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# CAPITAL MARKET REVIEW

## Financial Development and Economic Growth Nexus: The Moroccan Case

Mohamed Abouch\* and Elhadj Ezzahid\*\*

*The issues of the existence and the direction of causality between finance and growth are not yet settled. Even if theoretical and historical evidences suggest an important contribution of finance to foster economic growth, empirical studies provide conflicting results depending upon analytical approaches, econometric techniques, and used data sets. The empirical exploration of the links between the development of the Moroccan financial sector (MFS) and the economic performance of the country shed some light on the profile of this relationship. It appears that even if the indicators measuring the degree of development of the MFS have steadily evolved, they are not systematically and significantly linked with economic growth. This situation may be explained by the characteristics of the MFS and the existence of other factors, not related to this sector, that hinder economic growth.*

**Keywords:** Morocco, financial development, economic growth, cointegration, vector error correction model

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### Introduction

Studies dealing with the links between finance and growth particularly, or the interactions of the financial and the real sectors generally had addressed fundamental issues relating to this topic. However, the issue of the direction of causality between finance and growth remains controversial. Indeed, the diversity of statistical methods, analytical approaches, operational measures of variables and estimation strategies makes it almost impossible to obtain systematized results and to formulate a unique view about the issue of contribution of finance to growth.

For the World Bank, growth of the Moroccan economy is an enigma (World Bank, 2006). Despite stable macroeconomic policies, increased openness of the country to trade and to foreign direct investments, and structural reforms, the rate of growth of the Moroccan economy remains paradoxically erratic and insufficient (Abouch and Ezzahid, 2004). In this paper we aim to establish if there is empirical evidence indicating any links between financial development and economic growth in the Moroccan economy. The importance of this paper stems from the fact that Moroccan authorities have applied, since the beginnings of the 1990s, thorough

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reforms of the financial sector in order to make it a growth enhancing factor.

In this paper, a data set covering a period of 36 years (1970-2005) will be used. Three indicators are used to measure the development of the Moroccan financial sector. Besides testing cointegration in a system including financial and real variables, a vector error correction model (VECM) is used in order to capture more precisely the dynamical relationships between finance and growth. This framework permits, when validated, to capture simultaneously long and short run dynamics between finance and growth in Morocco. The indicators used to gauge financial and economic performance are devised so as to capture different aspects of the two phenomena.

The paper is structured as follows. After the introduction, a sample of the literature addressing the issue of finance and growth nexus will be surveyed. The third section is reserved to present some conclusions of empirical literature. The fourth section is reserved to present the major evolutions of the Moroccan financial sector (MFS) and to summarize the main results of the previous studies addressing the finance and growth nexus in the Moroccan case. The fifth section is reserved for the exposition of the methodology, the data, and the results of the empirical exploration. The last section serves to conclude.

## Literature Review

In the 18<sup>th</sup> century, Smith (1776) signaled in his famous book “The Wealth of Nations” the importance of banks in conducting commercial affairs. In the 19<sup>th</sup> century, Bagehot (1873), remarked that the United Kingdom financial system had played a fundamental role in mobilizing and directing financial resources to the most productive uses. In the 20<sup>th</sup> century, Schumpeter (1911) vigorously highlighted the role of finance in the process of economic

growth. He argued that by controlling credit, the financier may enhance or impede long-run economic growth depending upon the part of resources he allocates to innovative activities. Hicks (1973) stressed the importance of the financial innovations of the 18<sup>th</sup> century in the inception and success of the first industrial revolution.

Patrick (1966) developed an analysis where the finance and growth nexus is an evolving one. In the earliest stages of economic development, finance does really lead economic growth. In the most advanced stages, finance becomes a simple follower of real activities. In the first stage finance is said to be a leading factor (supply-leading hypothesis). Symmetrically, in the second stage finance becomes a simple follower of real sector activities (demand-following hypothesis).

In the beginning of the 1970s, the proponents of financial liberalization recommended abolishing financial repression in order to create a deep, wide, and efficient financial sector that serves as a catalyst for growth by mobilizing more savings and allocating it to the most efficient projects (McKinnon, 1973; Shaw, 1973). The conformity of this view with the liberal ideology and its adoption by the international agencies provide more attractiveness and credit to the policies labeled under the term financial liberalization (World Bank, 1989).

In the last decade of the 20<sup>th</sup> century a burgeoning literature dealing with the finance and growth nexus had been produced. The constructed models showed the role of finance in enhancing continuously, as in endogenous growth schemes, the rate of economic growth (King and Levine, 1993). Basically, *“theoretical models show that financial instruments, markets, and institutions may arise to mitigate the effects of information and transaction costs. In emerging to ameliorate market frictions, financial*

*arrangements change the incentives and constraints facing economic agents. Thus, financial systems may influence saving rates, investment decisions, technological innovation, and hence long-run growth rates”* (Levine, 2004).

