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Bank-based investing RoSCA for Islamic finance: a new alternative to drain households savings and reduce financial exclusion

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Abstract

On the arrival of the new banking law in Morocco, in august 2015, conventional banks and their foreign rivals will finally have the possibility to create their subsidiaries dedicated to micro-credit, participative finance and payment, and hence, supply the market with new Islamic financial solutions for money saving and financing. In order to drain the substantial households savings escaping to classic banks, and consequently, gain ground among these latter, we think that those new Islamic finance operators should target, in almost equal proportions, people with no access to formal financing and those with religious convictions about interest rate prohibition in Islam. For this purpose, we conceptualized an innovative bank based model of Rotating Savings and Credit Associations that allows its members to invest their savings by means of the bank, and raise free-interest rate loans with no application and management fees. In fact, The conception of this model relied on the results of a survey questionnaire we administered among 725 subjects from different social categories in Morocco to comprehend the inherent features of this informal practice (RoSCA) locally called "*Daret*". The first part of the answers gave us a basic data we used, by means of the two-way ANOVA (Analysis of the variance), to determine which social characteristics interact together to motivate a person to join a RoSCA. As for the second part of the answers, it gave us insights into the functioning of traditional RoSCAs in Morocco and their members preferences and perceptions on different scales. After all, we based on these findings to conceptualize the model taking into account both equity between members and sustainability of the operation. Additionally, unlike the traditional types of RoSCAs that rely on confidence and social links between members, this bank-based investing RoSCA allows people with no prior cognition to be gathered. This by introducing the bank as a guarantor and withdrawing, temporarily, a deposit for default risk to estimate by means of a risk-rating matrix we proposed. The model is, also, found to be more attractive regarding its real economy promotion through investment, risk sharing process, and integration of financially excluded households.

JEL-Classification: O16; O17; G32; G2.

Keywords: RoSCA; Two-way ANOVA; Islamic finance; Default risk; Morocco.

1 Introduction

Beyond the traditional saving and credit practices used locally in many developing countries, Rotating Savings and Credit Associations¹ (henceforth, RoSCAs for short) had a very special attention from various economists and sociologists who have been studying the historical, sociological and economic aspects of these widely known informal financing alternatives. In fact, some authors went to the point of modeling and analyzing the financial functioning and behavior of some very sophisticated types of RoSCAs (Tchuindjo, 2000)(Yu, 2013). We refer here to *bidding*² RoSCAs widespread in Asia, Latin America and some southern African countries. In general, RoSCAs are often analyzed in the literature of microfinance and collaborative finance.

The importance granted to these associations can be explained first, by their major role in the financing of several informal sector activities in many African and Asian developing countries (Lelart, 1990)(Ardener and Burman, 1995)(Gasse-Hellio, 2000)(Umuhire, 2013)(Umuhire and Nyssens, 2013). In fact, during the eighties, many developing countries were heavily indebted and faced inextricable difficulties with the steady rise in interest rates. Populations of these countries felt the urgent need to use domestic savings and find ways to mobilize it more effectively to finance their development on a micro scale.

In addition, the national banking systems were often in crisis at this time regarding a reckless credit policy. As a consequence, commercial banks lost the trust of their customers and were unable to collect people's savings and therefore finance agriculture, commerce and small businesses (Kedir et al., 2011). And This is how we have witnessed the emergence of new financing informal practices at this period. These informal practices represent an original behavior of the local populations and correspond to a quite strange financial mechanisms that constitute what is now called "informal finance" (Lelart, 1999).

It is really difficult to have a clear idea of the extent of this phenomenon. This is because transactions through these informal practices are not recorded and therefore, cannot be attributed to national accounts. But we are certain that informal finance is important and very significant and we still wonder about its role in relation to that of institutional finance (Goffe, 2014). It is also important to know how to make the best possible use of the huge funds flowing in informal finance to meet the needs of the emerging economies.

Morocco as a developing country does not make an exception compared to countries where informal finance has existed for decades as a common practice in various forms (Abdaimi, 1989). The most used forms we can cite here are : self financing through financial hoarding ; family financing or proximity financing ; traditional-mortgage housing transactions³ and RoSCAs commonly called "*Jamaaia/Daret*".

¹The term Rotating Savings and Credit Associations (RoSCA) as it was used for the first time by (Geertz, 1962) refers to financial self-help groups that collect multiple contributions from their members across time, and allocate merged funds called pots-back generally in rotation. RoSCAs are generally categorized by researchers into random, fixed, and bidding RoSCAs (Ardener, 1964)(Yu, 2013). These informal financing institutions travel under many different names : *Chit funds* in India, *Susu* in Ghana, *Tontines* in many francophone countries in west Africa, *Cheetu* in Sri Lanka, and *Daret* in Morocco which means rotation in Arabic dialect. These are just few examples.

²In these associations, each participant contributes with regular intervals to a pool, an amount of money fixed in advance. This fund is put on sale each time, according to a process of oral bidding, and the products drawn from this auction are immediately put on sale according to the same process of bidding. These type is not used in Morocco because of its interest-rate based remuneration prohibited by Islamic religion and partially, by Moroccan law.

³For more details see (Mansouri and Ziki, 2005).

The use of these informal financial practices is mainly explained by the absence of customized banking services to the needs of the poor and micro entrepreneurs. Despite the fact that the Moroccan banking system is well positioned in terms of banking coverage compared to many African and Arab countries⁴, the offered services still inadequate to the needs of a large majority of the population. The World bank reported in 2014 that 41% of Moroccan adults have never used any formal financial product or service. In an worldwide scale, over 2 billion adults are unbanked and some socioeconomic categories (farmers, artisans, small traders...) with low incomes have simply no access to bank financing for lack of reliable forms of collateral that could be used to assuage bank's fears of non repayment. Expensive bank charges associated with lack of competition as stated by (Demirgüç-Kunt and Klapper, 2012) are considerably another influencing factor.

To meet the needs of this population, in parallel with the surfacing of microfinance all around the world, Morocco has initiated the first operations of micro-financing with the support of the NGO "AMSED" (Association Marocaine de Solidarité et de Développement) in 1993. In the late 90s, with the efforts of public authorities, international donors, NGOs and local banks, the micro-credit sector has been consolidated⁵ and microfinance associations had strengthened their institutional and financial capacities⁶.

