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# Optimal Capital structure and financial stability

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## Abstract

This paper attempts to answer the fundamental question of the choice of capital structure. The financial structure in Morocco raises several questions about the behaviour of firms, especially in relation to the banking system and the financial market. We tried to determine the factors that explain the choice of financial structure. In addition to the traditional known factors, we were able to introduce the effects of financial stability on the financial structure. The results obtained affirm that Moroccan companies are in a hierarchical conception of the choice of financing and they prefer the use of internal financing with a particularity where companies with long experience are less and less attracted by external financing. In addition, financial stability significantly affects the choice of financing method. Indeed, when the financial system is stable, companies prefer to use external financing, which results in over-indebtedness that negatively affects the stability of the Moroccan financial system in a second rank. We generalize this theoretical conception to assert that the degree of financial stability can have effects on the choice of the financial structure of companies.

**Keywords:** financial structure, banking system, pecking order, financial stability

**JEL classification:** G21, G11, G32

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## **I. Introduction**

The debate on the financial structure is still ongoing. The objective is to respond or find the optimal choice between external and internal sources of funding. The choice between debt, equity and self-financing is quite complex because of the multidimensional factors that can influence the final decision within firms. While a number of pilot studies have explained the choice of permanent capital (Modigliani and Miller, 1958; Modigliani and Miller, 1963; Jensen and Meckling, 1976; Myers, 1977, 1984; Myers and Majluf, 1984; Myers, 2001; Fama and French 2002), the formulation of a unanimous answer to this question remains complex.

We can classify the various explanations advanced on the theoretical level into three main families that have been able to criticize the fundamental theory of Modigliani and Miller (1958): the theory of indifference, the theory of agency and the theory of pecking order (hierarchical financing). Of course, it should be noted that not all these theories have been able to provide conclusive evidence (Graham, 2000; Circonspect and Roberts, 2010) regarding the choice of financial structure.

In general, the theory of compromise (Kraus and Litzenberger, 1973; Myers, 1984) is the first to respond to Modigliani and Miller (1958). This theory puts forward the possibility of conducting a cost-benefit analysis in relation to the debt, depending on the tax savings to be gained and the associated costs, in order to arrive at a compromise that maximizes the firm's value. The benefits of debt are therefore associated with tax deductibility. In contrast, debt costs derive mainly from the direct and indirect costs of bankruptcy by increasing the financial risk of the firm (Kim, 1978; Kraus and Litzenberger, 1973).

The pecking order theory developed by Myers and Majluf (1984) states that the choice of funding is hierarchical. Shareholders prefer internal resources over debt or external resources. The hierarchical order depends on transaction costs, publication costs and information asymmetries. Indeed, undistributed surpluses result in lower transaction costs and lower publication costs than other sources, while debts require lower costs in terms of reducing information asymmetries. In addition, this theory suggests that managers often have more information than external investors do. Thus, external investors require a higher return on equity because it has a higher level of risk compared to debt. In this theory, an optimal debt ratio to maximize value is non-existent.

In addition, the agency theory developed by Jensen and Meckling (1976), Jensen (1986) and Hart and Moore (1994) states that the optimal permanent capital to maximize the firm's value is that which helps to minimize agency costs. The cost of equity capital agency is caused by agency problems between executives and shareholders, while the cost of debt agency is related to the relationship between debt and equity.

In this research work, we will answer two main questions. On the one hand, we will determine the factors that explain the choice of financial structure among Moroccan companies. To this end, we will exploit all the theories and empirical advances in this field. In a second step, we will introduce the character of financial stability as one of the determinants of the choice of financing. The objective is to explore the relationship that may exist between the choice of the financial structure of companies and financial stability. The basic idea is that, in addition to the factors intrinsic to firms, financial stability can influence the choice of financing. Because of the abstract nature of financial stability, we have proposed approaches based on structural equations to capture this multidimensional phenomenon (Firano, 2012). The expected results of this work will corroborate or invalidate several dominant political statements currently made in Morocco and around the world.

## II. Literature review

Modigliani and Miller (1958) were the founding fathers of the question with their theory of the interdependence between the value of the firm and the choice of the financial structure. Although their theory is now a major source of inspiration, it is based on a set of assumptions, which are unrealistic and contradictory. Modigliani and Miller (1958) also incorporated market imperfections and corporate taxes into their analysis and demonstrated that the firm's value can be maximized because of the leverage effects generated by the tax. The same result was found by DeAngelo and Masulis (1980) who examined the effects of other forms of taxation on the firm's value and confirmed that the existence of such an imperfection makes it possible to define an optimal financial structure.

In addition, Stiglitz (1969) and Rubinstein (1973) introduced risky debt into their model and were able to verify the opposite, considering that permanent capital is independent of the firm's value. Leland (1994, 1996) examined the relationship between permanent capital and the effect of taxation and business disruption costs and concluded that the optimal financial structure exists. Jensen and Meckling (1976) analysed agency costs and were able to confirm that the choice of financing methods depends on the value of the firm, so that there is an optimal financial structure that makes it possible to minimize agency costs. Ross (1977) introduced signal theory into the analysis of funding choice. Ross' contribution is to consider that the choice of financial structure is dependent on the will of management because of the signalling power on the financial market. In this sense, the change in the financial structure may be a signal whose interpretation or assessment may have an impact on the firm's value.

In the wave of these great schools of thought, several empirical studies have tried to verify the relevance of the explanations put forward. Deesomsak et al (2004) have studied the determinants of permanent capital and report that size, growth and liquidity are negatively related to firm power. In addition, Jong et al (2008) analyze the determinants of financial structure in a panel of countries and conclude that the explanatory factors of financial structure differ from one country to another according to its specificities. Psillaki and Daskalakis (2009) report that size is correlated with power while capital structure, profitability and risk are negatively correlated with permanent capital. Sbeti and Moosa (2012) indicate in their work on Kuwait that the pecking order theory is more reliable than the indifference theory. Santos et al (2013) sought to examine how permanent capital is affected by power manipulation, and found that shareholder power influences the choice of financial structure.

The identification of the determining causes of permanent capital has been a subject of controversy for several years. Permanent capital is normally stable (Lemmon et al., 2008; Andres et al., 2014) until some specific or macroeconomic changes occur (Korajczyk and Levy, 2003; Andres et al., 2014).

The literature on the determinants of permanent capital has studied the effects of certain firm characteristics such as growth, size, profitability, tangibility of capital, tax savings, revenue volatility, industry sector, risk, profitability, intangible assets, liquidity, availability of internal funds, cost of equity capital agency, operating power, financial constraints, age, probability of default, regulatory aspects and firm value.

