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The Long-Run Behavior and Short-Run Dynamics of Private Savings in Morocco

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1. Introduction

Since the early 1980s many developing countries have started to liberalize their financial sector as part of wider structural adjustment programs that included fiscal consolidation, reforms of the exchange rate and foreign trade system, price liberalization, deregulation of activities, and other reforms with a view to improve the supply responsiveness of the economy and remove any market distortions that impede free market conditions [Eatwell (1996), Chowdhury (2001), Mavrotas and Kelly (2001)]. This has been a part of a broader move towards a reduced role for the government in the economy. The process has varied widely, however, in terms of both speed and sequencing.

Proponents for the reform of the financial sector argue that it will lead to significant economic benefits, in particular through a more effective domestic savings mobilization and a more efficient resource allocation process, by reducing intermediation spreads, financial deepening, and enhanced access to credit. This follows from McKinnon (1973) and Shaw's (1973) argument that in a financially repressed economy, interest rates remain below its market clearing value, thereby generating less than the optimal amount of savings and thus detracting from the pool available for investment.[1]

Various studies have tried to evaluate the impact of financial liberalization on private savings in a number of both developed [Bayoumi (1993a, 1993b), Caporale and Williams (2001), Chapple (1991)] and developing countries [Bandiera et al. (2000), Dayal-Gulati and Thimann (1997), Demetriades and Luintel (1997), Fry (1995), Hussain (1996), Jbili et al. (1997), Loayza and Shankar (2000), Gavin et al. (1997)]. However, the results have been inconclusive.

Some of these studies have shown that financial reform may increase the level of savings by widening the range of available savings instruments and increasing the expected return through higher real interest rates and reduced risks, as deeper mar-

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[1] A World Bank study has also found that the paucity of financial savings, due to government rationing of available credit to so-called priority sectors, has an adverse effect on economic growth by reducing both the volume and productivity of investment [World Bank (1989)]. An alternative view considers the effect of including the informal loan market into the original McKinnon-Shaw models, and finds that interest rate liberalization may, in fact, lower output growth [see Mavrotas and Kelly (2001) on this issue].

kets make financial assets more liquid [Kelly and Mavrotas (2001)]. On the other hand, it has also been argued that financial reform may actually decrease savings by reducing liquidity constraints through, say, improved access to consumer credit [see, for example, Chowdhury (2001) and Ostry and Levy (1995)].

Most of the studies on the developing countries have concentrated on specific regions, for example, East Asia [Fry (1995), Lahiri (1989)], South-east Asia [Chowdhury (2001)], Sub-Saharan Africa [Aryeetey and Udry (2000)] and Latin America [Melo and Tybout (1986), Gavin *et al.* (1997)]. One region that has not received much attention is North Africa.[2] This study intends to fill the gap in the literature by empirically analyzing the behavior of the determinants of private savings in Morocco, with special emphasis on the impact of financial reform.

Morocco makes an interesting case study, as it has a rather rich history of financial repression and a number of financial sector reforms undertaken during the last decade. Prior to the late 1980s, the financial sector in Morocco was characterized, among others, by complex guidelines for credit allocation, centralized lending by the central bank to public enterprises, absence of indirect monetary policy instruments, fixed and negative (in real terms) cost of funds, lax business supervision, and an inadequate accounting system.

Beginning in the late 1980s, Morocco became one of the first countries in North Africa to embrace reform. It has adopted a gradual approach to financial sector reform[3] and has implemented a broad-based program of encompassing changes in the structure of the financial system, prudential and supervisory frameworks, and monetary management.

One of the central objectives of the reform was to promote savings, investment, and growth. Interest rate deregulation and the increased availability of financial instruments were expected to stimulate savings and investment, while improved resource allocation would follow from efficiency gains in financial intermediation. In this context, it would be informative for policymakers to understand the recent trend in private

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[2] The only two exceptions are Jbili *et al.* (1997a) and Kelly and Mavrotas (2001).

[3] See Nsouli *et al.* (1995) and Jbili *et al.*(1997b) for a detailed discussion of the reforms that occurred in Morocco in the 1980s and early 1990s.

savings in the presence of financial sector development. Specifically, the hypothesis to be investigated in this paper is that there exists a stable relationship between the level of private savings and its determinants including a measure of financial reform. This information is crucial to the actual impact of financial reform on savings, as an accurate calibration of both long-run and dynamic effects of various government policies on private savings would allow inferences about the macroeconomic implications of financial liberalization.

The paper is organized as follows. Section 2 discusses the theoretical link between financial reform and the level of domestic savings and reviews the empirical literature; while Section 3 presents the financial sector reforms undertaken in Morocco. The estimating model is introduced in Section 4 and the estimation results are presented and discussed in Section 5. The paper ends with concluding remarks in Section 6.

2. Financial Reform and Savings

2.1 Theoretical Issues

Before formally modeling the impact of financial reform on savings, it would be useful to establish how these two variables may be linked to one another. Financial reform involves the elimination of credit controls, deregulation of interest rates, easing of entry into the financial services industry, development of capital markets, increased prudential regulation and supervision, and liberalization of international capital flows.