Except the fact that the sector of microfinance was continuously growing in Morocco till 2007 (Otto and Ashta, 2012), some serious problems have surfaced. The repayment rate dropped to 95% instead of 99% in 2007 and continued to fall (Reille, 2009). The second MFI in Morocco "Zakoura", experienced serious management problems, which led to its absorption by the FBPMC (Fondation Banque Populaire pour le Micro-Crédit) to avoid its bankruptcy. Additionally, a serious crisis of confidence has settled in the sector.

We do not intend to go further into details concerning the problems of micro-finance in Morocco. What to retain is that, some informal financing practices had existed for a long time and continue to run as an efficient and durable financing alternative against micro-finance products for different reasons. And one of these practices is mutual RoSCAs. As stated by many authors, „RoSCAs succeeded where market failed in the development of suitable formal saving and credit mechanisms“ (Kedir et al., 2011) (Pitt and Khandker, 1998).

In this paper we analyze the economic role and performance of RoSCAs in Morocco as a major informal financing source, and determine what social characteristics motivate the most a person to join a RoSCA. Another contribution of this paper is the identification of the common key factors of success of RoSCAs in Morocco and why this practice has resisted and still preferred for a good number of social categories.

Last but not least, we aim to conceptualize a new formal type of mutual RoSCAs where equity⁷

⁴The banking penetration rate is estimated at 57% until 2014 and the coverage rate is about one banking agency for 6.000 residents.

⁵A National Microfinance Observatory was established as part of the partnership between the FNAM (Fédération Nationale des Associations de Microcrédit) and the Mohammed VI Centre in support of solidary microfinance

⁶Towards the end of 2012, the twelve MFIs operating in Morocco were serving 810,712 customers for approximately 5 billion dirhams of loans, and four MFIs located in Morocco were in the Forbes ranking of the 50 Top Microfinance Institutions in 2007.

⁷(Besley et al., 1992) studied the allocative performance of random and bidding RoSCAs and found that nether type of RoSCA is efficient in terms of allocative performance and equity between members

between contributors is ensured and the default risk is managed. We also take into account the restriction of interest rates in Islamic religion and Moroccan law⁸ in the process of conceptualization. Furthermore, the proposed model should be designed in a way that utility function of each member is the same giving them similar opportunities and usefulness. A major challenging issue is also to make the proposed model permissible for applicants with no prior cognition which is not met on the other types of these savings and credit unions.

The structure of the remaining is as follow. The next section presents the materials and methods used for the study. The third section outlines in its first subsection the survey questionnaire results and describes the two-way ANOVA test results, while the second subsection exposes and discuss the functioning of our proposed model and the related default risk rating method. The last section serves to conclude and sets out future research directions with relation to this topic.

2 Materials and methods

As mentioned by many authors, RoSCAs can be considered as one of the the most ancient traditional and informal financial institutions (Yakeen et al., 2014)(El-Gamal, 2015). They have contributed over centuries to the development of various populations and helped people in several cases to climb social ladders as found on the results. The success of this institutions is mainly attributed, inter alia, to the efficient management of default risk based on proximity of contributors and application of group pressure, furthermore, they are almost the lowest cost financing alternative compared to classic and micro financing solutions. They require no collateral for applicants to join, the main guarantee here is shared confidence. And most important, they are interest-free (Random and fixed RoSCAs in particular).

Some questions that come to mind are, what if mutual RoSCAs were managed to bring together people with similar contribution capabilities but who do not know each other? In other words, what if proximity and social links between members were totally absent? this implies that confidence between members should be urgently replaced by reliable guarantees. Another question is, what if these associations were redesigned to provide more equity between members in terms of allocative performance and utility? (Besley et al., 1992) is his first works on this question found that neither type of RoSCA ensure equity by means of its functioning mechanism, especially for random RoSCAs were order is determined by drawing of lots. a third question is about the possibility of making households savings profitable. In other words, what if members of RoSCAs were able to invest during the cycle to make profits. This is very motivating when we know that not all people join RoSCAs for a urgent financial need and most of them prefer to take the pot in the last phase. At least there will be a mean to compensate the depreciation of money in a context of hyperinflation for instance.

Finding ways to modernize and redesign RoSCAs to meet the aforementioned objectives aims to be a real support of growth of this informal practices to compete and alternate classic financial products. But before this, it was necessary to have a prior understanding of these unions and perceive their members motivations, preferences and choices.

⁸The Moroccan code of obligations and contracts stipulates explicitly the prohibition of interest rates in a contract concluded between two Muslims in its 870th article but still authorize it for moral persons and other religious groups. See (Kettani, 2005) for more details.

Economic theory has much to say about efficiency and performance of formal financial products, but when it comes to formalize and modernize the informal ones, one should first study their inherent aspects and characteristics so that their modernization enables them to gain ground among existing financial saving tools and their derivatives.

Using a quantitative approach, by administering a survey questionnaire conducted among a targeted sample with some specific economic and social status, the questionnaire was shaped so the answers of the subjects give insights into features of RoSCAs in Morocco.

The size of the sample was revised upwards and its subjects were diversified at several times to be statistically representative. A total number of 725 persons was investigated. At first, we administered an online questionnaire among people with a minimum level of education from different social categories (ranging from senior executives to students and housewives). We used professional social networks and e-mail databases to reach our targeted subjects. In a second time, in order to diversify the sample by including people with low incomes and no knowledge about using *Information and Communication Technologies*, a field investigation was conducted where subjects had simply to give answers we noted.

