, rather it is to identify the significant relationship (between the NFS and systemic risk) in order to confirm the usage of the panel threshold regression, or not, and the coefficient signs which reflect the relationship's convexity. The outcomes which emerged suggests that the squared and cubic term of the NFS measurements are statistically significant at a 1% level, the output also implies that a cubic relationship is apparent between both the NFS and systemic risk and finally the coefficients signs show that the relationship is concave in its nature.

Table 5: The Cubic Relationship between Financial Structure and Systemic Risk (model 2)

RISK	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
NFS	61.308	11.647	5.26	0	38.35	84.265	***
NFSSQ	-33.824	7.882	-4.29	0	-49.36	-18.288	***
NFSCU	5.319	1.48	3.59	0	2.401	8.237	***
NI	.141	.083	1.70	.09	-.022	.304	*
CN	.064	.088	0.73	.469	-.109	.237	
Constant	35.701	7.073	5.05	0	21.761	49.642	***

Mean dependent var	59.862	SD dependent var	19.439
R-squared	0.878	Number of obs	253.000
F-test	74.792	Prob > F	0.000
Akaike crit. (AIC)	1761.184	Bayesian crit. (BIC)	1895.453

*** p<.01, ** p<.05, * p<.1

In the below figure, the vertical axis represents the systemic risk measure whilst the horizontal axis indicates the financial structure measurement. Additionally, figure 1 reveals that, in terms of systemic risk, countries are likely to benefit from increased levels of stock market and debt market financing as long as the NFS remains below 0.7 and theoretically doesn't exceed 1.0. Yet, as shown in figure 1, the likelihood of systemic risks increases after it exceeds 0.7, and this is denoted by the red line. In addition, this implies that a threshold exists beyond the effect of the financial structure on systemic risk.

As a result, there is the presence of various inflection points and these are considered to be threshold values which are calculated in the next subsection using Hansen's Bootstrap procedure (1996).