The theoretical literature addressing links between finance and growth privileged particular aspects to construct models showing how finance influences or is linked with economic activities. These models generally have a common feature: they consider financial instruments, institutions and markets as means to “*ease information, enforcement, and transactions costs*” and by these channels affect the rate of economic growth (Levine, 2004).

In this vein, Bencivenga and Smith (1991) elaborated a model where financial intermediaries and markets arise to face liquidity risks characterizing long-run investment projects. By this channel, financial intermediaries allow/make possible the affectation of more resources to illiquid but highly productive projects, and hence foster economic growth.

Considering another aspect, King and Levine (1993) show, in a Schumpeterian perspective, that financial intermediaries affect growth positively by choosing the best and most innovative entrepreneurs that are seeking funds to undertake their projects. This effect is possible by collecting more information on proposed projects, on entrepreneurs proposing them, and on the economic environment in general. In this model, the incitation for the creation of financial intermediaries stems from the necessity to gauge projects and entrepreneurs and from the impossibility for individually investing agents to support sunk and fixed costs incurred in/by such activities (Levine and King, 1993).

Other researchers explore the probable interactions between the financial and real sectors of the economy. For instance, Barthélemy and Varoudakis (1996)

constructed a theoretical model where there is a feedback between the evolutions of the two sectors. Savings generated in the real sector is allocated more efficiently by the financial sector to productive activities. This makes it possible to produce more wealth and then to generate more saving which is channeled by the financial intermediaries to the most productive activities and so on. The result of this mutual dynamic is the existence of multiple equilibriums and threshold effects in the interacting process between finance and economic activities.

In a recent paper, Aghion et al. (2006) construct a model predicting that above a level of financial development countries “*will converge to the growth rate of the world technology frontier*”.

The importance of the financial system is not taken for granted by all researchers. For instance, Robinson (1952) argued that finance just follows real entrepreneurial activities. More recently, Lucas (1988) said that economists overstress the importance of finance as a determinant of economic growth. More formally, there are very elaborated models where the development of financial intermediation eases the liquidity constraints confronted by economic agents leading them to save less with a negative impact on capital accumulation and economic growth (Jappelli and Pagano, 1994)

### ***Empirical findings***

There is abundant literature surveying the empirical studies treating the finance and growth nexus (Levine, 1997; Theil, 2001; Levine, 2003 and 2004; Auerbach and Siddiki, 2004; Wachtel, 2001; Papaionnou, 2007). Nevertheless, the authors of these empirical studies use different methodologies, different measures to capture different dimensions of the phenomenon of financial development, different data sets, and different analytical

frameworks. Thus, the obtained results are not easily comparable. Furthermore, the use of pooled cross-sectional data that yields results for multiple countries make it difficult to draw precise conclusions for each country (Demetriades and Hussein, 1996). As a consequence of the use of different methodologies, different data sets, and different analytical tools the results obtained by the researchers are conflicting or at least do not provide a systematic pattern.

Taking this into consideration, the available studies addressing the finance-growth nexus may be classified into three analytical directions. First, there are papers prepared directly to explore this precise subject. Second, there are papers prepared to evaluate empirically the basic hypotheses and predictions of the financial liberalization paradigm formulated by Mckinnon (1973) and Shaw (1973). This second group of contributions proceeds fundamentally by testing if interest rates and financial deepening are conducive to more savings, more investment and consequently a faster economic growth. The third group of papers is prepared in the spirit of the endogenous growth literature and aim at testing if finance is one of the endogenous determinants of growth.

The techniques used to explore the probable contribution of finance to growth and its different features stand from country focused studies, time series studies, panel studies, large cross country growth regressions to microeconomic focused studies. Also empirical studies of the finance growth nexus have different objectives. Some studies attempt to provide simply an answer to the question of the existence or not of any effect of finance on growth. Other studies, besides proving the existence of this effect, attempt to measure it. Another group of empirical studies focuses on the channels through which finance contributes to growth. Another set of papers explore

the conditions under which finance affects growth if it really does.

The goal of Roubini and Sala-i-Martin (1992) was “*to analyze the effects of distortions in the financial markets (in particular, financial repression) on the rate of economic growth*”. By adopting the analysis of Mckinnon (1973) and Shaw (1973), Roubini and Sala-i-Martin (1992) assumed that a distorted financial sector hinders financial deepening and thus limits the availability of financial services. Financial repression was measured by a dummy variable depending on the range of real interest rates. Using a data set related to a large cross section of countries (53 ones), and controlling by other factors affecting long-run economic growth, Roubini and Sala-i-Martin (1992) found that “*a higher degree of financial repression leads to lower economic growth*”.