3 Findings and discussion

3.1 The survey's results

Considering the first part of the respondents answers, the table below gives an overview of the survey's sample demographics and socioeconomic data :

Table 1: Summary of Participants Demographics and Socioeconomic Data (part I)

Gender	50.4% Male			49.6% Female		
Age	<20 (12%)	20-30 (23.5%)	31-40 (14.8%)	41-50 (32.8%)	51-60 (9.6%)	61 or more (7.9%)
Marital status	56.3% Single		34.7% Married	4.1% Divorced	4.9% Widow(er)	
Number of children in charge*	1 child 39.4%	2 children 24.2%	3 children 15.2%	4 children 7.6%	5 or more 1.5%	
Educational level	Primary 14.3%		Secondary 28.5%		University 57.2%	
Employment status	Employed 65.8%		Job seekers 16.5%	Non working 22.2%		Retired 4.5%
Salary frequency**	Monthly 71.5 %		Bimonthly 3.2%	Weekly 5.1%	Daily 1.3%	
Bank loan in repayment	(25.9%) Yes			(74.1 %) No		
Amount of the monthly payment (for the 25.9% who said yes (in MAD))	<1000 12.5%	1000-1999 20.3 %	2000-2999 23.4%	3000-3999 15.6%	4000-4999 6.3%	5000 or more 21.9%
Currently/former member of a RoSCA	53.9% Yes			46.1% No		

(*) Question answered by the 43.7% of the subjects being married, divorced or widow(er).

(**) Question addressed to the 65.8% of employed subjects.

Source: Authors own elaboration based on the survey's results

A first look at the table above highlights a significant concentration of the age of investigated subjects around the age class of [41-50]. In fact, in order to test the existing correlations⁹ between having a certain social status and being a current/former member of a RoSCA, we intentionally targeted this age class supposed being stably employed and, additionally, having eventual past experiences with bank loans. Another reason for selecting this category is related to the assumptions of two-way ANOVA method used in this study, namely, distribution's normality and heteroscedasticity.

The study of the associations was realized throughout a two-way ANOVA (Analysis of the variance) test which has the advantage, in our case, to examine the influence of social characteristics on the fact of being a current/former member of a RoSCA. Social characteristics represent the independent categorical variables while the positive or negative answers to the question of being a current/former member of a RoSCA represent the continuous dependent variable¹⁰.

The table below sums the F-test results for each combination of independent categorical variables (factors of influence) :

Table 2: two-way ANOVA F-tests results

2nd factor		1st factor (MS: marital status ; NCC: number of children in charge ; EL: educational level ; ES: employment status ; BLR: bank loan in repayment)							
		NCC		EL		ES		BLR	
		F	Sig	F	Sig	F	Sig	F	Sig
MS	1st factor	F(4,710)=56.31	.998	F(2,709)=12.29	.991	F(3,713)=0.80	.511	F(1,717)=6.00	.989
	2nd factor	F(3,710)=1.03	.603	F(3,709)=0.11	.050	F(3,713)=16.72	.990	F(3,717)=29.30	.999
	Between	F(12,710)=0.30	.015	F(6,709)=0.98	.568	F(9,713)=0.29	.024	F(3,717)=2.83	.961
NCC	1st factor			F(2,710)=3.16	.960	F(3,705)=63.2	.979	F(1,715)=4.50	.976
	2nd factor			F(4,710)=18.60	.998	F(4,705)=49.10	.912	F(4,715)=15.80	.999
	Between			F(8,710)=0.22	.011	F(12,705)=0.41	.042	F(4,715)=0.16	.043
EL	1st factor					F(3,713)=22.10	.756	F(1,719)=3.47	.943
	2nd factor					F(2,713)=16.10	.985	F(2,719)=2.45	.918
	Between					F(6,713)=8.09	.997	F(2,719)=0.19	.174
ES	1st factor							F(1,718)=0.45	.500
	2nd factor							F(3,718)=3.12	.970
	Between							F(3,718)=0.09	.033

Notes : The F-stat reported are represented in the following form : F(1st factor degrees of freedom, 2nd factor degrees of freedom). F-stat in bold are those statistically significant at 0.05 level of significance. Sig = probability of significance. In order to surpass the problem of non homogeneity of variances (Heteroscedasticity), a Welch correction to the denominator degrees of freedom in the F-test was used. The second assumption of observations independence is found to be insured. The table contains all combinations of inter-variables F-tests. Note that the permutation of the IV has no effects on the tests results, in other words, taking a social characteristic as a 1st factor or a 2nd factor will simply have no effect on the test results.

Source: Elaborated by authors based on Eviews and Excel output tables

Considering the first F-test results combining number of children in charge (NCC) and marital status (MS) as independent categorical variables. It is shown that both social characteristics do not have an influence on joining a RoSCA independently while their interaction do. This result¹¹ was initially anticipated. In fact, a good number of married and divorced respondents said that, sometimes,

⁹Some authors prefer the use of the word "association" instead of correlation for categorical data.

¹⁰Positive and negative answers were transformed to 0/1 binary variables for the needs of the F-test.

¹¹Note that both categorical variables have more than 2 levels (5 levels for NCC and 4 levels for the MS). This allowed us to perform a *Tukey-Kramer Post-hoc* tests in order to identify where means are significantly different from each other, in other words, what levels are the most significant between all?. We mention here that Tukey-Kramer post-hoc procedure was used regarding unequal samples sizes, and this, by using the harmonic mean instead (Tukey, 1949).

joining a RoSCA is motivated by future education fees of their children for the next academic year and even for the graduate studies. Exceptionally, some low incomes respondents we debriefed during the investigations, mentioned that the collected pool served for buying children clothes in religious celebration, namely, Eid al-Fitr.

In the same vein, the fourth test including educational level (EL) with number of children in charge (NCC) proves that both factors interacted jointly to influence the participation of some survey's subjects to a RoSCA. Indeed, some of respondents having a certain degree of education admitted that saving for future education fees of children (graduate studies) takes a part from their financial resources as a contribution to a formal saving plan¹² or, most importantly, a RoSCA.

The third F-test for both employment status (ES) and marital status (MS) demonstrates that the interaction between both variables has a significant¹³ effect on being a current/former member of a RoSCA. Furthermore, the table shows that for all tests including employment status (except for ES/EL test) the F-stat of the variables interaction is statistically significant. This sustains the fact that RoSCAs are largely used in professional contexts where proximity and mutual confidence are very important between members.

Concerning educational level (EL), the results are very coherent, and the non-significant calculated F-statistics shows that the factor has no influence on joining a RoSCA neither solely¹⁴ or in interaction with other factors (except for the EL/NCC test detailed above). This asserts the fact that the practice is widely known and practiced within most of social categories whatever their educational level is. In fact, we found that this associations are created in different contexts where levels of studies are widely divergent, a concrete example of this is the associations regrouping factory laborers and senior executives in a socio-professional context.