Thus, several studies have proposed variables that can explain the choice of the financing structure. First, growth is a variable that can have a certain relationship with power. Thus, the association between growth and power is not as simple as it might seem and we remain inconclusive about this relationship. Some of the studies (Kim et al., 2006; De Jong et al., 2008) conclude an inverse relationship between growth and power. Other authors such as Fama and French, (2002); Hall et al., (2004) report a positive correlation between the two variables. Some authors such as Long and Malitz (1985); 2010), Rajagopal (2010) and Yang et al. argue that the

results are heterogeneous and controversial. Size was also introduced as a key variable to explain the financial structure. The explanation given is that large firms are more diversified than small and medium-sized enterprises, so access to financial sources is easier because of the characteristics of these firms (Ferri and Jones, 1979; Titman and Wessels, 1988; Ozkan, 2001). Profitability and profitability have an influence on the financial structure of companies. Most authors argue that there is an inverse relationship between profitability and power (Fama et al. Français (2002); Drobetz and Wanzenried – 2006 – and Kim et al – 2006). This means that companies often have a preference to use undistributed results to the detriment of other external sources. Similarly, the tangible nature of capital is a variable that influences power and this is explained by several authors (Hovakimian et al., 2001; De Jong et al., 2008; Yang et al., 2010) via two elements: first, the availability of assets likely to be collateral facilitates access to external financing and simplifies tax gains. In addition, the existence of a guarantee reduces the company's risk and reassures all lenders. The volatility of the company's revenues is also a key factor that determines the level of risk. Thus, the greater the volatility, the more expensive it is for firms to use external sources of financing. Liquidity is another factor since firms that are more liquid have the ability to cover short-term commitments and this allows for more tax gains related to debt incurrence.

In parallel with these company-specific factors, macroeconomic factors also influence the choice of financial structure. In particular, the development of the financial market has an effect on the choice of financial structure. For example, Gallois (2004) indicates that profitability indicators explain the choice between equity and debt. Demirgüç, – Kunt and Maksimovic (1996) suggest that the level of development of a financial market should influence the choice of financing since an emerging market attracts more capital at the expense of other sources of financing. In addition, economic growth is also a factor of influence in the choice of financial structure. Indeed, companies will have to use debt in expansion situations to benefit from growth effects (Frank and Goyal, 2009) that tend to reduce interest rates but increase risks. In addition, interest rates in the country may have an impact on the choice of financial structure to be adopted. Usually, interest rates are a factor that stimulates agents' expectations, a low interest rate supports credit demand (Fosu, 2013; Ramli and Nartea, 2016). Also, the inflation rate is a determining factor in the choice of financing. Feldstein and Sheshinski, (1978) derive a theoretical equation that describes the effect of inflation on the debt threshold under economic conditions. During a recession, when inflation is high or deflation sets in, firms will find it difficult to repay debts (Leeth and Scott, 1989). Titman, and Twite, (2010) also note that inflation can affect financial decisions because lenders are normally discouraged from providing long-term debt during inflationary pressures.

### **III. Data and methodology**

From the OMPIC<sup>3</sup> data, we selected a sample of Moroccan companies according to their representativeness in terms of size, sector of activity and their contribution to added value. The majority of the companies in the sample are public limited companies with a few limited liability companies. The age of the companies studied exceeds 20 years on average. The choice being to take into consideration firms whose existence is long in order to understand their behaviour during several cycles of the Moroccan economy. Similarly, the choice of companies of significant age is tantamount to taking into account the changes that Morocco has undergone in its transition from a debt economy to a market economy (see Table 1).

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<sup>3</sup> Moroccan Office of Industrial and Commercial Property.

Table 1. Enterprises characteristics

Forme's	Sector	Number	Variable	Mean	STD
SA	Financial activity	1	CA	109242398	5437221
			Age	43	2
	Buildings and public works	2	CA	480901204	193821836
			Age	8	3
	Commercial activity	9	CA	235316269	121259397
			Age	24	9
	Real estates	1	CA	1876561303	627544115
			Age	37	2
	Industries	1	CA	404966455	194045117
			Age	34	2
	Industries manufacturing	12	CA	1157218522	2222111933
			Age	33	20
Production and distribution of water and electricity	1	CA	563820368	227272421	
		Age	11	2	
SARL	Commercial	3	CA	168591493	53757477
			Age	18	8
	Hotels and Restaurants	1	CA	189147311	32417723
			Age	21	2
	Industries	1	CA	139886353	45402082
			Age	4	2
	Industries manufacturing	6	CA	417081890	279146041
			Age	27	20
	Transports & Communications	1	CA	364255472	206576638
			Age	6	2
SARLAU	Industries manufacturing	1	CA	102300645	9819872
			Age	12	2

We considered several financial and activity variables in order to capture the structure of the companies studied. In terms of value added, the real estate sector in Morocco is the most important due to the high degree of profitability emanating from this sector. This explains, on the other hand, the massive use of equity financing and the low level of debt in this sector. In this sense, it is expected that the choice of funding in this sector is probably explained by the theory of hierarchical order.

In addition, the construction and public works sector has a very high level of debt with a leverage ratio of more than 3 on average. This sector is also the weakest in terms of profitability and the least in terms of value creation. Several explanatory hypotheses can be put forward, the most likely of which is the State guarantee for this type of activity.

The same observation applies to the financial services sector, where the debt ratio is very high compared to other sectors, but where value added and profitability are very low. This is naturally explained by the risk-taking in these types of activities and the increasing use of external financing resources. The extractive industries are also dependent on internal financing resources. Indeed, despite the high degree of profitability, this sector has a low level of debt.