Levine and Zervos (1998) used annual data related to 47 countries and covering the period 1976-1993 to explore the links between the indicators of the development of both banks and stock markets and economic variables. The tests show, after controlling by the other determinants of long-run growth, a strong relationship between actual development of banks and stock markets and future values of capital stock growth, productivity, and economic growth. Another important result of Levine and Zervos (1998) is the fact that both the indicators measuring banks and stock markets development are positively and significantly correlated with the above three real variables demonstrating the complementary nature of the impact of banks and stock markets on real variables.

In their paper, Beck et al. (2000) explored the impact of finance on the rate of economic growth and on its underlying sources, i.e. private saving rate, the physical capital accumulation, and TFP growth rate, for a set of 63 countries and a data set covering the period 1960-1995. The

authors, “*find that higher levels of financial intermediary development produce faster rates of economic growth and total productivity growth*”. This result is robust and persists even after including “*a wide array of conditioning information to control for other factors associated with economic development*”. On the contrary, they “*do not find a robust relationships between financial intermediary development and either physical capital accumulation or private savings rate*”.

Using a data set related to a group of 69 developing countries and covering the period 1960-1990, Trabelsi (2004) found a significant and positive effect of financial development on economic growth. Nevertheless, when the author introduced the temporal dimension in the simulations, finance ceased to affect real activities. He explained this situation by the absence of a class of entrepreneurs able to transform funds channeled by the financial sector into viable projects. Another important empirical result highlighted by Trabelsi was that finance enhances growth mainly through its positive impact on investment productivity.

Focusing on the case of China, Shan and Qia (2006) used the VAR approach of innovation accounting and simulation of impulse response functions to explore the finance and growth nexus. They used annual data covering the period spanning from 1978 to 2001 and proxied financial development by the ratio of total credits to the size of the economy. The authors documented a “*two-way causality between finance and growth*”.

Another paper dealing with the finance-growth nexus and focuses on the Turkish economy is written by Halicioğlu (2007). The author used annual data (1969-2005) to investigate the links between finance and growth. The author documented the existence of long-run relationship between growth and finance; also there is evidence

on the existence of a causality running from financial development to growth. Analyzing the relation between finance and growth also in the Turkish economy, Acaravci et al. (2007) used quarterly data covering the period 1986:1-2006:4. Nevertheless they found that “*first, the results show one-way causality from financial development to the economic growth. Second, the results do not provide evidence of a long-run causal relationship between financial development and economic growth in Turkey*”.

It is important to mention an original paper dealing microeconomically with the finance and growth nexus. Indeed, Rajan and Zingales (1998) attempted to capture how finance, especially external finance, may contribute to promote firms performance. Using firms level data, the two authors documented that the firms depending upon external finance develop more rapidly in more financially developed countries.

### ***Evolution of the MFS and previous studies on its links with growth***

The Moroccan financial sector is one of the most modern and diversified financial sectors in North Africa (IMF, 2003). Indeed, the Moroccan banking system includes, at the end of 2004, 17 commercial banks that have 2043 offices. Besides the commercial banks, there are 6 offshore banks. There are 24,000 employees in all banks. The Casablanca stock exchange (CSE) is the Moroccan organized market for securities. Since 1993, several reforms of the Casablanca stock exchange had been adopted to strengthen its legal and institutional framework. In the mid of 2003, there are 54 companies listed on the stock market. There are 13 securities brokerage firms. There are 169 mutual funds that intervene in the market and who have strong links with commercial banks. The greatest telecom company in Morocco is listed both

at the CSE and at the Paris stock exchange. Beside banks and the stock market, there are active operators in leasing activity and in microfinance.

The Moroccan financial sector (MFS) has undergone major transformations/changes since the creation of its most important institutions in the late 1950s after the end of the French direct colonialism. Since then, we can distinguish, considering overall patterns and major orientations of the public policies, three important periods. The first period spanned from the late 1950s to the early 1980s. The second period stretched from 1983 to 1992. The third period spanned from 1993 until now.

During the first period, financial institutions and instruments were considered as tools for the success of *“inward-looking development strategies with the state playing a prominent role”*, (Jbili et al., 1997). For this reason, the financial sector was *“heavily controlled; interest rates were set administratively and were usually negative in real terms; monetary policy was conducted primarily through direct allocation of credit and refinancing; money markets were underdeveloped; and bond and equity markets were virtually inexistent. Commercial Banks were often obliged to lend to priority sectors with little concern for the borrowing firms’ profitability”* (Jbili et al., 1997). Globally, the essential features of this policy toward the MFS were identical to those characterizing the policy termed by McKinnon (1973) financial repression. This situation leads to negative real interest rates which discouraged private saving, and consequently lead to a reduced private investment rate<sup>1</sup>.