Reform is expected to increase competitive efficiency within the financial market in at least three ways. First, the removal of regulations and price distortions permit savings to be directed into highest-yielding (risk-adjusted) forms of investment (improved allocative efficiency). Second, increased competition reduces the cost of financial intermediation (higher operational efficiency). Third, the reform measures generate an improved range of financial products and services adaptable to changing consumer needs (dynamic efficiency). Although financial reforms can increase the efficiency with which resources are channeled into productive use, its impact on the quantity of savings is theoretically ambiguous.

From an analytical point of view, the impact of financial reform on savings include

a direct, short-term, and an indirect, long-term, effect. The direct effect works through the price and quantity channels. The price channel reflects the impact of reforms on savings through changes in the real interest rates. Fry (1978, 1995) reports that, across a sample of fourteen Asian countries, the gross national savings rate is positively affected by higher real interest rates. However, the positive response is small and diminishes in later years.[4] Reynoso (1989) finds that savings increase rapidly as real interest rates move from sharply negative to just below zero, but that the effect levels off at low positive real interest rates and becomes negative as interest rate rises. This raises the possibility of a nonlinear relationship between interest rates and savings, perhaps involving threshold effects. Morocco moved away from negative real interest rates after the liberalization process started.

The quantity channel affects savings by expanding the supply of credit to credit-constrained consumers. A number of studies have argued that the high level of savings evident in countries in East Asia and Japan can be contributed not to high interest rates but to bank expansion in rural areas and the availability of low-yielding but safe deposit instruments [Loayza *et al.* (2000)]. They estimated that a one percentage point increase in the ratio of private credit flows to income reduces the long-term private saving rate by 0.74 percentage point. This seems to indicate that the expansion of credit reduces private savings, as economic agents are able to finance increased consumption at their current income level.

Financial liberalization, that leads to large capital flows, can also have short-term implications for savings. Bandiera *et al.* (2000) have argued that the impact on savings of financial liberalization comes through the related changes in the availability and cost of credit, expected income growth, and increased wealth due to higher property values.

2.2 Empirical Results

The empirical results, however, have not been consistent across countries. Hussain (1996) estimated that, in the three years following financial reforms, savings in Egypt increased by about 6 percent of GDP over the level that would have occur-

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[4] Giovannini (1983) showed that Fry's results are sensitive to changes in the sample period or region employed.

red in the absence of financial liberalization. Chapple (1991), however, reported a decline in both household and corporate savings in New Zealand following liberalization. Evidence from Turkey during the 1970s and 1980s demonstrated that a negative income effect from higher interest rates outweighed the positive substitution effect on the private savings rate [Uyger (1993)]. Evidence from Bangladesh also showed a decline in private savings following financial liberalization [Chowdhury (2001)]. Kelly and Mavrotas (2001) examined the impact of financial sector development on private savings in 17 African countries but found the evidence to be rather inconclusive, although in most of the countries a positive relationship between these two variables was evident.

Financial reform has also been shown to lead to consumption boom and consumer lending in a number of countries, including, the United Kingdom [Bayoumi (1993b)], Mexico, and Thailand. Using the overlapping generation framework, Bayoumi (1993b) has shown that a move from a financially regulated to a deregulated system will make savings more sensitive to changes in income, wealth, demographics, and real interest rates. In addition, there will be a transitional decline in savings associated with higher real interest rates and a larger current account deficit. In summary, there is conflicting evidence in the literature regarding the impact of financial liberalization on domestic savings. No clear pattern of results or consistent conclusions emerge from the studies.

3. Financial Sector Reforms in Morocco

Jbili *et al.* (1997a) and Williamson and Mahar (1998) have discussed the actual and ideal sequencing of financial sector reform in a developing country. Usually, reform begins with interest rate liberalization, the introduction of market-based instruments of monetary policy, such as government or central bank securities with market-determined interest rates, and initial measures to strengthen banking supervision. Steps to increase competition among banks, and the development of the equity markets and non-bank financial services, are usually later measures in the reform process.

During the 1970s and most of the 1980s, Morocco pursued an inward-looking development strategy with a heavily controlled financial system [Jbili *et al.* (1997b)]. Monetary policy was conducted primarily through direct allocation of credit and refi-

nancing, while interest rates were set administratively. Money, bond, and capital markets were either underdeveloped or virtually non-existent.

The inefficiencies and distortions of this system were exacerbated by serious macroeconomic difficulties in the early 1980s. With prodding from the IMF and the World Bank, the government responded by embarking on a comprehensive stabilization and structural reform program. Financial sector reforms became an important part of these programs with an objective to reduce direct government intervention, allocate financial resources based on market demand, improve the capacity of financial institutions to mobilize domestic savings, and increase competition in the banking sector.