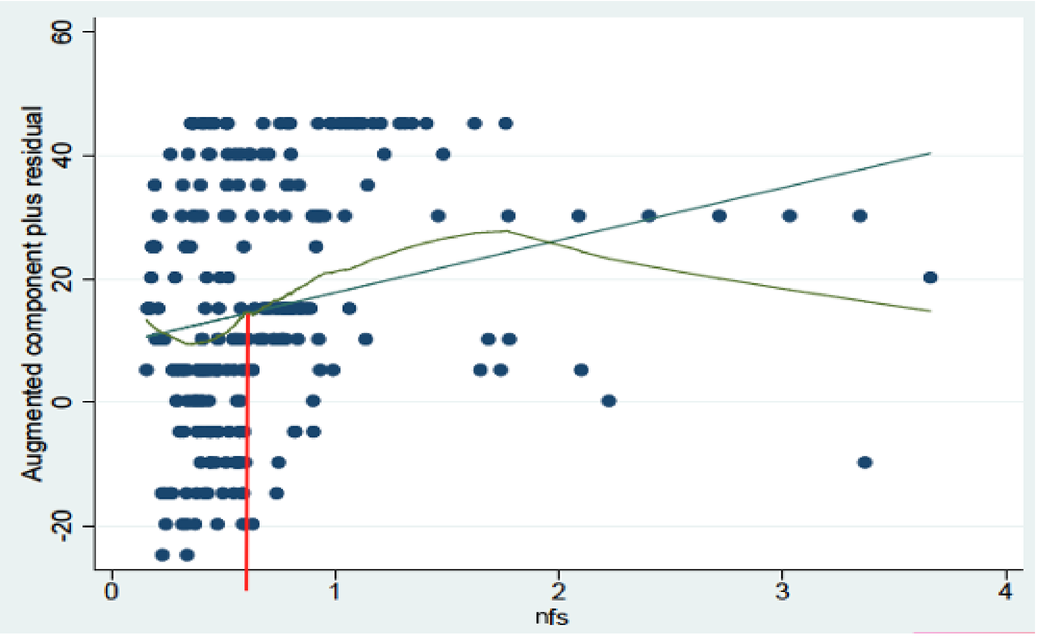

Fig.1: The Cubic Relationship between Financial Structure and Systemic Risk

The third hypothesis is tested using the panel threshold regression represented by model 3. The output of this model is presented in table 6 and presents the structural break model in which the first section, regime 1, presents the coefficients value of estimation in the first row of each variable and are considered to be below the threshold. In the second section, regime 2, the first row of each variable is considered to be the coefficient value of estimation and are above the threshold. Whereas, the standard error of each variable is shown in the second row in regime 1 and regime 2. The results obtained from the Hansen F-test (1999) showed a bootstrap p-value at 0.002 < 0.010, which in turn caused the rejection of the null hypothesis which claims that no threshold effect. Furthermore, the F-test detected a "break" in the data as well as the NFS threshold value being at 0.4788 which is symbolized by the "λ" sign.

It is important to note that when the λ is below/equal to 0.4788, it is essentially an indication of the fact that bank financing doesn't affect systemic risk. However, the control variables which reflect the banking sector displayed different results in which the bank's non-interest income is positively significant at a 5% level, whereas the bank concentration is not considered to be significant. In any case, when the λ is above 0.4788, the relationship between bank financing and systemic risk is still insignificant. In regards to the first control variable, the bank's non-interest income is considered to be negatively significant at a 1% level, which suggests that the banking sector will decrease the credit rating. Based on these findings it can be concluded that the non-interest income that banks are providing increases systemic risk beyond the threshold point, including those transactions which are yet to be covered by laws and regulations. This notion contrasts deeply with the finding of Bats and Houben (2020) which state that bank credit has the potential to increase systemic risk below the threshold value and in turn has no impact should it go beyond the threshold. Similarly, in regards to the bank's non-interest income, it was found that it had no impact on systemic risk below and above the threshold. It should be noted that the main difference between this study and the one conducted by Bats and Houben is the development of the financial systems of the sampled countries.

In contrast, financing through a non-financial market has a significantly negative impact on the credit rating above and below the threshold value of 1% significance level, therefore; non-financial debt financing has the potential to increase the level of systemic risk. In regards to stock market financing, systemic risk is considered to be insignificant below the threshold and significant above the threshold at 5% significance level.

Table 6: The Impacts of Financing Indicators on Systemic Risk above and below λ (model 3)

	Ln (RISK)
Regime 1: λ ≤	0.4788
Intercept	4.2318***
	(0.1067)
BK	−0.0021
	(0.0020)
DM	−0.0062***
	(0.0008)
SM	0.0003
	(0.0004)
NI	0.0037**
	(0.0015)
CN	0.0013
	(0.0011)
Observations	110
Regime 2: λ >	0.4788
Intercept	4.5523***
	(0.0928)
BK	0.0006
	(0.0014)
DM	−0.0069***
	(0.0007)
SM	0.0013**
	(0.0006)
NI	−0.0078***
	(0.0018)
CN	0.0005
	(0.0013)
Observations	143
Bootstrap P−Value:	0.002

This table reports empirical results from estimating model 3 using threshold regression method, the results are based on robust standard errors corrected for potential heteroskedasticity and time-series autocorrelation within each country.
*** p<.01, ** p<.05, * p<.1

5. CONCLUSION

As of recent, economists have shed light on to the contributions of the financial structure components, particularly in regards to which system (bank system or market system) generates more systemic risk and at what inflection point is this risk originates. However, despite the heightened level of concern, very few studies have confronted this predicament and there is still very limited literature which delves deep into the roots and means of measurement of systemic risks.

The central purpose of this paper is to examine the relationship between financial structure and systemic risk. Moreover, it aims to examine whether bank financing poses more of a risk than market financing (amongst the selected eleven countries based in the MENA region) by measuring the systemic risk through the credit rating of each country.

The findings of this study have indicated that there's a relationship between financial structure and systemic risk and this relation is a non-linear relationship. In depth, both separate and pooled systems, the determinants of systemic risk contribution are found to be conditional on the financial structure whether a country has a bank-based or market-based financial system. The systemic risk contribution is generally larger for banks in a market-based system. The findings remain robust to linearity of size, different lags, different exchange rate levels and risk measures. Further research should be conducted in order to determine to what extent does the level of financial development play in lowering the contribution of financial banking and increasing the level of market financing in regards to systemic risk.

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