The last test containing bank loan in repayment (BLR) and employment status (ES) emerged a significant results about the interaction influence, which is to say that having a certain employment status and having or not a bank loan in repayment play a role together in belonging to a RoSCA. Deeply into details, the *Tukey-Kramer* post-hoc performed test isolated the level [employed] as the level where the difference between means lies exactly. Concretely, employed people are the most susceptible to get a bank loan when asking for it by means of their salary as a guarantee, and in some cases, these borrowers find themselves forced to solicit other solutions to pay their monthly payment of bank credit when financial difficulties occur and expenses increase. Then, a urgent plausible solution to solve this problem is to join a RoSCA and collect the pool first (if lucky) to pay their financial commitments.

Being aware of what factors motivate the most a person to join this associations was not satisfactory to conceptualize a new form of RoSCAs. This took us to go further into details with people having past or actual experiences with this practice by asking them multiple questions on the operating procedures of the joined RoSCA, and whether they tolerate or not some facts during the operation (entrance of a new member for instance).

The following table summarizes answers of respondents in percentages :

¹²Plan d'épargne éducation (PEE) is a regulated tax-free saving plan proposed by many commercial banks in Morocco to finance future students fees.

¹³The calculated F-stat is bigger than tabulated F corresponding to (9,713) degrees of freedom with an estimated p-value equal to 0.024 lower than significance level of 0.05. We reject the null hypothesis and therefore, both IV have an influence on the continuous dependent variable

¹⁴Note that no main effects were found for the educational level (EL) factor in all tests that include (EL) as a 1st or a 2nd factor on Table 2.

Table 3: Summary of Participants Demographics and Socioeconomic Data (part II)

Current/former member of a RoSCA	(53.9%) Yes			(46.1%) No			
Number of members of joined RoSCA*	<5 (27.7%)	6-10 (51.1%)	11-15 (10.9%)	16-20 (3.6%)	21-25 (1.5%)	26 or more (0.0%)	
Contribution's frequency*	Daily (3.7%)	Weekly (10.4%)		Monthly (85.7%)		Other (0.2%)	
Subscription amount (in MAD)*	<500 (32.6%)	500-999 (24.2%)	1000-1999 (28%)	2000-2999 (8.3%)	3000-3999 (3.8%)	4000-4999 (1.5%)	5000 or more (1.5%)
Joining motivations*	Spontaneously (35.3%)	Buy a home (8.9%)	Buy durable goods (22.5%)	Children education (9.3%)	Vacation travel (18.9%)	Pilgrimage (2%)	Other reasons (3.1%)
Tolerate a new proposed entrance*	(75.9%) Yes				(24.1%) No		
Order determining criteria*	Drawing of lots (26.2%)	Agreement of participants (41.8%)		Social criteria (age, sexe...) (6%)		Financial criteria (21.3%)	Others (4.7%)
Tolerate a urgent beneficiary*	(91.9%) Yes				(8.1%) No		
RoSCA or low interest rate bank loan ?	RoSCA (74.1%)			Low interest rate bank loan (25.9%)			
Respondents preferring RoSCA are motivated by	Administrative procedures (28.3%)		Interest free & no fees (47.3%)		Religious conviction (19.1%)		Other reasons (5.3%)

(*) Questions addressed to subjects affirming their current or previous participation to a RoSCA, the 53.9% who said yes.

Source: Authors own elaboration based on the survey's results

The first important point to stress on this second part of results is the significant percentage of subjects joining RoSCAs with 5 to 10 members (51.1% in this case). Moreover, only (1.5%) of the respondents were (or actually are) participating in a RoSCA with more than 20 members which is very marginal. This is basically related to level of confidence between members. The more the number of participants increases, the more level of trust decreases. People select each other based on mutual trust and genuine commitment to cooperative (Klonner and Rai, 2005), the small groups are found to be more functional since groups members serve as guarantors for each other and have more ability to create groups pressure between each other and enforce mutual loyalty.

Sure enough, most of associations allocate the pots monthly (85.7% of respondents contribute monthly) while 10.4% of the subjects collect the pot on a weekly basis. This latter are generally people with no fix jobs and low incomes who get their salary at the end of the week like most of informal workers in Morocco. (Bouasria, 2013) investigated the practice of RoSCAs among Moroccan working women more precisely and found very close results.

Surprisingly, the third (35.3%) of the respondents joined a RoSCA spontaneously as a simple easy way to save money with no fees. This finding comfort us already about the ability of this financial practice to drain more households savings once formalized and proposed by financing organization, typically, an Islamic bank. An intuitive explanation of this is related to precautionary motives (one of the Keynesian liquidity preference motives), people prefer to ensure liquidity for future social unexpected problems that need unusual costs. During our field investigation where we addressed a good

number of housewives, some of them stated that they generally participate to a RoSCA to save their marginal incomes from immediate consumption claimed by their husbands. Note that this typical case is largely present among Kennan housewives as observed by (Anderson and Baland, 2002).

For the remaining part of respondents, these are usually getting into a RoSCA for future acquisitions and expenditures. Buying durable goods¹⁵ (as cars or furniture) and paying coming vacation expenditures are the most motivating reasons to be a member of a RoSCA (22.5% and 18.9% respectively). This is not surprising given the fact that Moroccan society is a consumer society where consumption credits represent a significant part of granted loans (70.2 billion dirhams in 2015, nearly 6,41 billion Euros). On another scale, some financially excluded poor people tend to purchase durable goods for the simple reason to protect their savings from theft because of their restricted access to bank services, which is reasonable too.

In consideration of accepting a new entrance proposal from an existing member, (75.9%) of respondents mentioned that they would accept a new member to join them if this one is proposed by an existing member. As long as trust is guaranteed and no violations will occur, existing members would accept as much as possible new entrance without any restrictions¹⁶. We strongly relied on this fact in conceptualizing the new formal type of RoSCA by making its mechanism more flexible for the entrance of supplementary members and the departure of the existing one. This will, inter alia, keep the cycle turning even in case of default of one of the members. Another advantage is to keep it open for all members desiring to join a cycle corresponding to their preferences in terms of order, contribution's amount and frequency, etc.