As a part of this program, interest rate liberalization was implemented gradually and took over a decade to complete. The structure of administered interest rates was simplified in October 1980, and the average levels of lending and deposit rates were raised by about 20 percent during the same year. However, real interest rates on deposits remained negative for most of the first half of the 1980s. In 1985 the monetary authorities liberalized interest rates on above-one-year deposits. Liberalization of 6-month and 3-month deposit rates took place in 1989 and 1990, respectively. During 1986-1991, a *minimum* (floor) interest rate, aimed at promoting long-term savings, replaced the fixed rate which was in place for all other deposits that were still subject to regulation. However, interest rates on all time deposits were liberalized in 1992. Real interest rates have become consistently positive since 1987. On the other hand, most lending rates were still regulated although the controlled fixed rates had been abolished in 1985 and replaced by a ceiling rate. Lending rates in Morocco were effectively liberalized in February 1996.

While the major financial reforms with – at least in theory- direct effects on private savings were interest rate liberalization and new banking regulations, several other reforms focused on the development of the financial sector in Morocco with potential impact on private savings.

First, in September 1993 Morocco repealed the *Moroccanization* law of 1973 that limited foreign ownership in many sectors of the economy (currently only agricultural land and some mining industries are subject to restricted foreign ownership). This action encouraged both national and foreign investment in the banking sector as well as other industries. Second, tax reforms that included changes in the corporate profit

tax in 1984, and the introduction of the value-added-tax (VAT) in 1986, resulted in sim-plification, neutrality and more transparency of the tax system, and had some benefi-cial effects on investment. Third, trade liberalization was greatly enhanced by introdu-cing current account convertibility in 1993. This was an important step towards allo-wing banks to accept deposits from exporters and importers in foreign currency which was expected to lead to greater deepening and higher effectiveness of financial inter-mediaries. Fourth, the privatization programs that were launched in 1990, and conti-nued until 2001, also targeted the banking sector. Privatization of state owned banks was expected to enhance their efficiency, and extend and diversify their financial ser-vices. Finally, the Casablanca stock exchange (CSE) was the vehicle through which privatized firms would raise funds. Indeed, the wave of privatization and the financial liberalization that was taking place in Morocco contributed to a remarkable turnover increase. The CSE turnover rose to about 24 billion dirhams in 1995 from 672 million dirhams in 1989, and market capitalization increased from 5 billion dirhams in 1989 to 39.0 billion dirhams in 1995. The CSE itself was privatized in 1993. Concurrently, in order to protect savers and allow smooth and efficient operations at the CSE, several other institutional changes have taken place including the creation of the *Deontologic Council of Stocks and Bonds* (Conseil Déontologique des Valeurs Mobilières) which helped to smooth the operations of the stock market and ensure the protection of savers.

Substantial trade liberalization has also been achieved since the mid-1980s. For non-agricultural products, the maximum custom tariff has been reduced from over 70 percent in the mid-1980s to 50 percent in 2001. The number of tariff band has been reduced from 26 in the 1980s to 8 in 2001, and most quantitative restrictions were lif-ted or transformed into tariff equivalents.

4. The Savings Equation

4.1 The Model

Based on the discussion in Section 2, an empirical savings function can be deri-ved for this study. Specifically, the private savings rate $(s/y)_t$ can be modeled as a func-tion of the natural log of real per capita income (y_t), real interest rate (r_t), other finan-

cial liberalization measures including financial depth (fd_t) and financial intermediation effectiveness (fe_t), dependency ratio (dep_t), share of agriculture in GDP (agr_t), and the ratio of public savings to gross national disposable income (pbs_t).[5] Thus,

$$(s/y)_t = a_0 + a_1 dep_t + a_2 agr_t + a_3 r_t + a_4 y_t + a_5 fd_t + a_6 fe_t + a_7 pbs_t \qquad (1),$$

where, following Dayal-Gulati and Thimann (1997), private savings is calculated as domestic investment plus the current account surplus minus public savings.

4.2 Rationale for Including Various Determinants [6]

The inclusion of real per capita income is pretty standard in the savings literature [Lahiri (1989)]. First, because savings and economic growth have been highly correlated over long time horizons as well as for many regions and stages of development [Dayal-Gulati and Thimann (1997)]. Second, because savings is directly associated with output through investment, so that, to the extent that it increases domestic investment, higher domestic savings will generally result in higher growth if the economy is below its steady state. It is also a proxy for the presence of credit constrained consumers [Kent (1997)]. However, the impact of income on savings has been inconclusive. The simple permanent income theory predicts that higher economic growth reduces private savings because forward-looking consumers who expect their permanent incomes to rise will dissave against future income. In contrast, the intertemporal optimizing models, such as, the life-cycle model, suggest a positive relationship between income and private savings. Most of the cross-country empirical studies find that permanent increase in income have a positive effect on private savings rate.[7]

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[5] In addition, a number of other factors have been theorized to affect private savings. These include, but are not limited to, macroeconomic stability measured by inflation, external factors including current account balance, foreign savings, and terms of trade, etc [Williamson and Mahar (1998), Dayal-Gulati and Thimann (1997)]. However, given the small sample size available for this study, inclusion of any additional variables would have led to serious degrees of freedom problem.