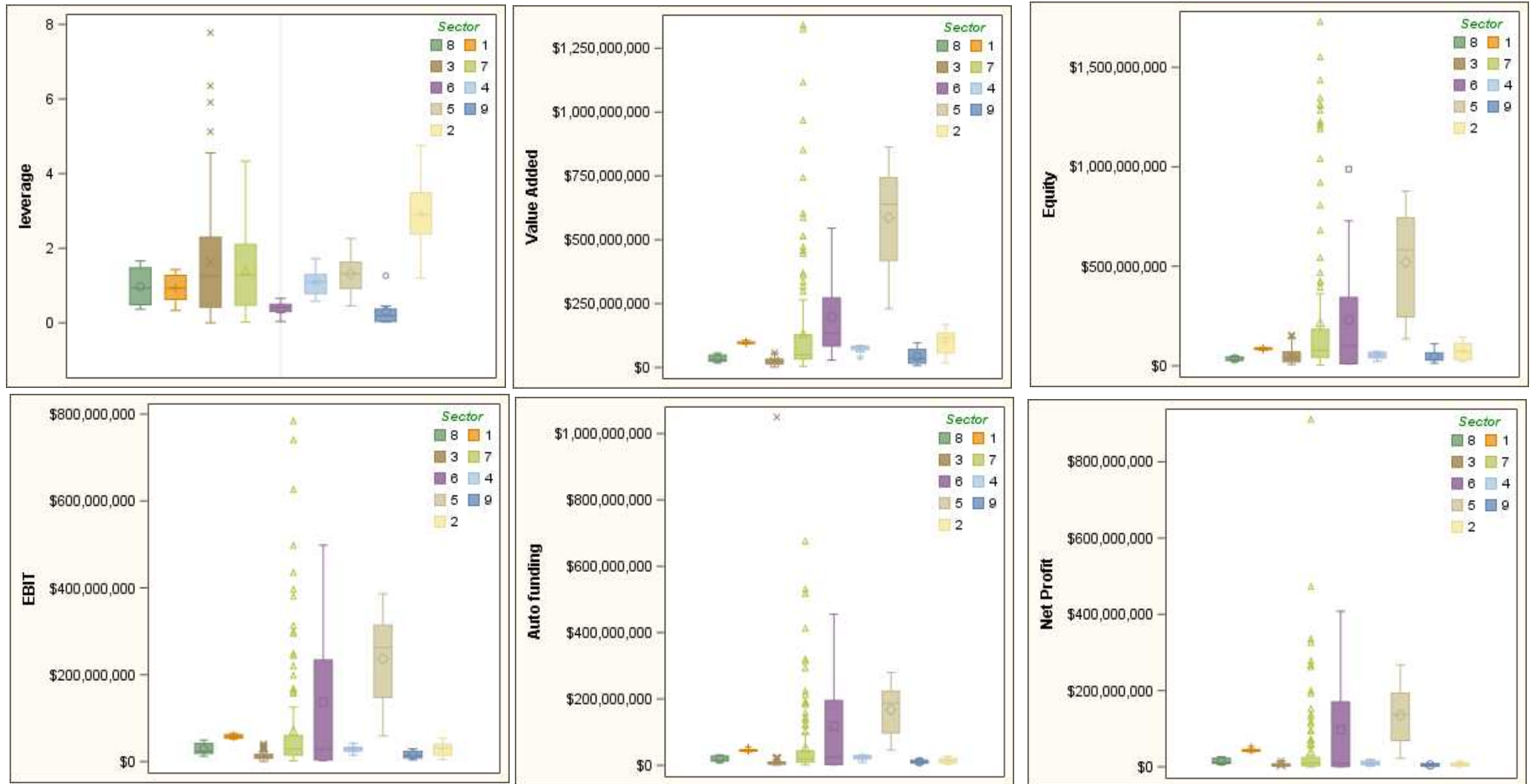
The commercial activity is also well indebted with a very limited level of profit. In fact, commercial enterprises are increasingly in a situation of deficiency due to the predominance of

working capital needs and trade receivables in particular, which forces them to use the banking sector (see Figure 1).

The heterogeneity of corporate behaviour by sector largely explains the accessibility of bank debt to companies. Overall, companies with a high-profit sector and high value added are increasingly reducing their reliance on debt. This is theoretically explained by the fact that companies prefer to finance profitable investments from internal sources rather than share the gain with the banking system.

Admittedly, the difference between the different sectors cannot be dependent solely on financing policy, there are other policies to be taken into account such as investment policy and corporate dividend policy. Also, there are also factors specific to the sector itself; such as demand and supply factors.

Figure 1. Characteristics of enterprises by sector (from 2005 to 2012)<sup>4</sup>



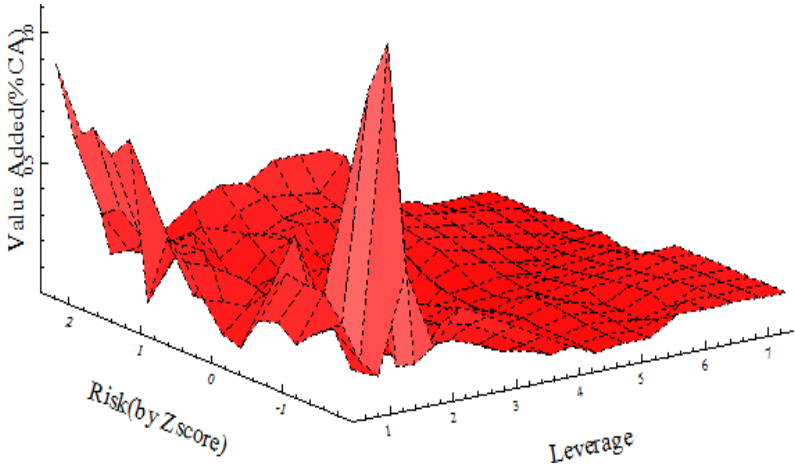
<sup>4</sup> Financial activities:1; Building and public works:2; Trade; auto and household goods repairs:3; Real estate, rental and business services:5; Extractive industries:6; Manufacturing:7; Production and distribution of electricity, gas and water:8; Transportation and Communications:9



One reality of the companies in our sample is the correlation relationship between risk and leverage. Indeed, Moroccan companies tend to have more debt when the added value is low, and the introduction of the risk level explains this behaviour more.

Thus, companies with very high risk levels certainly have significant gains but very low debt levels. This can be explained by the fact that companies whose investment projects are highly profitable are naturally risky, so the banking system is excluded from this type of investment and only projects whose profitability is certain are drained into bank deb.

Figure 2. risk, value added and leverage



In order to better understand the behaviour of companies with regard to debt, we have used variables with theoretical influence on the decision to use bank debt. In the literature review, we were able to identify several variables such as company size, asset tangibility, liquidity, risk, growth, etc. We will therefore examine the descriptive behaviour of the different potentially exogenous variables.