Last but not least, when asking people whether they prefer to join a RoSCA or not even if they have the possibility to contract a low interest rate bank loan, three-quarters (74.1%) of the subjects responded favorably. Despite the presence of moral hazard and few guaranties in RoSCAs, most of respondents affirmed that they would prefer it at the expense of bank loans for several reasons, and the most important one is the absence of fees and interests (47.3%). The second reason determined relies to administrative burden for getting a bank loan, which we initially expected. We know that the banking coverage rate is at only 61% in Morocco and much people cannot access bank services for lack of secure guaranties. At the same level, religious convictions regarding the prohibition of interest rate in Islamic law, play also a substantial role in preferring RoSCAs instead of bank loans for the survey's subjects. We mention here that this practice was approved by both classical and contemporary Islamic jurists, including the most conservative¹⁷.

3.2 The Bank-based investing RoSCA model

3.2.1 Mechanism of functioning

We propose on this section our baseline model of Bank-based investing RoSCAs (henceforth investing RoSCA for short) which represents a new alternative of the classic type of RoSCAs practiced informally.

¹⁵This result supports the findings of (Besley et al., 1993) who studied the economic role of both random and bidding RoSCAs and concluded their primarily use for the purchase of durable goods. The same finding was published by (Gugerty, 2007) recently.

¹⁶This finding motivates us to wonder about the optimal (abusively, the maximal) number of members that a RoSCA could hold with no impact on level of trust settled within the association.

¹⁷Dr. A. Al-Jibrin, studied and posted in Arabic at: <http://www.mktaba.org/vb/showthread.php?t=13001> (accessed October 16, 2015) a list of the positive opinions, ranging from neutral permissibility to positive approbation of credit unions built on RoSCAs.

Our proposition is intended to be an alternative for financing institutions (merrily, new Islamic finance operators in Morocco) to drain more savings and reduce financial exclusion of a large proportion of the population in respect of their convictions, on religious ground.

In fact, the model's hybrid mechanism is based on the functioning of multiple financial instruments combined together to give the participants both saving and investing opportunities. Unlike the classic form of this associations, each member will have two opportunities, either getting an interest-free loan or investing its savings and reap profits at the end of the operation. It is noteworthy that equity between members and non inclusion of interest-based remuneration were highly taken into account in the conceptualization of the model to fit with peoples preferences highlighted above on the survey's results, and therefore, gain ground among existing conventional financial products.

Schematically, the bank (which is the organizer of the operation, the guarantor and the main investor as well) join the (n) participants in an associative relation to form an investing RoSCA. At the beginning of each period T_i a pot is accumulated by members contributions including the bank which makes a global amount (the pot) equal to $C \cdot (n + 1)$ where C is the individual contribution. After that, the recipient has to choose between two options :

- The first one is to take-up the collected amount reduced by a temporary removal of a deposit for latent default of payment. This deposit is calculated based on a risk score which depends on the likelihood and severity of the default risk. At the end of the cycle, the whole deposit amount is restored to the recipient ;
- The second option is to delegate the investment of the collected pot to the bank within the remaining periods until the end of the cycle, and after that, the pot is returned to the recipient plus its share of returns. r_i is the Return On Investment (ROI) rate for the invested pool by the i -th participant. If the investment is profitable, the returns are shared by both the participant and the bank according to a predetermined percentages (p_i and $q_i = 1 - p_i$ respectively). However, if any losses occur, they are borne only by the participant.

The table below traces the cash flows of each one of the members all along the cycle :

Table 4: Cash flow statement for all participants including the bank

	Bank	Participant 1		Participant 2		...	Participant (n-1)		Participant n
	Invest	Take-up option	Invest	Take-up option	Invest	...	Take-up option	Invest	Invest
T_1	$C \cdot (n+1)$	$-C$		$-C$		...	$-C$		$-C$
T_2	$-C$	$C \cdot (n+1) \cdot (1-w_1)$	$-C$	$-C$		...	$-C$		$-C$
T_3	$-C$	$-C$		$C \cdot (n+1) \cdot (1-w_2)$	$-C$	...	$-C$		$-C$
\vdots	\vdots	\vdots	\vdots	\vdots	\vdots		\vdots	\vdots	\vdots
T_n	$-C$	$-C$		$-C$		...	$C \cdot (n+1) \cdot (1-w_{n-1})$	$-C$	$-C$
T_{n+1}	$-C$	$[C \cdot (n+1) \cdot w_1] - C$	$-C$	$[C \cdot (n+1) \cdot w_2] - C$	$-C$	...	$[C \cdot (n+1) \cdot w_{n-1}] - C$	$-C$	$C \cdot (n+1)$
Capital at the end of the cycle	$[C \cdot (n+1) \cdot [(1+r_B) + \sum_{i=1}^n r_i q_i]]$	$C \cdot (n+1)$	$C \cdot (n+1) \cdot (1+r_1 p_1)$	$C \cdot (n+1)$	$C \cdot (n+1) \cdot (1+r_2 p_2)$	...	$C \cdot (n+1)$	$C \cdot (n+1) \cdot (1+r_{n-1} p_{n-1})$	$C \cdot (n+1) \cdot (1+r_n p_n)$

C = The amount of contribution. $T_{1,2,\dots,n+1}$ are the periods (in months generally). r_B = The Return On Investment (ROI) rate of the invested pool $C \cdot (n+1)$ by the bank at the first period. $r_{i \in \{1;n\}}$ = The ROI rate for the invested pool by the i -th participant. $w_{i \in \{1;n\}}$ = The guarantee fee rate levied on the raised pool $C \cdot (n+1)$ as a deposit for default of the i -th participant. $p_{i \in \{1;n\}}$ = Share of the i -th participant in its investment returns while q_i is the part of the bank, therefore $p_i + q_i = 1$.

Source: Authors own proposition

At the first period T_1 , as shown on the table, the bank has only one option to collect the pot $C \cdot (n+1)$ and invest it until the end of the operation. By doing so, this money will firstly serve as a provision against any future risks, especially default of the members, and ensure liquidity¹⁸ for the bank dedicated to investment from the beginning of the cycle. Secondly, the returns on investment of this first pool should only benefit to the bank at 100% so it could at least recover the management fees of the operation¹⁹. Aforementioned on the table by r_B .