[6] Loayza *et al.* (1999) provides an excellent summary of various determinants of savings and findings from previous empirical studies.

[7] See, for example, the paper by Blanchard and Fischer (1989) and Bosworth (1993).

The real interest rate captures the effects of financial reform and deepening. It is measured as nominal interest rate on time deposits less the rate of consumer inflation. The theoretical literature is ambiguous about the effect of a change in interest rates on savings because the income and substitution effects of such a change work in opposite directions. The substitution effect is positive. Since higher real interest rates imply higher rate of return on savings, a rise in real interest rates leads to an increase in saving. The income effect is negative. An increase in real interest rates leads to a decline in saving, as less saving may result in a given (targeted) level of funds in the future.

The next variable, dependency ratio (dep_t), captures the life-cycle effect and is included to measure the impact of demographic variables on the savings rate. In the life-cycle model of household behavior, savings is viewed as being motivated by the desire of households to smooth lifetime consumption in the face of uneven income flows. The savings rate of the working age population is positive, whereas that of the retired and young population is negative. An increase in the ratio of the non-working age population to the working age population thus lowers the savings rate.[8] Following Khan *et al.* (1994), the dependency ratio is defined as the ratio of the difference between the total population and the employed labor force to the total population. An inverse relationship is expected between the dependency ratio and private savings [Lahiri (1989), Bosworth (1993)].

Given the predominance of agriculture in economic activity in Morocco, it is clear that a large share of the population face uncertain income. Theory predicts that greater uncertainty should increase savings as risk averse consumers set aside resources as a precaution against possible adverse changes in income [Skinner (1988)]. Rural incomes are more uncertain than urban incomes and, in the absence of financial markets through which risks can be diversified, rural residents would save a greater fraction of their income. Edwards (1996) report empirical support for this view. The share of agriculture to GDP captures the impact on savings of such an occupation structural variable.

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[8] An alternative view follows from evidence suggesting that the savings rate of the elderly is not significantly lower than that of the younger population, a phenomenon that is sometimes attributed to the existence of an altruistic bequest motive for savings. An inference drawn from the similarities of savings rate found among different age groups is that a shift toward a more elderly population will have little effect on the savings rate. See, Leff (1984) on this issue.

Fiscal policy can potentially affect private savings through revenue policy (say, tax structure), expenditure policy (say, income redistribution), or the extent of public savings. The rationale is to find out the extent to which the private sector in Morocco internalize the government budget constraint and hence the extent to which an increase in public savings is offset by an increase in private savings. Hence public savings is included here. The variable is measured as the ratio of public savings to gross national domestic income.

Our next variable for measuring financial market reforms is difficult to quantify. Virtually, all studies have used the degree of monetization of the economy - generally measured as the ratio of M2 to GDP - to capture the degree of financial depth [Dayal-Gulati and Thimann (1997)]. This variable has been consistently found to be higher in market economies (indicating that most transactions are intermediated within a formal financial system) and lower in financially repressed economies. The finding of statistical significance of this variable in a number of studies [see, among others, Edwards (1996), Johansson (1996)] have led to the conclusion that financial markets development has a positive net effect on savings.

In this study we have also included an indicator of the effectiveness of financial intermediation measured as the ratio of reserve money to total deposits. As the banking system improves its efficiency and begins to attract more deposits, this ratio declines. As pointed out by Jbili *et al.* (1997) financial development in Morocco as measured by the large number of bank branches began in the mid 1980s but the provision of banking services was quite narrow. Thus, we need to distinguish between financial depth and the efficiency of financial intermediaries.

5. Estimation Results

To perform the analysis, annual data on the eight variables mentioned above are obtained from *International Financial Statistics* (IFS) published by the International Monetary Fund and from the database of la *Direction de la Statistique* in Morocco. The period covered in this study is from 1960 to 1999.

In Table 1a, the performance of some of the financial indicators after reform are considered with comparable data immediately preceding the beginning of the reforms in 1986. It is interesting to see that the averages for income growth and real interest

rate are much higher immediately following the reforms. On the other hand, significant changes in the measures of financial indicators took place much later (in the third and fourth period in the Table). The savings ratio also registered a slight increase after reform.

Table 1b shows the correlation coefficients between the private savings ratio and the indicators of financial sector reform. The correlation coefficient between the savings ratio and M2/GDP variable drops significantly after reform. It is also evident from the plot of the two variables shown in Figure 2. The same trend of decreasing correlation after reform is evident between the private savings ratio and real interest rate, public savings ratio, and agriculture. In case of the reserve money/time deposit ratio, the correlation coefficient is negative during the pre-reform period while positive after reform.