The second period began with the balance of payments crisis of 1982 and the adoption of the Structural Adjustment Program. The shift was materialized by the

more liberal view adopted by Moroccan authorities under the auspices of the multilateral agencies especially the World Bank and the International Monetary Fund. During this period of stabilization policies and structural reforms important measures were adopted to redirect the financial sector to serve private operators.

In the third period, the MFS had undergone great transformations in all its subsectors as a consequence of the adoption of a set of ambitious reforms. Thus, the monetary authorities enacted a new banking law in 1993. Four public banks were privatized in 1995. The market of securities had been revitalized in 1996 by the reactivation of the Casablanca Stocks Exchange. More market-oriented practices were introduced in the conducting of the monetary policy and the financing of the government deficits. Furthermore, since 1996 debtor and creditor interest rates were let to be fully fixed by the market rules.

The aims of this flow of reforms had been to liberalize the process of interest rates determination, to modernize the legal framework governing the banking institutions; to introduce more competition between banks on one side and between banks and alternative schemes of financing on the other; and to introduce more market procedures in conducting monetary and credit regulation policies. The final objective of these reforms has been to deepen the financial sector and to make it an enhancing factor of economic growth.

Since the beginning of the new millennium, other reforms have been adopted and recently a new law was enacted about the missions and statutes of the Moroccan central bank. This new law came into force in February 2006. Some of the new features of this new law are the independence of Bank Al Maghrib (BAM)

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<sup>1</sup> For a thorough discussion of the evolution of the Moroccan financial sector see: (Abouch, 1991; Zamiti, 1998; Ezzahid, 2003; Alaoui Moustain, 2004; Tatom, 2005; Bank Al-Maghrib, 2006)

from the government and its autonomy in formulating and implementing monetary policy. The major responsibilities of BAM are defined to be the preservation of price stability and the control and supervision of financial intermediaries.

Globally, the initiated reforms had produced important effects. The ratio M3/GDP increased from 43.6% in 1982, to 66.8% in 1993, to 83.7% in 2000, to 103.7% in 2005. This conclusion emerges also from the observation of the evolution of the ratio of M3 to M1 which we use to measure the sophistication of the Moroccan economy as illustrated in table 1.

Despite the major reforms adopted to deepen and reinforce the MFS, this sector still suffers from important weaknesses and caveats. M3/GDP, which is the indicator measuring the availability of financial services or the financial depth of the economy is less than in similar countries as Jordan, Turkey and Tunisia (World Bank, 2001). This same conclusion is drawn if we compare the ratio of credits distributed for the private sector to the GDP for the same countries. Furthermore, the ratio of bancarization, which measures the part of the active population having an account in a bank in the total active population, is very low when compared with developed and emergent countries.

Fortunately, there are many studies about the contribution of finance to growth in Morocco. They have been prepared by focusing especially on the Moroccan case or by introducing separately data for Morocco in papers dealing with the finance-growth nexus. Balamoune-Lutz (2003) explored the impact of financial liberalization on

economic growth in Morocco by testing the supply-leading hypothesis. The author used vector error-correction model as an econometric technique of research and her data set covers the period 1972-1999. Economic growth is proxied by the log of real per capita GDP. Financial sector development is measured by four indicators: M2/GDP, the ratio of reserve money to quasi money, the ratio of reserve money to total deposits and real interest rates. Balamoune-Lutz (2003) explained the use of more than one indicator to gauge financial sector development by her concern to capture deepening and effectiveness aspects of the Moroccan financial sector development. The study fails to find strong evidence in favor of the supply-leading hypothesis. Furthermore, almost all the results “provide evidence in favor of unidirectional causality from economic growth to financial development” (Balamoune-Lutz, 2003).

In his paper, Achy (2003) attempted to evaluate the impact of financial liberalization on savings, investment, and growth in some Middle East and North African (MENA) countries included Morocco. To estimate the regressions, the author used the panel data approach and introduced for each country an intercept in order to account for the fixed-effects. Beside the classic indicators of financial development, the author used a constructed index to gauge the advancement of the process of financial liberalization in the countries constituting his sample. The author reported that “an increase in financial depth leads to a lower level of private savings”. The simulations show that “the coefficients on financial

Table 1. Indicators of the deepening and structure of the Moroccan financial Sector and interest

	1970	1982	1993	2000	2005	Mean (1970-2005)
M3/GDP	32	43.6	66.8	83.7	103.7	58
M3/M1	112	125	155	161	150	139
Real interest rate on 6- month Treasury bills	2.20	-2.04	5.34	3.60	1.71	1.18



*development indicators as well as on financial liberalization index indicate a negative impact of financial depth on private investment in five MENA countries investigated*". When the links between financial depth and growth are explored, the author found no relationships after controlling for the impact on growth of fundamental variables such as investment rate and other policy related variables.