Additionally, at each time that one of the participants decides to invest its pool by means of the bank, a pro rata percentage of overall returns should be awarded to the latter (q_i). Thus, the capitalized amount for the bank at the end of the cycle is given by :

$$[C \cdot (n+1) \cdot [(1+r_B) + \sum_{i=1}^n r_i q_i]]$$

As for the other participants, each one of them in turn (except the n -th participant) is being offered two possibilities :

¹⁸Since new Islamic finance operators in Morocco cannot access the existing inter-bank lending market because of interest rates, they technically, run higher short term liquidity risk comparing to conventional banks as long as an Islamic inter-bank money market has not been established yet. This proposed model of investing RoSCAs offers a significant advantage for this new operators in terms of ensuring immediate liquidity.

¹⁹The challenging advantage here is that participant will have no application or management fees to pay for joining the investing RoSCA. This is very motivating when we know that 24% of unbanked Moroccans cite high costs as the main reason for not having a bank account (reported in 2014 by the World Bank on a survey they conducted in Morocco about financial inclusion and Capability).

- The first one consists in collecting the pool reduced by the deposit amount $C \cdot w_i \cdot (n + 1)$ where w_i is the guarantee fee rate levied on the raised pool $C \cdot (n + 1)$. This deposit is recovered at the last period T_{n+1} . Subsequently, the recipient capitalizes at the end of the cycle a global amount only equivalent to the individual contribution multiplied by the number of periods $C \cdot (n + 1)$. We call it here the neutral position.
- On the other side, the second option offered is to consign the pot to the bank which invest it and pay back the recipient a capital of $C \cdot (n + 1) \cdot (1 + r_i p_i)$ when the cycle is complete. r_i is the ROI rate for the pool invested by participant i and p_i is its share in these returns. We talk here about the risky position. It's noteworthy to mention that this second option of investing offered to participants is based on the concept of "*Mudaraba*"²⁰ found in Islamic finance and one of the pillars of Islamic banking.

After all, the participant n (the last one) will be offered only one option that consists in getting the pot at the end of the cycle plus its investment returns corresponding to one period T_n (the last month of the operation for instance), with a corresponding ROI rate of r_n . Generally, it is a person who does have no intention to take up the pool during the whole operation.

Since returns are supposed to be higher as long as the period of investment is longer, investing the pool at T_1 is more likely to be profitable than its investing at the last period T_n . Consequently, assuming that percentages of returns p_i of each participant are equal, this will led to assign higher profits (losses eventually) for the first beneficiaries.

In order to ensure equity between all the members, these have to be given the same investment opportunity all along the cycle, which supposes to attribute increasing percentages p_i as long as the cycle comes to its end to balance the situation. Explicitly :

$$\forall i \in \llbracket 2; n \rrbracket, \quad 0 < p_{i-1} < p_i < 1 \quad \text{and} \quad 0 < q_i < q_{i-1} < 1$$

$$\text{Where} \quad \forall i \in \llbracket 1; n \rrbracket, \quad p_i + q_i = 1$$

The challenging issue here is that the return on investment rate is not fixed beforehand as for interest rate known initially, and could be either positive or negative. Participants have to wait until the end of the cycle to observe their returns just like in the profit-loss sharing contract *Mudaraba* in Islamic finance. This makes the proposed model completely Shariah-compliant because both sides share profits and losses, which is the real essence of Islamic finance.

In addition, note that this mechanism encourages investing actions all along the procedure by giving the participants the possibility to invest at each period in parallel with the option to take up the pot for consumption. Real economy is more promoted by this Model of RoSCA comparing to the traditional ones and so many other informal financing practices. This is why we chose to name it "*Investing RoSCA*".

²⁰In *Mudaraba*, the capitalist (*rabb al-mal*) entrusts his capital (*raa's al-mal*) to an agent (*'amil or mudarib*), to be managed and employed in generally determined trade operations. The agent agrees to return the capital when the transaction is complete, along with whatever profit had been agreed upon, while keeping the remaining amount of profit as compensation for his work. The financial risk is entirely assumed by the capitalist, while the agent is not charged with any refund in case the deal fails for a cause not attributable to him (Khan and Porzio, 2010).

3.2.2 Risk score evaluation

What if RoSCAs were gathering people who do not know each other? in other words, should people rely only on their social capital to form these associations?. This question led us straightforward to take into account anonymity between members in the conceptualization of this model, and this for several reasons.

First of all, people wishing to form a RoSCA at a certain moment might not be able to gather a sufficient number of acquaintances for several considerations. And even though, these latter are not supposed to have the same plan of contribution in terms of capacity or frequency while other "unknown" people are. The challenging issue here is about making these associations permissible to people with no social or professional links.

Introducing the bank as a member of the investing RoSCA is of primary importance. Besides organizing the operation and investing for the participants and for its own account, the bank serves mainly as a guarantor toward all participants in case of default of one them.

Indeed, the bank is the first one to take-up the collected amount serving as a provision for default risk, and additionally, serving to cover the management fees of the operation through its returns of investment.

A second safety measure is that, once one of the members decides to take-up the amount, a deposit is levied according to a certain guarantee fee rate w_i . This one is calculated depending on two factors : the likelihood of default and its severity (impact of default of one of the members on the progress of the operation).

In the worst case-scenario of failure of one of the members, the bank takes over and acts in his place in terms of rights and obligations. This procedure makes the "wheel" continuously turning without any compromise to the flow of the operation. Therefore, this makes the investing RoSCA model more sustainable comparing to the other types of RoSCAs (random and bidding RoSCAs for instance).

As noted above, the guarantee fee rate w_i is function of two factors, namely, the likelihood of the default risk and its impact or severity on the progress of the operation. Hereafter, we present the risk-rating matrix we elaborated for the determination of the guarantee fee rate w_i .