For estimation purposes, unit root (results are reported in Table 2) and cointegration tests are conducted, and error correction models are generated. The stationarity of the series is tested by computing augmented Dickey-Fuller (ADF) test statistics to investigate the presence of unit roots under the alternative hypothesis that the series is stationary around a fixed time trend.

When variables are non-stationary, determining whether there is a long-term relationship (or cointegration) becomes very important. As noted by Engle and Granger (1987), the presence of cointegration requires that a short-run causality model involving non-stationary cointegrated variables must include the cointegration constraint, which has been referred to in the literature as the *error correction term*. On the other hand, if variables are not cointegrated, any linear combination will be non-stationary and the residuals will also be non-stationary. Johansen and Juselius' (1992) test of the cointegration rank is used to get the most efficient estimate of the cointegrating relationship and to determine the number of cointegrating vectors.

The appropriate lag length for all variables is determined following Hsiao (1981) and on the basis of Akaike's final prediction error (FPE) criterion. Based on Johansen-Juselius' cointegration test results reported in Table 3, the hypothesis of no cointegration is rejected for r=1 but not for r=0. Both the maximal eigen value and the trace test yield the same conclusion, confirming the presence of a unique cointegrating vector.

The results from estimating the long-run causality (cointegration) equation are displayed in Table 4. These results indicate that, at the 5-percent level, five variables

seem to have a long-run impact on private saving. The coefficients associated with per capita income, financial depth (M2/GDP), and public saving are significant and have the expected signs. We find that, as anticipated, an increase in per capita income increases the saving ratio. Similarly, an increase in financial depth has a positive effect on private savings. The coefficient on public saving is significant (at the 1-percent level of significance) and has the expected negative sign. In addition, the coefficient is almost unity, implying that there is evidence to support the presence of full *Ricardian Equivalence* in Morocco. In a Ricardian world, an isolated cut in taxes or an increase in government expenditures would lead to an equivalent rise in private spending because individuals would expect an equivalent discounted tax increase in the future. Under these conditions, as articulated in Barro (1974), fiscal policy is unable to directly affect savings. Bandiera *et al.* (2000) also found support for the Ricardian equivalence in three (and depending upon specification, five) out of eight developing countries in their study.

However, the variables measuring dependency and the effectiveness of financial intermediation, although significant, have positive (instead of negative) signs. While this might seem puzzling, there are some reasonable explanations.

First, as stated earlier, we would expect an inverse relationship between private savings and dependency suggesting that a decline in the proxy for dependency leads to higher savings. The statistical results derived in this study show the opposite. A plausible explanation is that most of the private saving is undertaken by high- and middle-income groups. In countries where corruption and nepotism are widespread - particularly during the period under study - such groups are seldom directly affected by unemployment; so that their savings behavior may not be responsive to changes in the structure of the labor force. Another plausible explanation lies in the fact that the unemployment data supplied by the government understate unemployment rates greatly. If there is a threshold level of dependency above which one would see a significant decline in private savings, by understating unemployment we may not capture such relationship.

The second unexpected finding is the positive coefficient on the ratio of reserve money to total deposits (fe_t), implying that the effectiveness of financial intermediaries has a negative impact on private savings. Perhaps this can be rationalized by the role of intermediation in expanding and easing credit. Both the easing and expansion of

credit tend to lower savings. This indeed was the case in Morocco since the early 1990s as consumer credit institutions relaxed their requirements for providing consumer loans. It is worth noting that this variable is significant only at the 10 percent level.

On the other hand, the share of agriculture in GDP and real interest rates appear to have no long-run effect on private saving. The result associated with the share of agriculture stands in contrast to the finding in Edwards (1996). As explained earlier, one would expect a decline in this ratio to cause private savings to fall due to the lower uncertainty associated with urban income relative to rural income. However, there are at least three reasonable explanations as to why this may not necessarily hold in the case of Morocco. First, while it is true that there is high uncertainty in the agricultural sector, particularly in the last two decades as drought has become chronic, the government does subsidize this sector by providing low-interest or interest-free credit through specialized state-owned financial institutions such as *Credit Agricole* (a bank that lends to disadvantaged farmers) and other relief measures.

Second, when farmers abandon agriculture and migrate from rural to urban areas, they often join the service/trade sector (particularly tourism related activities), not the industrial sector where new job creation is highly cyclical. The service/trade sector is also subject to high uncertainty so that the behavior of saving may not change. Third, informal saving is quite predominant in rural areas; even if there were a shift in the behavior of savings, it would not be captured through a saving model that focused on the formal sector. As income taxes paid by most income earners in rural regions in Morocco are assessed on the basis of assumed earnings, farmers often use informal saving markets so as to evade taxation.

In the same vein, the finding that real interest rates do not have an impact on private savings should not be viewed as startling. Our results suggest that, while real interest rates in Morocco have become consistently positive since the late 1980s, the negative income effect offsets the positive substitution effect of an increase in real interest rates. Bandiera *et al.* (2000) also could not pin down a positive effect of increases in the interest rates on savings.