Tableau 2. Keys variables of enterprises

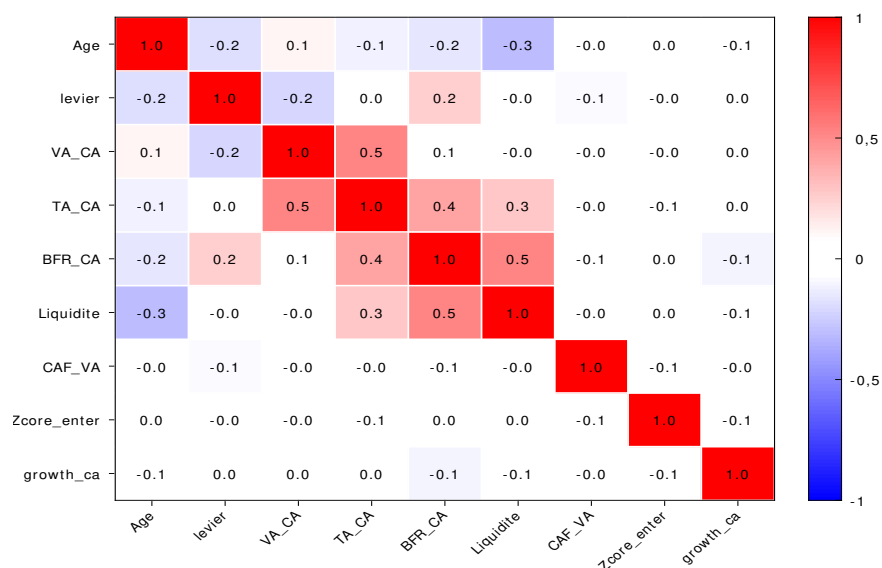
	Mean	Median	Maximum	Standard deviation
Age	25.16	20.76	70.95	16.99
leverage	1.44	1.19	7.78	1.24
VA sur CA	0,22	0,15	2,40	0,22
TA sur CA	0,64	0,57	6,33	0,46
BFR sur CA	0,38	0,36	1,76	0,27
Liquidity	1,47	1,24	8,37	1,24
CAF sur VA	0,47	0,36	36,51	2,03
Z-score	0.00	-0.08	2.47	0.94
Growth	0,20	0,09	27,29	1,55

The average age of the companies in our sample is around 25 years with a standard deviation of 16 years. The average leverage is higher than the unit needed to confirm the significant use of debt by companies. The average degree of liquidity is also important because companies have claims that dominate current assets compared to current liabilities. On average, self-financing capacity is around 40%, which suggests an opportunity to finance its own activities from internal sources.

The level of risk is quite low on average, although the degree of dispersion is significant, indicating a certain heterogeneity between the different firms. At the same time, business growth averaged 20%, indicating a positive trend in all economic sectors.

In terms of interdependence, the correlation matrix indicates a causality or relationship between the leverage ratio and the potentially and theoretically explanatory variables. Thus, an inverse relationship is identified with the age of the firm and the added value created. Also, it appears that the correlation between the leverage ratio and working capital requirement is positive, proving that the increase in trade receivables influences the debt decision to cover operating needs<sup>5</sup>.

Figure 3. Matrix of correlation



In terms of depth, we have also introduced other variables indicating the multidimensional nature of the Moroccan financial system. The idea is quite simple, in the sense that the behaviour of the financial system determines the supply and demand for bank credit. In other words, if the financial system is stable and resilient, then it will be business-friendly and can promote growth and investment. Obviously, when the banking and financial situation is gloomy, the banking system will be led to adopt a credit rationing behaviour.

To this end, four composite characteristics of the system will be taken into account, including development, performance, competition and risk. The objective is to capture the level of soundness of the financial system or even the level of financial stability.

The choice of these dimensions is based on the work of the World Bank and the IMF and especially the nature of the variables used in the Financial Stability reports. In addition, financial stability indicators are based on these dimensions to analyse the soundness of financial institutions (markets). (Zakaria, F., & Fatine, F. A. (2016)).

The development (or structure) of the financial system was captured via several variables characterizing the structure of the Moroccan financial system and we opted for the creation of a composite index to summarize all of these variables. The profitability of the financial system was also measured by several variables from different components of the system. To deduce the behaviour, we have aggregated all these variables into a single index.

Competition or concentration in the financial system is also an indicator that can influence the degree of stability, especially since financial and microeconomic theory identifies a

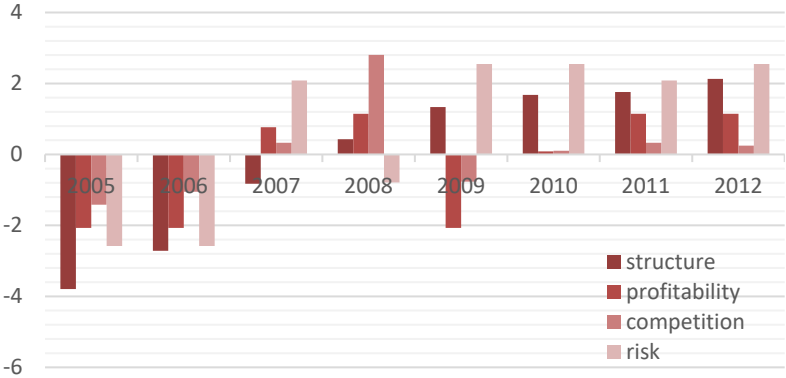
<sup>5</sup> This remains to be qualified because correlation cannot affirm a causal relationship. The use of financing by price-term liabilities may arise in situations of cash flow difficulties and may not be related to the financing policy of companies.

controversial relationship between competition and the resilience of the financial system. Thus, we have opted in this direction for several indicators of both concentration and competition<sup>6</sup>.

The level of risk is also a factor that can influence the financing decision of the economy. Indeed, credit rationing is a behaviour that can result from the excess risk affecting the financial system. In this perspective, we have considered introducing risk as a factor that partly explains the stability of the financial system. Several variables<sup>7</sup> were taken into account in order to identify this concept of risk and were aggregated into a single composite index.

Four composite indices were therefore produced. The objective is to measure an unobservable variable, namely the stability of the financial system. The abstract nature and multidimensional reality of the notion of stability requires the introduction of the four major phenomena that have been summarized in the four indices. However, and since financial stability is not measurable as such, we have opted for structural equation modelling by considering financial stability as a latent variable that can influence the choice of financial structure in the Moroccan economy.