Table 5: Risk Rating Matrix (Risk score = likelihood \times Severity)

				Likelihood				
				Improbable $0 \leq \rho_i \leq 0.2$	Remote $0.21 \leq \rho_i \leq 0.4$	Occasional $0.41 \leq \rho_i \leq 0.6$	Probable $0.61 \leq \rho_i \leq 0.8$	Frequent $0.8 \leq \rho_i \leq 1$
Severity	Very high impact	T_2	1	ρ_i				
		T_3	$\frac{n-1}{n}$	$\rho_i \cdot \frac{n-1}{n}$				
	⋮	⋮	⋮	⋮				
		T_{n-1}	$\frac{2}{n}$	$\frac{2\rho_i}{n}$				
	Very low impact	T_n	$\frac{1}{n}$	$\frac{\rho_i}{n}$				

n = Number of participants. $T_{i \in \{2; n\}}$ are the periods given that participants cannot take the pot until the second period T_2 . ρ_i = The estimated probability of default of the i -th participant.

Source: Proposed by the authors based on the credit risk rating method (Anthony Tony Cox, 2008).

The risk rating method is used in several areas like banking, information systems management, and security... where risks are existing and should be evaluated. This method calculates a score by multiplying the scale points of likelihood of risk occurrence by the scale points of its severity. Generally, the likelihood and severity factors are being attributed scale-points ranging from 1 to 5, hence, the scores range from 1 to 25. In our case, we adopted a different type of scales for both factors where the product of their multiplication is a weighted score to the guarantee fee rate w_i .

For the first factor of likelihood, there are five categories that represent the estimated probability of default ρ_i of the i -th participant. On the other side of the matrix, the severity factor contains scale points as much as the number of periods T_2 to T_n . Periods T_1 and T_{n+1} are, simply, not included here because the bank and the n -th participant are not concerned by the guarantee fee since they do not have the option to take-up the pool.

The scale points of the second factor of severity express how impacting is the default of one of the members at each period. Practically, the default of one of the members at period T_2 has more consequences on the progress of the Investing RoSCA compared to the default of one of them at T_n . This is why severity is decreasing from very high impact to very low impact as long as the time passes. The scale points calculation is given by the following formula :

$$\text{Severity scale point} = \frac{\text{number of periods until the end of the cycle}}{n}$$

Concretely, if the participant takes-up the pot at period T_2 , he will be forced to contribute within n periods until the end of the cycle to honor his commitments, hence, the scale point is equal to $\frac{n}{n} = 1$. For the last taker, he will have only one period left to the end of the cycle which gives a scale point equal to $\frac{1}{n}$. The table above gives the product (Risk scores) of both factors scale points as well.

These scores represent the weighting factors used to determine the guarantee fee rates w_i , where :

$$\forall i \in \llbracket 1; n - 1 \rrbracket, \quad w_i = f(\text{risk score})$$

Assuming that participants have the same probabilities of default ρ_i , the guarantee fee rate w_i will be decreasing as much as the end of the cycle is closer allowing the raised amount to be more significant. The risk score is here diluted by time. That said, it is important to mention that this scoring approach relies also on the fair estimation of default risk probabilities ρ_i of each one of the members.

When it comes to predict the future and estimate probabilities of default, the most reliable way is to review the past. In the micro finance and banking sectors, data such as credit reports and salary history help lenders to make fair predictions on a larger scale and in an increasingly automated way in their procedure of credit approval. The banks credit-scoring approaches typically assess three characteristics (Baer et al., 2012) :

- Identity, to reduce fraud ;
- Ability to repay, based on income and current debt load ;
- Willingness to repay, usually based on past credit performance²¹.

These methods are less effective in emerging economies, and especially among unbanked lower-income segments. Because lower-income customers often have no access to formal financing, there

²¹These information are generally provided by specialized institutions such as "*La centrale des risques*" in Morocco, These institutions collect, centralize, and communicate information on credits and micro loans granted by banks and micro credit institutions to specific inquiries from financing institutions.

is no record of past borrowing behavior. Debt capacity is hard to judge because most lower-income workers are often paid wages in cash and have little or no formal savings or registered assets that could be used as collateral (Baer et al., 2012).

The issue is that when, it is about an unbanked lower-income desiring to join an investing RoSCA, the information required to estimate default probability of applicants might not be satisfactory. In general, as like in micro-finance sector, a field investigation is performed to get a bigger picture of risk by collecting more information about the applicant.

For our present model, as a complementary measure to take into account in the default evaluation, we propose to adopt a "grading system" for applicants who know already each other and wish to form an investing RoSCA in a body. Practically, each one of the group will be called to rank his associates "anonymously" by default likelihood, and hence, the bank will get already an additional insight into solvency and default probability of each one of them. We estimate that the best information about an applicant comes from his associates, because they are the most affected by his default that impacts the progress of the operation. This concerns only the applicants who desire to opt for the group frame. But in general, the model is designed so the participants could join with no prior cognition.

4 Concluding remarks

This study has presented some econometric evidence on the economics of rotating savings and credit associations in Morocco. The first results pertain to the socioeconomic characteristics interacting mutually to motivate a person to join a RoSCA. These are four in number, marital and employment status, educational level, and having a bank loan in repayment.

By using the two-way ANOVA, we found that these variables interact jointly one-to-another, and with other variables to motivate a person to join a RoSCA. But we suppose that, it will be interesting in our shortcoming works, to incorporate further independent variables, such as salary, to explain the motivating reasons for joining a RoSCA as well as periodicity and amount of contribution, and number of contributors. This by using a multivariate analysis of variance (MANOVA).

The second part of the survey's answers provides insights into the functioning of RoSCAs in Morocco and members preferences in terms of participation plan (contribution amount, frequency, order determination, etc.). The answers gave us, also, a basis to the conceptualization of a new model of RoSCA that fits with people's religious convictions, preferences and conditions.

The designed model introduces the bank as an associate member to the participants and gives them both possibilities of collecting their pots in turn or investing instead. It is important to mention that all participants, including the bank, derive substantial benefits through this procedure. The bank gets hold of immediate liquidity, which represents for Islamic banks an additional alternative to compensate their restrained access to conventional inter-bank market. As for the participants, the financially excluded ones get the possibility to access free of charges formal financing in an associative form with no consistent collateral.

This model is found to be more equitable and sustainable compared to other types of RoSCAs on different scales. In an investing scenario, participants who decide to invest are being offered a balanced final capital (given a common offered return on investment (ROI) rate). This makes the order insignificant, at least if there are no urgent needs to raise funds first.

The bank acts as a guarantor for any anticipated default risk. This through the set up of several measures. By doing so, people could make part of these savings and credit associations with no necessary prior cognition. This is very engaging, especially for applicants with no extended social capital in which they can rely to do it separately. One of these measures is the temporarily levy of a deposit for default.