Moustain (2004) conducted a study to capture dynamic linkages between financial development and economic growth over the period 1970-2000. The author performed cointegration and causality tests in a b-VAR framework. The empirical results are mitigated. The author does not find any long run relationship, i.e. cointegration, "between real GDP and the financial development variables". Furthermore, empirical analysis revealed only "a short-run, spasmodic relationship between financial development and economic growth" and more surprisingly found "evidence supporting the argument that higher levels of financial development are associated with higher levels of consumption, both overall and private". The author explained her findings by the newness of reforms and the structural factors preventing a higher growth of the Moroccan economy.

The paper of Balamouné-Lutz (2006) is specifically devoted to the study of the short-run and long-run relationships between the process of financial reform and the mobilization of domestic savings in the Moroccan economy. The level of intermediation which indicates the financial depth of the Moroccan economy was measured by the ratio of broad money to GDP. The effectiveness of the financial intermediaries is measured by the ratio of reserve money to total deposits. They used

data set covers the period 1960-1999. The essential results of the author are that "in the short-run, financial depth (volume of intermediation) has a positive influence on private saving, while interest rates show a negative impact. On the other hand, the effectiveness of financial intermediation does not seem to have a direct effect on saving but has a significant influence on the volume of intermediation. Thus, intermediation effectiveness seems to have an indirect influence on private saving. In the long run, savings have a stable relationship (co-movement) with financial reform but the influence of interest rates remains negative, indicating that the income effect outweighs the substitution effect in the long-run as well" (Balamouné-Lutz, 2006).

## Methodology

In this paper, we explore the links between financial development and economic growth in Morocco. As is widely recognized by scholars, financial development is a multidimensional process. This paper focuses on three aspects of development the Moroccan financial sector. The first is the depth or the extent of the MFS. The second is the structure or the sophistication of the financial services provided to economic agents. The third aspect is the effectiveness or the cost of intermediation of funds by the financial institutions. The used indicators are devised so as to capture these three aspects.

In the first step, the stochastic properties of the variables are looked for. This step permits to determine the order of integration of each variable<sup>2</sup>. If a variable is stationary in level it is said that its order of integration is 0, and if it is necessary to differentiate it one time to make it stationary, it is said

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<sup>2</sup> A time series  $X_t$  is said to be weak stationary if  $E(X_t) = \mu < \infty$ ,  $\text{Var}(X_t) = \sigma^2 < \infty$ , and  $\text{Cov}(X_{t-h}, X_t) = \gamma_h$ . That implies that these three parameters are time invariant.

to be integrated of order 1, and so on<sup>3</sup>. For the determination of the order of integration of variables we will use the augmented Dickey-Fuller (ADF) test. The objective of studying the stochastic properties of variables is to avoid spurious regressions as advised by Newbold and Granger (1974). To explore the cointegration between growth and financial variables we adopt the Johansen multivariate approach that is adapted for systems including more than two variables among which there is more than one potential cointegrating relationship.

The finance and growth nexus will be explored by the cointegration procedure<sup>4</sup>. Indeed, we will test if there are long run relationships between financial variables and growth using the Johansen's unrestricted rank test. In the case of the existence of such co-movements we will run a vector error correction model to capture both short-run and long-run dynamics between financial development and growth. As stipulated by the representation theorem, the VECM framework provides a unifying tool to model simultaneously the long run and short run dynamics between variables.

We start from the fact that a VAR(p) of an N dimensional system  $X_t$  may be rewritten as a VECM:

$$\Delta X_t = \Gamma_0 + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \dots + \Gamma_{p-1} \Delta X_{t-p+1} + \Pi X_{t-p} + \varepsilon_t \quad (1)$$

Our system  $X_t$  includes five variables: LRGDP<sub>t</sub>, LRGFCF<sub>t</sub>, FD<sub>t</sub>, pubdef<sub>t</sub>, and Lpop<sub>t</sub>. FD<sub>t</sub> is the generic of one of the three variables measuring financial development. Hence, we will have three systems each

including one of the three measures of financial development besides the other four variables. The system  $X_t$  includes at least one no-stationary variable in level that is difference stationary.  $\Pi$  are 5\*5 coefficient matrices.  $\Delta$  is the difference operator and  $\varepsilon_t$  is a vector of normally and independently distributed error terms.