Figure 4. Evolution of Composite index's<sup>8</sup>



Indeed, several theoretical models can be examined within the framework of structural equations that assume how a set of variables define theoretical constructs and potential relationships. The objective of using this type of model is to determine the extent to which the theoretical model can be adapted to existing data. In structural models there are two types of variables, latent and observed. Latent variables (constructs or factors) are variables that are not directly observable or measured (the case here of financial stability). The observed and measured variables are a set of variables that we use to define the latent variables. To this end, structural equations essentially combine path models and confirmatory factor models, i.e., they incorporate latent and observed variables (Karl Jôreskog – 1973 –, Keesling Room – 1972 –, and David Wiley – 1973).

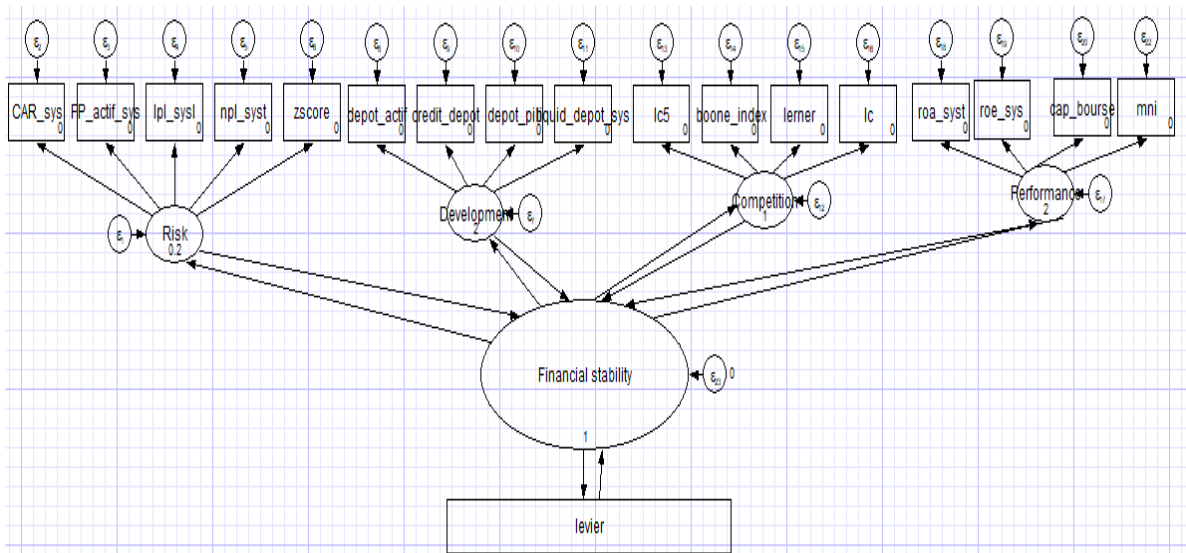
Structural equation models may face identification problems that are overcome by controlling the variance of latent variables. For approaches to estimating parameters in structural equation models, the most appropriate technique is to use a filtering function that approximates observable variables to latent variables. Several functions are available including maximum likelihood methods, ordinary least squares and generalized least squares that are most appropriate for structural equation models for several reasons. First, GLS and ML assessment methods have desirable asymptotic properties, such as minimum variance and impartiality. In addition, they assume the multivariate normality of the observed variables. In addition, the

<sup>6</sup> Bank concentration (%), Lerner index, Boone indicator and 5-bank asset concentration.  
<sup>7</sup> Bank Z-score, Bank nonperforming loans to credit, Bank capital to total assets (%), Bank credit to bank deposits (%), Bank regulatory capital ratio, Liquid assets to deposits and Provisions to nonperforming loan  
<sup>8</sup> The method of constructing indices is based on the main component approach.

weighted least squares method generally requires a large sample size, which limits the use of this estimation technique.

According to the structural model presented in the interrelationship diagram, we considered that financial stability, as an unobservable variable, is influenced by the four characteristics mentioned above (risk, performance, competition and development). This variable depends on the choice of financial structure. We opted for a maximum likelihood estimate with a constraint on the variance of the latent variable (FS – financial stability).

Figure 5. Structural Equation formulation (Diagram)<sup>9</sup>



The estimates were made using maximum likelihood based on the observed covariance variance covariance matrices and their comparisons with the estimated matrices. The results confirm the theoretical view that the financial stability of the system is conditioned by the four components; competition, performance, structure and risk. Two types of relationships have been estimated, the first is the influence of system stability on these characteristics and the second is the impact of the characteristics on the stability of the financial system. Thus, financial stability positively influences competition and the development of the financial system. This is because a resilient system promotes competition and supports the growth and development of financing and savings activities. In addition, risk, competition and development have a negative influence on the resilience of the financial system. In other words, the higher the risk, the more unstable the financial system. Similarly, the more unstable the system, the less aggressive the strategy of financial actors tends to be in the sense that competition is lessening, which explains the inverse link between strength and competition. Consequently, the increase in risks or the decrease in competition in the financial system leads to a slowdown in activity and a lowering of the degree of development of the financial system.

Direction of relation	Coefficient	Prob.
<i>Financial stability to Competition</i>	0.8897838	0.001
<i>Financial stability to performance</i>	-0.5003047	0.000
<i>Financial stability to Development</i>	0.6592689	0.019
<i>Risk to Financial stability</i>	-0.4172472	0:01
<i>Competition to Financial stability</i>	-0.3712598	0:01

<sup>9</sup> Leverage: leverage ratio, Zscore\_entr: Zscore of the companies studied, Growth-ca: turnover growth, CAF\_VA: cash flow on value added, Liquidity: liquidity of the companies, WCR\_CA: working capital on turnover, TA\_CA: total assets on turnover and Age: age of the companies.

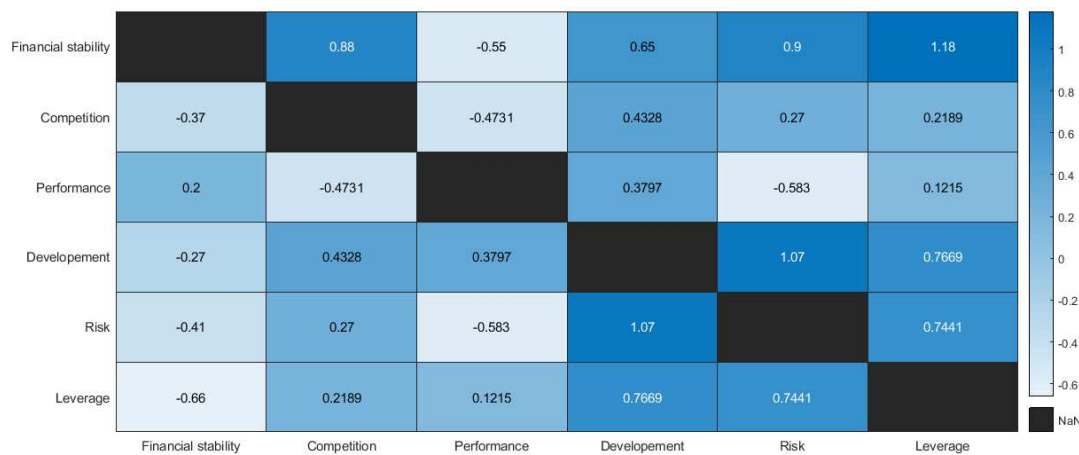
<i>Performance to Financial stability</i>	0.2087507	0:01
<i>Development to Financial stability</i>	-0.2750781	0:01