The short-run dynamics are captured by the error-correction model. The results are reported in Table 5. The coefficients associated with the variables per capita income, public saving and M2/GDP are all significant and have the expected signs. Full Ricardian equivalence seems to hold in the short run as well as

the long run. The dependency variable again seems to have a positive effect on private saving. As explained earlier, this result can be rationalized. There is no statistical evidence to support the presence of an influence from the other four variables on private savings. It is worth noting that the coefficient on the lagged value of private saving is not significant, implying that current saving does not depend on last period level of private saving.

Our results contrast with the finding of no impact of financial liberalization on private saving in the study by Jbili *et al.* (1997), which is the only study thus far that has tried to explore the link between financial liberalization and private saving in Morocco. While Jbili *et al.*'s work has contributed to the literature by extending empirical testing to countries in North Africa, we believe their study had three limitations.

First, it did not model the variables presumed to affect -or be affected by -financial reforms satisfactorily. For example, there was no testing for stationarity and cointegration. Since the variables turned out to have unit root, using OLS estimates is inappropriate. Second, by examining only annual data for the period 1970-1995, there may have been a small-sample bias that would account for the statistical results obtained. Third, the first phase of financial liberalization in Morocco occurred gradually and was not completed until 1993, while reforms targeting lending rates did not occur until 1996. Since reforms tend to work with significant lags, we believe Jbili *et al.*'s results are due to non-inclusion of relevant data (which were not available in 1994-95).

A longer period of time is therefore required in order to assess the effects from financial liberalization. The present study benefited from the availability of data including at least six years after substantial financial reforms were implemented in Morocco and, thus, tests using these data allow us to better ascertain the effects of financial liberalization on private saving.

On the other hand, our findings are consistent with conclusions in several other studies including Dayal-Gulati and Thimann (1997) who have shown that financial depth has a favorable impact on private saving in a comparative study of countries from South-East Asia and Latin America.

Next, the robustness of the results is checked using a battery of tests. Four separate stability tests are conducted and the results are given in Table 6. The Chow breakpoint test is carried out by considering two different breakpoints. First, we use 1986; this is quite reasonable since the liberalization reforms were launched in 1986.

However, due the gradual nature of the reforms, we may also consider the structural break as occurring in 1993. Major privatization programs and the convertibility of current accounts were implemented in 1993. The results from Table 6 fail to reject the hypothesis that the model is stable. The gradual implementation of financial liberalization in Morocco also implies that a breakpoint may be unknown. To address this concern, we carry out a Ramsey RESET test. The test statistics shown in Table 6 reconfirm our earlier stability results. Finally, we use recursive residuals and the CUSUM test (based on the cumulative sum of recursive residuals). These are shown in Figures 3 and 4, respectively. These tests also yield similar conclusions. Based on the results, the estimated model can be considered robust and amenable for further analysis.

6. Concluding Comments

Savings is an issue of fundamental importance to academicians and policy makers alike. While, for an individual, savings is essentially a way to move resources over time, for the economy as a whole the supply of savings represent an important source for the financing of investment. In the economic literature, there is a consensus that financial reform can improve resource allocation; however, there is less agreement as to whether or not it can substantially increase the private savings rate. To the extent that financial reform reduces liquidity constraints on households, the precautionary motive for savings may be adversely affected. Moreover, the development of the consumer credit markets might increase household indebtedness, again leading to a temporary decrease in savings. On the other hand, the availability of a greater range of savings instruments, with positive real returns, is likely to increase private savings.

The issue is, therefore, an empirical one. The paper adds to the existing literature in this area by empirically analyzing the impact of financial reform on the level of private savings in Morocco. Since the mid-1980s, Morocco has implemented a broad-based program of financial and market reforms, encompassing changes in the structure of the financial system, prudential and supervisory frameworks, and monetary management. Time series models are estimated in order to evaluate the impact of various determinants of private savings – with special emphasis on financial reform. Initial estimates show that a broad range of varia-

bles, rather than a single policy variable, affect private savings in Morocco. In particular, per capita income, dependency ratio and public savings have a statistically significant impact on private savings.

Interestingly, the financial reform index, as measured by financial depth, has a positive impact on the level of private savings. This supports the view that financial reform has led to significant economic benefits, in particular through a more effective savings mobilization and a more efficient resource allocation process by reducing intermediation spreads, and enhancing financial deepening and access to credit.

The results also suggest that economic policies that reform financial markets and enhance financial deepening can have a significant impact on the private savings rate. Hence the importance of a stable macroeconomic environment along with low fiscal deficits, a banking system with low non-performing loans, an effective regulatory and supervisory environment, and a contestable financial market cannot be underestimated.

Finally, it should be pointed out that financial reform in Morocco has been an ongoing process since the mid-1980s. The results presented here can only indicate the direction of change during the early years of reform, rather than a complete evolution of the effect of reform on private savings.