In any system of 5 variables, three cases are to be distinguished  $r=5$ ,  $r=0$  and  $0 < r < 5$ . If  $\text{Rank}(\Pi)=r=5$ , that means that any linear combination of the variables in the system  $X_t$  is stationary implying that all variable in  $X_t$  are stationary. A VAR with the variables of  $X_t$  in level suffices to capture dynamics between the elements of the multivariate system. In the case where  $\text{Rank}(\Pi)=r=0$ , that mean that there is no linear combination of the variables in  $X_t$  that is stationary. In this second case, it worths more to use a VAR to model the interdependence between the first differences of the variables in  $X_t$ . If there are r such relationships that mean that the rank of  $\Pi$  is r ( $0 < r < 5$ ), and using the rank factorization theorem  $\Pi$  may be represented as a product of two matrices as follows:  $\Pi = \alpha \beta'$ . The matrix  $\alpha$  has 5 rows and r columns and the matrix  $\beta$  has 5 rows and r columns. The matrix  $\beta$  contains in its columns the r cointegrating vectors and the matrix  $\alpha$  contains the wight of each of the r cointegrating vectors in the VECM. If  $\text{Rank}(\Pi)=r < 5$ , there are r linear combinations of the variables of  $X_t$  that are stationary. These stationary combinations of the the elements of  $X_t$  are introduced in the VECM to capture short run and long run links between the variables in the system  $X_t$  (Lardic and Mignon, 2002). Consequently to the decomposition of  $\Pi$  we obtain:

<sup>3</sup> To determine the order of integration of each variable we perform the augmented Dickey-Fuller test by running this regression:  $\Delta X_t = \alpha_0 + \alpha_1 T + \alpha_2 X_{t-1} + \sum_{i=1}^K \beta_i \Delta X_{t-i} + e_t$ . The procedure is applied in a manner permitting to know if variables are trend or difference stationary.

<sup>4</sup> « One of the main attraction of the concept of cointegration is that it provides a framework for modelling both the long-run equilibrium ... information about which is often given by economic theory , and the short -run dynamics for which economic theory information is relatively scarce » (Hylleberg and Mizon, 1989)

Table 2. MFS indicators

Financial indicators	Symbols	Measured aspects of the MFS
Ratio of M3 to GDP	M3GDP	Financial depth of the Moroccan economy
Ratio of M3 to M1	M3M1Ratio	Sophistication of the Moroccan financial sector
Real interest rate on the 6- month treasury bills	R6MIRTB	• Cost of funds in the Moroccan economy • The effectiveness of financial intermediation

$$\Delta X_t = \Gamma_0 + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \dots + \Gamma_{p-1} \Delta X_{t-p+1} + \alpha(\beta' X_{t-p}) + \varepsilon_t \quad (2)$$

The reparametrization of a VAR(p) conducts to a VECM. This last representation allows capturing the short-run and long run relationships among the random variables constituting the system  $X_t$ . The cointegrating vectors between the elements of the system  $X_t$  are the rows of  $\beta'$  and  $\beta' X_{t-1}$  are the r resulting stationary processes. The lagged value of  $X_t$  in the VECM captures the adjusting (short run) dynamics between variables in the system. In other words it accounts for the correction of any previous deviation from the equilibrium path. So “the  $\alpha$ 's are the error correction coefficients (loading factors) which indicate the speed of adjustment towards long-run equilibrium” (Luintel and Khan, 1999).

Three variables are used to proxy the degree of development of the Moroccan financial sector: the ratio of M3 to GDP (M3GDP), the ratio of M3 to M1 (M3M1ratio), and the real interest rate for 6-month treasury bills (R6MIRTB). Table 2 precises the definition of each variable and the particular aspect of the MFS proxied by it.

We will use the log of real Gross Domestic Product as an indicator of economic growth (LRGDP). The variables that are supposed to affect growth are: the log of Real Gross Fixed Capital Formation (LRGFCF), the degree of financial development measured by M3GDP, M3M1Ratio, or R6MIRTB, macroeconomic stability measured by the

rate of public deficit (RatePD), the log of the size of the Moroccan population (Lpop). The real values of the variables are obtained by deflating nominal values by the deflator of the GDP. All variables<sup>5</sup> cover the period 1970-2005. Three systems are obtained depending on the used measure of financial development.

$$X_t = [\text{LRGDP}_t, \text{LRGFCF}_t, \text{M3GDP}_t, \text{ratepd}_t, \text{Lpop}_t] \quad (\text{System 1})$$

$$X_t = [\text{LRGDP}_t, \text{LRGFCF}_t, \text{M3M1Ratio}_t, \text{ratepd}_t, \text{Lpop}_t] \quad (\text{System 2})$$

$$X_t = [\text{LRGDP}_t, \text{LRGFCF}_t, \text{R6MIRTB}_t, \text{ratepd}_t, \text{Lpop}_t] \quad (\text{System 3})$$

## Result and Discussion

Before applying the Johansen's cointegration rank test, we explore the stochastic properties of the variables. The application of the augmented Dickey-Fuller (ADF) test for the determination of the order of integration of the seven variables yields the results summarized in table 3.