The results of the estimates also affirm that there is a bilateral causal relationship between the stability of the financial system and the choice of the financial structure of Moroccan companies. We have distinguished two meanings of causality. First, the choice of financial structure has a negative influence on financial stability. This can be rightly explained by the fact that the higher the debt ratio of companies, the more unstable the system tends to become. Theoretically, a high level of debt is a sign of difficulty in an economy and can be an indicator of financial instability. Moreover, an examination of the impact of stability on the choice of financial structure indicates that a resilient financial system can promote demand for debt. However, it should be noted that the analysis of the coefficients indicates a non-proportional effect, as the impact of the choice of financial structure is less important than the inverse effect of financial stability on the debt ratio. This can be explained by the systemic nature of financial stability, which may be accentuated by contagion effects.

<b>Direction</b>	<b>Coefficient</b>	<b>Error</b>	<b>Z-stat</b>	<b>P&gt; z </b>
Leverage to financial stability	-.6,622,003	.055367	-11.96	0.000
Financial stability to leverage	1,187,619	.5,429,884	2.19	0.029

Thus, the results suggest that financial stability has an impact on the various components of the financial system and is also influenced by the characteristics of the financial system. The most important thing to note is that financial stability encourages companies to use debt and that firms' financing strategies take into account the situation in the financial system.

Figure 6. Heatmap financial stability, leverage and financial system characteristics (coefficient of SEM modelling)



The existence of a causal relationship between financial stability and firms' choice of financing makes it possible to identify a new factor influencing the leverage ratio and this makes it possible to affirm that firms take into account the situation of the financial system before making the financing decision. This implies that an even more in-depth analysis of the determinants of debt choice is required. Thus, we opted for panel data modeling to capture firms' behaviour in terms of leveraging ratio formation and financing decision-making. We opted for two types of model; a static model and a dynamic model. The idea is that the financing decision is a long-term financial policy and the choice is conditioned by a certain inertia, when

debt dependence is recurrent. In static estimation, the technique adopted is simple, yet in the dynamic case several approaches are to be promoted.

Indeed, the estimation of models using linear dynamic panel data has become increasingly popular in recent decades, especially in financial matters. However, when the time dimension is short, ordinary least squares (OLS, fixed effects) and generalized least squares (GLS, random effects) give biased estimates due to the correlation of the delayed dependent variable with the combined error term (Hsiao, 2005). In order to solve some of these problems, the econometric literature on maximum likelihood estimation (ML) has been the subject of much recent work. The founding document of Hsiao, Pesaran and Tahmiscioglu (2002) proposed an ML estimator to correlate the predictors of each equation with fixed effects, but with two difficulties: one is the introduction of effects specific to each individual, which increase with the number of observations in the cross-sectional dimension. The other is the problem of initial values. Both lead to the violation of conventional regularity conditions for the ML of structural parameters to be consistent (Nickell, 1981). Hsiao et al (2002) addressed the problem of incident parameters using the same approach as Arellano and Bond (1991), first taking differences between variables over time, thus eliminating individual fixed effects. The likelihood was then formulated in terms of difference scores. To address the problem of initial values, they introduced stationarity assumptions for the generation of initial values from unobserved previous processes, assumptions they admitted can be controversial. They also presented simulations indicating that the performance of the ML estimator was slightly better than that of several GMM estimators, and although the use of the first differences solves the problem of parameters for fixed effects, it greatly complicates the further development of the method. In addition, Han and Phillips (2013) argued that the probability of first difference was not a likelihood function and could therefore behave inconsistently, particularly when the autoregressive coefficients have values close to unity.

Unlike Hsiao et al (2002), Moral-Benito (2013) showed that the parameters can be directly estimated by maximum likelihood without prior differentiation or assumption about initial conditions. The key idea is that specific effects should not be treated as fixed parameters. As Mundlak (1978) and Chamberlain (1982, 1984) pointed out, the fixed-effects model is equivalent to a random-effects model that allows unrestricted correlations between specific effects. Once this approach has been adopted, it is no longer necessary to impose arbitrary assumptions on the initial values. They can be treated as strictly exogenous, which is quite appropriate given the lack of knowledge about what precedes these observations.

Unlike the GMM method, the ML assumes a multivariate normality for all endogenous variables, while the GMM approach does not make any distribution assumptions. However, the ML produces consistent estimators even when the normality hypothesis is violated (Moral-Benito 2013). And if there are concerns about normality, robust standard errors can be used to construct confidence intervals and hypothesis tests.

Near-maximum likelihood estimation (MLQ) can bypass this bias by modelling the unconditional likelihood function instead of conditioning the initial observations. Although this requires additional assumptions about the marginal distribution of estimators, the QML is an

attractive alternative to other estimation methods in terms of efficiency and performance of finished samples if all assumptions are tested. In addition to the QML approach, we also have the bias correction procedures proposed by Kiviet (1995), Bun and Kiviet (2003) and Everaert and Pozzi (2007), which may be a more effective alternative to deal with the endogeneity of the delayed dependent variable. Both first obtain biased estimates, then eliminate bias based on analytical bias expressions or with a bootstrap procedure. In contrast, the QML and GMM approaches are designed to avoid bias in the first place. In the analysis of the determinants of the financial structure of Moroccan companies, we have put into competition several estimation methods to have an accuracy as for the estimated relationships. The results of the estimates are shown in Table 2.