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Appendix

Table 1a: *Indicators of Financial Sector Reform (in percent)*

Variable	1970-85	1987-90	1991-95	1996-99
s/y	0.186	0.199	0.191	0.196
Real GDP growth	4.800	4.511	-0.117	3.237
M2/GDP	0.403	0.489	0.615	0.712
Per capita income growth	0.298	2.491	-1.844	1.503
Reserve money/time dep.	0.556	0.474	0.434	0.365
Real interest rate	-2.300	4.721	1.659	0.196

Table 1b: *Correlation of Selected Variables with the Private Savings Rate*

Variable	Entire period	Pre-Reform	Post Reform
s/y	1.00	1.00	1.00
per capita GDP	0.49	0.65	0.45
M2/GDP	0.26	0.59	0.16
Reserve money/time dep.	-0.23	-0.34	0.08
Real interest rate	-0.31	-0.47	-0.01
Public savings rate	-0.76	-0.92	-0.15
Agriculture	-0.50	-0.56	-0.29

Note: In Table 1a, the figures for s/y and per capita income growth in the pre-reform period (1970-85) are for the 1983-85 period.

Table 2: *Augmented Dickey-Fuller tests* for the presence of unit root*

Variable	t statistics for $\rho 1$	
	Level	First difference
S/Y	-2.337	-5.562
dep. Ratio	-1.954	-5.814
Agri/GDP	-3.141	-10.471
Real interest rate	-2.779	-9.129
Per capita income (log of)	-2.156	-8.518
M2/GDP	1.472	-9.140
Reserve money/total deposits	0.004	-7.581
Public saving ratio	-1.952	-5.240

*ADF tests are performed by *OLS* estimation of the equation

$$\Delta xt = \rho 0 + \rho 1 x_{t-1} + \rho 2t + \sum_{i=1}^{n} \varphi i \Delta x_{t-1} + \varepsilon_t$$ (where t is a time trend). The null hypothesis of nonstationarity is rejected if $\rho 1$ is less than one and

statistically significant. The test is based on critical values obtained from a response surface analysis and reported by McKinnon (1991). The 1 and 5 percent critical values for testing the presence of unit root in levels are −4.189 and −3.497 respectively. The 1 and 5 percent critical values for testing the presence of unit root in differences are −4.216 and −3.531, respectively.

Table 3: *Johansen's cointegration test** *(LR for the maximal eigen value and the trace test.). Variables: $(s/y)_t$, dep_t, agr_t, r_t, y_t, fd_t, fe_t, and pbs_t*

H_0: r	Eigen value	p-r	λ_{max}= $-T\log(1-\lambda_{r+1})$	λ_{Trace}= $-T\log\Sigma\log(1-\lambda_i)$	$\lambda_{max}(0.95)$	$\lambda_{max}(0.99)$	$\lambda_{Trace}(0.95)$	$\lambda_{Trace}(0.99)$
0	0.7898	8	57.71	178.34	52.00	57.95	165.58	177.20
1	0.6659	7	40.56	120.64	46.45	51.91	131.70	143.09
2	0.5257	6	27.60	80.08	40.30	46.82	102.14	111.01
3	0.4766	5	23.95	52.48	34.40	39.79	76.07	84.45
4	0.3805	4	17.72	28.53	28.14	33.24	53.12	60.16
5	0.1600	3	6.45	10.81	22.00	26.20	34.91	41.07
6	0.1095	2	4.29	4.36	15.67	20.20	19.96	24.60
7	0.0020	1	0.07	0.07	9.24	12.97	9.24	12.97

* Statistical results were obtained using CATS.
Critical values are from Osterwald-Lenum (1992).
* Based on the test of significance of the largest λ_r, the hypothesis of no cointegration is rejected for r = 0 but not for r =1. The same result is obtained from the trace test. Thus, we conclude that there is one cointegrating vector.

Table 4: *Estimation of long-run relationship*
Dependent variable: Private savings ratio (s/y)

	Coefficients	t-satistics
Constant	-0.927	-3.162 [0.003]
dep_t	0.002	2.265 [0.03]
agr_t	-0.001	-0.484 [0.631]
r_t	0.001	1.098 [0.281]
y_t	0.0849	3.156 [0.003]
fd_t	0.116	2.049 [0.049]
fe_t	0.095	1.845 [0.074]
pbs_t	-0.985	-10.072 [0.000]

Actual P-values of the F ratios are in brackets.
$\bar{R}^2$= 0.839 , F-ratio = 28.675 [0.000]

Table 5: *Estimates of the error-correction model*
Dependent variable: $\Delta(S/y)$

	Coefficients	t-satistics
Constant	-0.002	-0.856
		[0.398]
$\Delta(S/y)_{t-1}$	0.091	1.085
		[0.287]
$\Delta(dep)_t$	0.002	2.497
		[0.018]
$\Delta(agr)_t$	-0.001	-1.372
		[0.181]
$\Delta(r)_t$	0.001	1.215
		[0.234]
$\Delta(y)_t$	0.169	2.567
		[0.016]
$\Delta(fd)_t$	0.205	2.081
		[0.047]
$\Delta(fe)_t$	0.02	0.317
		[0.753]
$\Delta(pbs)_t$	-0.956	-10.381
		[0.000]
(Error Correction Term)$_{t-1}$	-0.628	-3.146
		[0.004]