The paper provides also, a risk rating matrix to evaluate the default risk of participants depending on its likelihood and its impact on the progress of the operation. We proposed, as well, to opt for a "grading system" of the likelihood of the default risk to be operated by the socially linked applicants.

References

- Mohamed El Abdaimi. Le financement informel: problématique, typologie et évaluation à partir d'enquêtes à marrakech et dans le sud marocain. *Revue Tiers Monde*, pages 869–879, 1989.
- Siwan Anderson and Jean-Marie Baland. The economics of roscas and intrahousehold resource allocation. *Quarterly Journal of Economics*, pages 963–995, 2002.
- Louis Anthony Tony Cox. What's wrong with risk matrices? *Risk analysis*, 28(2):497–512, 2008.
- Shirley Ardener. The comparative study of rotating credit associations. *Journal of the Anthropological Institute of Great Britain and Ireland*, pages 201–229, 1964.
- Shirley Ardener and Sandra Burman. Money-go-rounds: the importance of rotating savings and credit associations for women. 1995.
- Tobias Baer, Tony Goland, and Robert Schiff. New credit–risk models for the unbanked, 2012.
- World Bank. 2014 morocco financial inclusion and capability survey, 2015.
- Timothy Besley, Stephen Coate, Glenn Loury, et al. *On the Allocative Performance of Rotating Savings and Credit Associations*. Research Program in Development Studies, Woodrow Wilson School of Public and International Affairs, Princeton University, 1992.
- Timothy Besley, Stephen Coate, and Glenn Loury. The economics of rotating savings and credit associations. *The American Economic Review*, pages 792–810, 1993.
- Leila Bouasria. *Les ouvrières marocaines en mouvement: qui paye? Qui fait le ménage? Et qui décide?* l'Harmattan, 2013.
- Asli Demirgüç-Kunt and Leora F Klapper. Financial inclusion in africa: an overview. *World Bank Policy Research Working Paper*, (6088), 2012.
- Mahmoud Amin El-Gamal. Islam and economics : Random thoughts about islam, muslims and issues related to economics and finance. [blog,url=http://elgamal.blogspot.com/](http://elgamal.blogspot.com/), 2015.
- ALM Abdul Gafoor. Mudaraba-based investment and finance. *Accessed at*, 11(03):2013, 2001.
- Matthieu Gasse-Hellio. *Les tontines dans les pays en développement*. PhD thesis, Université de Versailles saint-Quentin-en-Yvelines, 2000.
- Clifford Geertz. The rotating credit association: A " middle rung" in development. *Economic development and cultural change*, 10(3):241–263, 1962.
- Géraldine Goffe. L'articulation entre finance informelle et microfinance. *CIRTES - Centre Interdisciplinaire de Recherche Travail, Etat et Société*, page 23, 2014.
- Mary Kay Gugerty. You can't save alone: Commitment in rotating savings and credit associations in kenya. *Economic Development and cultural change*, 55(2):251–282, 2007.
- Abbi M Kedir, Richard F Disney, and Indraneel Dasgupta. Why use roscas when you can use banks? theory and evidence from ethiopia. 2011.
- Malika Kettani. Une banque originale la banque islamique. *Dar al Kotob al-ilmiya*, 2005.
- M Fahim Khan and Mario Porzio. *Islamic banking and finance in the European Union: a challenge*. Edward Elgar Publishing, 2010.

- Stefan Klöner and Ashok S Rai. Adverse selection in credit markets: Evidence from south indian bidding roscas. *Department of Economics, Cornell University*, 2005.
- M. Lelart. *La tontine: pratique informelle d'épargne et de crédit dans les pays en voie de développement*. Collection Universités francophones. John Libbey Eurotext, 1990. ISBN 9780861962600.
- Michel Lelart. *Finance informelle et financement du développement*. Agence Universitaire de la Francophonie, Fiches du Monde Arabe, Beyrouth, May 1999.
- B. Mansouri and M. Ziki. *Un cas Marocain de Finance Informelle Innovante : La pseudo-hypothèque immobilière et la rationalité individuelle à Marrakech*. Faculté de droit et de sciences économiques, Marrakech, Maroc, 2005.
- Philipp E Otto and Arvind Ashta. Microsavings and market saturation: the evolution of diversity in saving products. *Savings and Development*, 36:109–135, 2012.
- Mark M Pitt and Shahidur R Khandker. The impact of group-based credit programs on poor households in bangladesh: Does the gender of participants matter? *Journal of political economy*, 106(5):958–996, 1998.
- X Reille. Essor, crise et redressement du secteur de la microfinance au maroc. *Groupe Consultatif d'Assistance aux Pauvres CGAP*, 2009.
- Léonard Tchoundjo. La modélisation financière des tontines camerounaises. *African Review of Money Finance and Banking*, pages 47–96, 2000.
- John W Tukey. Comparing individual means in the analysis of variance. *Biometrics*, pages 99–114, 1949.
- Pierre-Germain Umuhire. *Informal Finance and Formal Microfinance: The Rationale of their Coexistence in the Context of Urban African Financial Markets*, volume 695. Presses universitaires de Louvain, 2013.
- Pierre-Germain Umuhire and Marthe Nyssens. Informal and formal microfinance in urban sub-saharan african markets: The case of micro-entrepreneurs in ouagadougou, burkina faso. *Securing Livelihoods: Informal Economy Practices and Institutions*, page 147, 2013.
- Rogier Van den Brink and Jean-Paul Chavas. The microeconomics of an indigenous african institution: the rotating savings and credit association. *Economic development and cultural change*, 45(4):745–772, 1997.
- Oliver E Williamson. The economics and sociology of organization. In *Industries, firms, and jobs*, pages 159–185. Springer, 1988.
- Mufutau Ayinla Abdul Yakeen, Nasir Mukhtar Gatawa, and AbdulRasheed Na-Allah. Modernizability and formalizability of rotating savings and credit associations through islamic banks. *International Journal of Humanities and Management Sciences*, page 1, 2014.
- Ning Neil Yu. On designs of rotating savings and credit associations. *Available at SSRN 2201436*, 2013.