*Tableau 3. Estimation of determinant of financial structure with panel data*

Variables	LSDV	GLS	GMM (1991)	GMM system	LSDV with Correction	QML	ML (SEM)
Lag leverage			0.2221414**	0.32756013***	0.34125181***	0.69236665***	0.39012***
value added to CA	0.86220961	-0.19814724	-6,0536008***	-4,0233901***	-2,5691132**	-0.5253231*	-2,91679***
assets to CA	-0.47003967*	-0.12763108	-1,439437**	-0.0766508	-0.82132929*	-0.31031187	-0.80762***
BFR to CA	2,4324072**	1,9138378**	2,7689813***	1,2428233***	2,3336792***	0.57581135**	2,22638***
IPC	5,6048896**	5,4574587**					
GDP	-2,4565058	-5,7041692					
Liquidity	-0.01732302	-0.04715172	0.07323529	0.14503985***			
Autofunding to VA	-0.01526524***	-0.01367012***	-1,1862868**	-1,1254067***	-0.95334421*	-0.88440865***	-0.97508
Zscore	-0.05508132	-0.04770368	0.00727085				
Growth of CA	0.0042576	0.00925288	0.05027741*	0.01137686		0.06021962***	
Age	-0.06719745**	-0.01132873	-0.03567887	-0.00565748*	-0.00913206**	-0.04491186*	
Competition				-0.04495452***			
Constante	-14,914074**	-4,2404252		1,8757837***		1,0330296***	

\*p <.1; \*\*p <.05; \*\*\*p <.01

As we have already mentioned, the debt policy is affected by inertia, which means that the temporal interdependence is significant. Thus, companies tend to have a certain stability in the choice of their financial structure. Moreover, in the dynamic version of the model, the potential for value creation measured by value added over turnover is negatively correlated to the leverage ratio. In the case of Morocco, this is explained by the fact that companies with high value added tend to have less recourse to the banking system. In addition, the level of tangibility of assets is also negatively weighted, which can be explained by the fact that Moroccan firms with a high degree of capitalisation are those that reduce the use of debt. This result is counter-intuitive, but is supported by hierarchical funding theory. Although Moroccan companies have significant assets, they prefer to use internal financing. In line with this result, operating requirements are positively correlated with the leverage ratio. Thus, firms with a heavy operating cycle are forced to use the banking system to continue their cyclical activities. Another factor that positively affects the choice of financial structure is liquidity. Firms with a significant degree of liquidity have those with a remarkable use of debt. Similarly, the existence of self-financing has a negative influence on the use of debt, companies prefer to have internal financing to the detriment of external financing. It should be noted that the age of companies is negatively weighted and has a high degree of significance. This indicates that the older the companies are, the lower the use of external financing. Companies of significant age prefer to

use internal resources over external ones. In Morocco this conclusion is in contradiction with the acceptances and conclusions put forward. Indeed, it is not large and old firms that benefit from bank financing, but conversely they use their own resources. Finally, growth prospects are a determining factor in the choice of financial structure, especially as it facilitates the use of external financing. Banks generally look carefully at this factor before providing financing to companies.

The existence of a relationship between the characteristics of firms and the financial system makes it possible to conform the assumption of the existence of a cointegrating relationship in the short and long term. To this end, we used cointegration tests using panel data based on Pedroni's (1999) fundamental idea. Indeed, Engle-Granger's cointegration test (1987) is based on examining the residues of a regression using integrated variables of order 1. If the variables are cointegrated, the residues must be stationary. On the other hand, if the variables are not cointegrated, the residues will have a unit root. Pedroni (1999, 2004) and Kao (1999) extended the Engle-Granger framework to tests involving panel data. Pedroni offers several cointegration tests allowing heterogeneous intercepts and trend coefficients on several sections. The Kao test follows the same basic approach as Pedroni's tests, but specifies specific intersections and homogeneous coefficients on first level regressors<sup>10</sup>.

	Statistic	p-value
Modified Dickey-Fuller	-46,154	0.0000
Dickey-Fuller	-58,902	0.0000
Augmented Dickey-Fuller	-57,157	0.0000

Cointegration results on all exogenous variables (characteristics of Moroccan firms and the financial system) confirm the existence of a relationship between these characteristics and the choice of the financing structure of firms. In this perspective, we adopted a statistical simulation model to simulate the mutual effects of characteristics on financing policy. Thus, a VAR panel data model was developed to meet simulation requirements. Only variables with a significant relationship were included in this modeling. Thus, we found that value added has a negative influence on the degree of indebtedness of companies and this effect persists for two periods,

<sup>10</sup> In the case of two variables the Kao (1999) test, we have:

$$y_{it} = \alpha_i + \beta x_{it} + \epsilon_{it}$$

With:

$$\begin{aligned} y_{it} &= y_{it-1} + \mu_{it} \\ x_{it} &= x + \epsilon_{it} \end{aligned}$$

Kao then runs either the pooled auxiliary regression:

$$\epsilon_{it} = \rho \epsilon_{it-1} + \vartheta_{it}$$

Or the augmented version of the pooled specification:

$$\epsilon_{it} = \rho \epsilon_{it-1} + \sum_{j=1}^p \varphi \Delta \epsilon_{it-j} + \vartheta_{it}$$

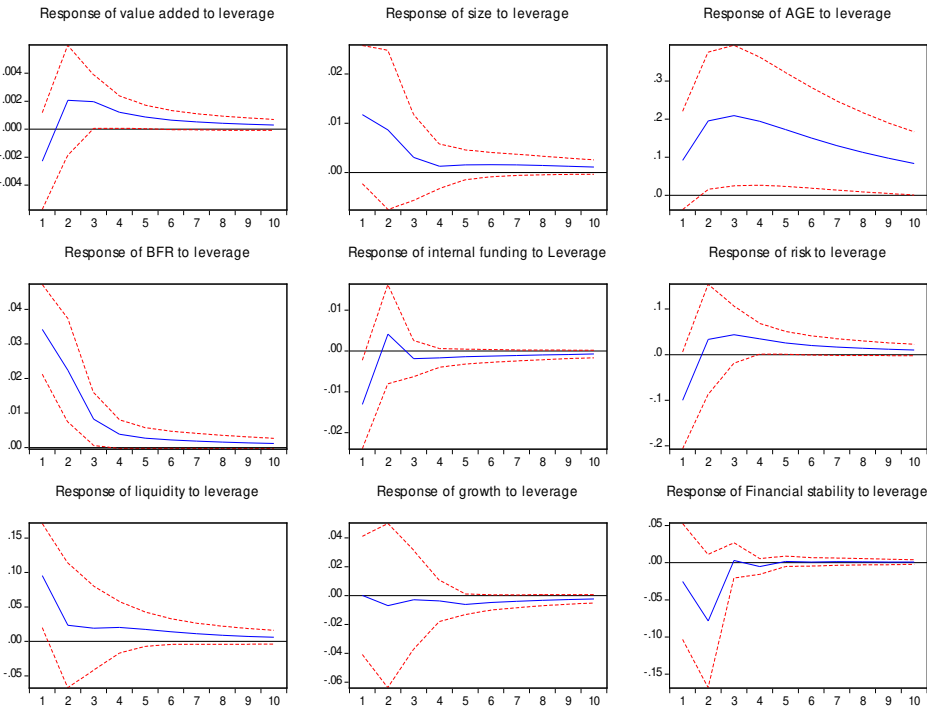
Under the null of no cointegration, Kao shows that following the statistics:

$$ADF = \frac{t + \sqrt{6N}\sigma / (2\sigma)}{\sqrt{\frac{\sigma^2}{2\sigma^2} + \frac{3\sigma^2}{10\sigma^2}}}$$