The max-eigenvalue test and the trace test are used to determine the number of cointegrating vectors among the variables of each of our three systems. Table 4 summerizes the results if we test for cointegrating relationships in system 1.

If the deepening aspect of financial development is considered, the Johansen's unrestricted rank test provides evidence in favor of the existence of two cointegration vectors according to the trace test and

<sup>5</sup> The variables included are the value of their levels, the rate of their growth or relatively to another variable or their logarithm of their real values in level.

Table 3. Order of integration of variables

Variables	Variables in level		Variables in first differences		Order of integration of the variables
	ADF statistic	Critical values of the ADF statistic	ADF statistic	Critical values of the ADF test	
M3GDP	6.08	-1.9506	-3.650112	-3.548490	I(1)+T
M3M1Ratio	-1.6865	-2.9484	-3.066298	-3.552973	I(1)+T+C
R6MIRTB	-1.95	-2.7486	-6.476535	-1.951332	I(1)
LRGDP	-2.036	-2.951	-4.777460	-2.954021	I(1)+C
LRGFCF	-3.20	-3.548	-3.293907	-1.951332	I(1)
Lpop	1.498	-3.54	-3.245784	-3.552973	I(1)+T+C
RatePD	-2.96	-3.54	-4.018573	-1.951332	I(1)

The significance threshold of the critical value is 5%. I(1) indicates that the variables is not stationary in level. T and C imply that the ADF test is runned with a trend and/or constant.

Table 4. Results of the Johansen’s unrestricted rank test

H <sub>0</sub>	Eigen-value	Max eigenvalue statistic	Trace statistic	Critical value of the λ <sub>max</sub> at 5% level	Critical value of the trace at 5% level
r=0	0.659	36.633	107.077	34.805	76.972
r=1	0.535	26.046	70.443	28.588	54.079
r=2	0.493	23.100	44.397	22.299	35.192
r=3	0.323	13.293	21.296	15.892	20.261
r=4	0.209	8.002	8.002	9.164	9.164

r is the number of the hypothesized cointegrating relations. The 0,05 significance level is used to accept or reject the null hypothesis.

the existence of one cointegrating vector according to the max eigenvalue test. The cointegrating vector is:

$$\begin{aligned}
 LRGDP_t = & 19.89 - 1.216 LPOP_t \\
 & (4,60) \quad (-2,52) \\
 & + 1.09 LRGFCF_t - 0.069 RATEPD_t \\
 & (6,05) \quad (-6,9) \\
 & + 0.007 M3GDP_t + \zeta_t \\
 & (3,5)
 \end{aligned}$$

The VECM is runned with two lags chosen according to the common used information criteria (AIC, SIC, ...). With one cointegrating vector we fail to validate the VECM representation except when the first difference of M3GDP is used as an endogenous variable. In this case the coefficient of the error term is negative and significant.

In the second simulated model, financial development is measured by the ratio of M3 to M1 (M3M1ratio). This ratio is expected to gauge the sophistication of the Moroccan financial sector. When this ratio grows it means that the financial sector is developing, and consequently that the

economy is financially best served. The trace test indicates one cointegrating vector whereas the the maximum eigenvalue test indicates non equilibrium relationship between the elements of system 2 (Table 5).

When we normalize by the coefficient attached to LRGDP; that is we use this variable as the endogenous variable, we obtain the following cointegrating vector:

$$\begin{aligned}
 LRGDP = & 0.834 + 0.367LRGFCF \\
 & (0,47) \quad (7,05) \\
 & + 0.937 LPOP - 0.011RATEPD \\
 & (5,81) \quad (-4,07) \\
 & - 0.082 M3M1RATIO + \zeta_t \\
 & (0,78)
 \end{aligned}$$

Remark that in the long run the log of the size of population and the log of real investment affect positively and significantly the log of the real GDP. The rate of public deficit affects adversely and significantly economic growth whereas the ratio of M3 to M1 affects negatively and insignificantly the log of real GDP. The VECM representation is not validated

Table 5. Results of the Johansen's unrestricted rank test

H <sub>0</sub>	Eigen-value	Max eigenvalue statistic	Trace statistic	Critical value of the $\lambda_{max}$ at 5% level	Critical value of the trace at 5% level
r=0	0.590	30,387	82,874	34,807	76,972
r=1	0.521	25.053	52,487	28,588	54,079
r=2	0.328	13.557	27.433	22,299	35,192
r=3	0.297	11.98	13,876	15,892	20,261
r=4	0.054	1.887	1.887	9,164	9,164

r is the number of the hypothesized cointegrating vectors. The 0,05 significance level is used to accept or reject H<sub>0</sub>.

when LRGDP is introduced as endogenous variables. The coefficient of the lagged residual term is positive and significant. That implies that any deviation from the long run equilibrium relationship established between the elements of X<sub>t</sub> is not absorbed in the next period. The lagged first difference of M3M1Ratio affects positively although insignificantly the rate of economic growth.