Actual P-values of the t statistics are in brackets.
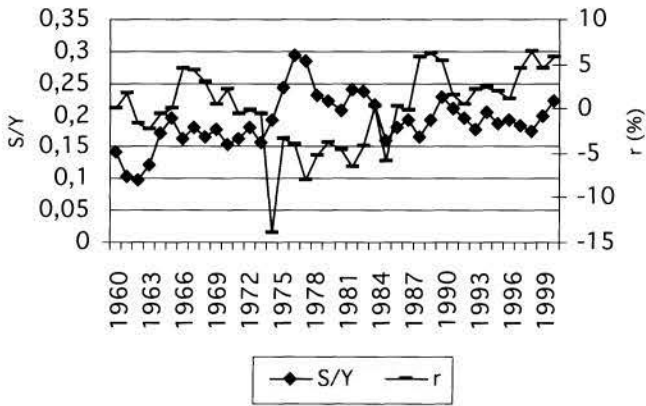
$\bar{R}^2$= 0.779 , F-ratio = 15.135 [0.000]

Table 6: *Tests for model stability*

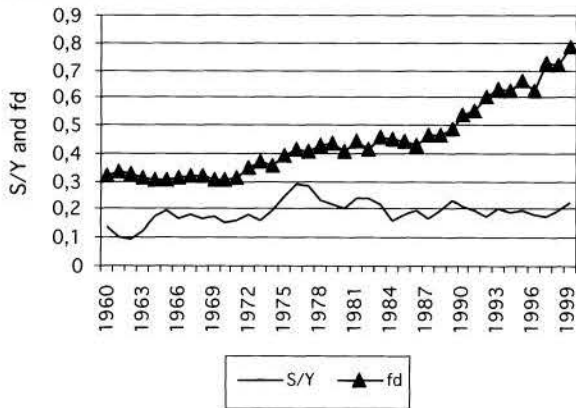|		
Chow breakpoint test (1986)	F-statistic	1.1672 [0.358]
	Log likelihood	13.145 [0.106]
Chow breakpoint test (1993)	F-statistic	0.8625 [0.517]
	Log likelihood	5.3729 [0.372]
Ramsey RESET test	F-statistic	1.0122 [0.322]
	Log likelihood	1.285 [0.256]

p-values are in brackets.

Figure 1. *Private saving ratio and real interest rates*

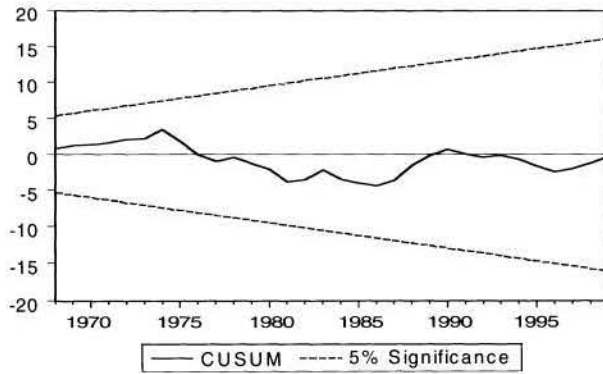**Figure 2:** *Private saving and financial depth (M2/GDP)*

Figure 3. *Recursive Residuals*
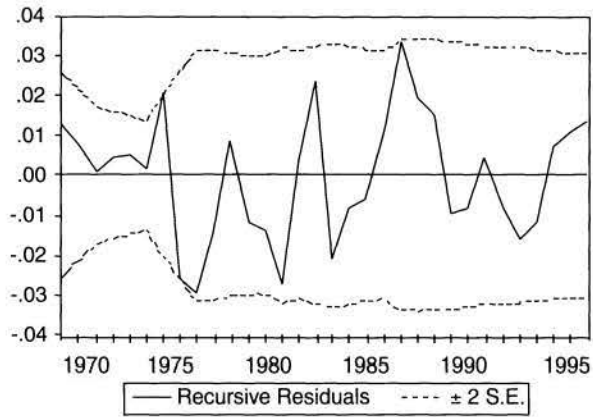
Figure 4: *Cusum Square Test*

Abstract

*The paper examines the trend in private savings in Morocco in the presence of finan-
cial sector development by utilizing a cointegration and error-correction modeling fra-
mework. Specifically, the hypothesis that there is stable relationship between the level
of private savings and its determinants including a measure of financial reform is inve-
stigated. The statistical results provide evidence in favor of a long-run relationship bet-
ween private savings and most of its determinants. More importantly, the financial
reform index, as measured by financial depth, is found to have a positive impact on
the level of private savings. This indicates that the financial reform program has ten-
tatively improved resource allocation in Morocco and with the availability of a greater
range of savings instruments, with positive real returns, private savings has increa-
sed.*