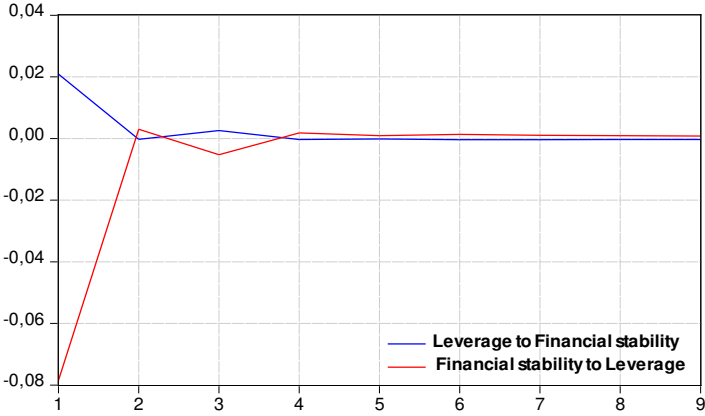
as does self-financing and the risk incurred by firms. In addition, the size, operating needs and liquidity of Moroccan companies have a positive impact on their debt levels.

Figure 7. Impulsion responses



Finally, the financial stability indicator also has an effect on debt levels. Indeed, the analysis of shocks indicates the existence of a negative effect of financial stability on the leverage ratio. This is because an increase in the degree of financial stability can have a negative impact on corporate debt.

Figure 8. Impulsion response (feedback effect – FS versus leverage)



Thus, better financial stability allows companies to increase their activity and therefore generate better financial resources for self-financing. Conversely, a shock on the debt ratio of firms also has an influence on the degree of financial stability. The more companies tend to get into debt, the more they can jeopardize financial stability. A corporate sector in a situation of over-indebtedness is able to counteract the stability of the financial system, especially through the channel of overdue receivables or credit risk.

The controversy over the relationship between financial stability and financial structure confirms that the choice of financing structure depends on the soundness of the financial system. When the financial system is stable and solid this confirms that the economic situation is favorable and in this context companies generate more turnover and therefore more self-financing and the use of external financing systems is reduced and vice versa.

## Conclusion

The analysis of the financial structure is a complex task because of the variables and factors that determine a firm's final decision. In addition to the factors intrinsic to firms, the behaviour and operating conditions of the financial system influence the choice of financial structure. In this work, we were able to answer two fundamental questions: first, we were able to detect the factors that explain the choice of the financing structure of Moroccan companies and then we were able to identify the effects of financial stability on the choice of the financial structure.

In this work, we used several empirical approaches to identify this funding issue. Structural equations have made it possible to quantify the abstract nature of financial stability and also to indicate the endogenous relationships between the leverage ratio and the resilience of the financial system. In addition, the use of panel data modelling (according to several estimators) has ensured better detection of the key variables explaining the choice of the financial structure of Moroccan companies.

The results obtained made it possible to affirm that Moroccan firms are more in a hierarchical conception in the sense that firms tend to prefer internal sources of financing over external ones. This strategy confirms that at least fewer companies are using bank financing. Moreover, the results indicate that the older the company is, the more it prefers to use its internal sources as a response to the requirements of the banking system.

The introduction of financial stability as an indicator that can be used in the choice of financing has made it possible to affirm that the resilience of the financial system stimulates the use of external sources of financing, but to a certain extent to be monitored carefully. Indeed, the increase in external debt also has opposite effects on financial stability, which is what we were able to affirm when we used simulation techniques.

## Annexes: Eigen Vector of financial sector indicators

<b>Eigen vector of correlation matrix (structure of financial system)</b>				
	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>	<b>Cumulative</b>
<i>1</i>	<i>4.98071900</i>	<i>4.10267247</i>	<i>0.8301</i>	<i>0.8301</i>
2	0.87804653	0.74932792	0.1463	0.9765
3	0.12871860	0.11789131	0.0215	0.9979

4	0.01082729	0.00929676	0.0018	0.9997
5	0.00153053	0.00137247	0.0003	1.0000
6	0.00015806		0.0000	1.0000

**Eigen vector of correlation matrix (profitability of financial system)**

	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>	<b>Cumulative</b>
<b>1</b>	<b>5.24004170</b>	<b>3.03549743</b>	<b>0.5822</b>	<b>0.5822</b>
<b>2</b>	2.20454427	1.31569596	0.2449	0.8272
<b>3</b>	0.88884830	0.45396938	0.0988	0.9259
<b>4</b>	0.43487893	0.20628731	0.0483	0.9743
<b>5</b>	0.22859162	0.22578099	0.0254	0.9997

**Eigen vector of correlation matrix (competition and concentration of financial system)**

	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>	<b>Cumulative</b>
<b>1</b>	<b>1.68779412</b>	<b>0.28915034</b>	<b>0.4219</b>	<b>0.4219</b>
<b>2</b>	1.39864378	0.66928854	0.3497	0.7716
<b>3</b>	0.72935525	0.54514840	0.1823	0.9539

**Eigen vector of correlation matrix (risk of financial system)**

	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>	<b>Cumulative</b>
<b>1</b>	3.42132704	1.03587116	0.4888	0.4888
<b>2</b>	2.38545588	1.72246089	0.3408	0.8295
<b>3</b>	0.66299499	0.31841919	0.0947	0.9243
<b>4</b>	0.34457580	0.16641757	0.0492	0.9735
<b>5</b>	0.17815822	0.17185972	0.0255	0.9989
<b>6</b>	0.00629850	0.00510893	0.0009	0.9998
<b>7</b>	0.00118957		0.0002	1.0000

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