In the third system, we introduce as indicator of financial development a measure of the effectiveness of financial sector. It is supposed that when a financial sector develops the cost of financial intermediation decreases and this is advantageous for firms and other economic agents because they acquire financial services at a reduced cost.

The max eigenvalue test provides non evidence on the existence of a long run equilibrium relationship between the elements of system 3 where the considered aspect of financial development is the cost of funds intermediation. The trace test is in favor of the existence of one cointegrating relationships.

The cointegrating vector is :

$$\begin{aligned}
 \text{LRGDP} = & 6.002 + 0.447 \text{ LRGFCF} + \\
 & (3.45) \quad (5.72) \\
 & 0.516 \text{ LPOP} + 0.009 \text{ R6MIRTB} \\
 & (2.54) \quad (3.61) \\
 & - 0.007 \text{ RATEPD} + \zeta_t \\
 & (-1.63)
 \end{aligned}$$

Except the rate of public deficit (RatePD), the other variables in the right hand side of the above equation affect positively and significantly the log of the

real GDP. Particularly the cost of funds in the Moroccan economy, proxied by R6MIRTB, affect positively and significantly economic growth. This result provides some credit to the main hypothesis of the financial liberalization paradigm. When LRGDP is the endogenous variable, the VECM representation is not validated because the coefficient attached to the lagged value of the residual is not negative. The first and second differences of the cost of financial intermediation proxied by R6MIRTB affect negatively and insignificantly the annual rate of economic growth (the first difference of the log of real GDP).

The existence of cointegrating vectors between the variables in a system does not imply that financial variables affect economic growth. It just means that there are links that keep together the elements of the system. To complete the study and in order to know the causal links between financial indicators and economic growth we use the Granger test of causality. The results are mitigated. There is a bi-directional Granger causality (G-causality) between M3GDP and the real per capita GDP. Another bi-directional G-causality holds between M3GDP and Gross real GDP. M3GDP G-cause real gross fixed capital formation. M3M1ratio G-causes R6MIRTB and this last variable G-causes the rate of national saving wich G-causes the real per capita GDP. Both M3M1ratio and R6MIRTB G-cause The RatePD. M3GDP, M3M1ratio, and R6MIRTB does not G-cause the log of real investment or the rate of investment.

Table 6. Results of the Johansen’s unrestricted rank test

$H_0$	Eigen-value	Max eigenvalue statistic	Trace statistic	Critical value of the $\lambda_{\max}$ at 5% level	Critical value of the trace at 5% level
$r=0$	0.633381	34.11668	92.53672	34.80587	76.97277
$r=1$	0.517850	24.80300	58.42004	28.58808	54.07904
$r=2$	0.388157	16.70351	33.61704	22.29962	35.19275
$r=3$	0.266543	10.53954	16.91354	15.89210	20.26184
$r=4$	0.170947	6.374000	6.374000	9.164546	9.164546

$r$  is the number of the hypothesized cointegrating relations. The 0,05 significance level is used to accept or reject  $H_0$ .

## Conclusion

Even if historical and theoretical evidence strongly suggest that financial variables may affect economic growth and its underlying factors, the empirical findings about the finance and growth nexus yield doubtful conclusions. At the light of empirical evidence financial variables are not systematically linked with growth or the variables that affect it directly or indirectly. This same conclusion emerges from the study of the Moroccan case.

There are many reasons that may explain the absence of a clear positive effect of financial development on economic growth in Morocco. First the initiated reforms undertaken in the mid 1990s to deepen and to modernize the MFS necessitate time to produce their full effects. Second, reforms must be reinforced and consolidated in order that the MFS be a strong catalyst of economic growth. In this direction, Moroccan authorities initiated another generation of reforms in 2006 especially to strengthen the regulatory and supervisory framework of the financial sector and to introduce more competition

between banks. The third explanation of the absence of a clear positive strong impact of the reforms of MFS on economic growth is the existence of factors that hinder growth and that are not yet treated such as institutional factors and the limited diffusion of entrepreneurship. Another explanation of the absence of inambiguous impact of financial variables on real ones is the reduced part of credits allocated to firms and other productive agents whilst the growing part of credits absorbed by consumption credits and government financing (Achy, 2003; Ezzahid, 2003; Alaoui-Moustain, 2004).

Finally if financial depth in Morocco has significantly increased in the last decade, the availability, the adaptability, and the proximity of financial services are not yet fully guaranteed for Moroccan firms and especially the category of micro, small, and medium enterprise. More efforts must be undertaken in two directions: strengthen the soundness and the stability of the Moroccan financial sector, and develop a more adapted bundle of financial services for economic agents.

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