# International financial competition and bank risk-taking in emerging economies.

## A theoretical model and empirical evidence for banks from MENA region

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**Abstract**

In this paper, we analyze the risk taking behavior of banks in emerging economies, in a context of international bank competition. In the spirit of Vives (2002 and 2006) who has developed the notion of "external market discipline", our paper introduces a new channel through which depositors can exercise pressure to control risk taking. They can reallocate their savings away from their home country to a more protective system of a developed economy. In such a framework, we show that there is no univoque relationship between the information disclosure of risk management and excessive risk taking. This relationship depends on the degree of financial openness of the emergent country, which ultimately defines how effective the international banking competition is. Furthermore, we no monotone relationship between the likeliness of excessive risk taking of banks in the emerging country and the level of deposit insurance. Finally, we test the relationship between disclosure, financial openness and bank risk-taking for a panel of 288 banks from MENA Region plus Turkey.

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# 1 Introduction

More efficient risk management in the banking sector is crucial for emerging economies. Because of their highly uncertain environment, these countries are prone to information problems that may cause excessive risk-taking behavior in banking (Vives, 2006). This situation is further aggravated by the low development of their financial markets, which results in a major role for banks. The intent of emerging countries to comply with advanced risk management procedures is nevertheless quite remarkable [1] (BIS 2006, FSI-BIS 2008). In 2009, 14 countries, whose large emergent countries, became members of the Basel Committee. According to many authors (Powell 2002, Fischer 2002, Llewellyn 2003, Balin 2008), however, the banking systems in emerging economies may face difficulties in adopting the sophisticated approaches initially intended for advanced countries such as those in the second Basel Accords. These authors highlight the structural weakness of the financial environment in emerging economies as captured by the low quality of accountancy data, a lack of auditing agencies, problems in accounting and auditing procedures and problems in implementing sophisticated risk measurements.

In this paper, we analyze how *international competition* for deposits may prevent excessive risk-taking in banking in the context of emerging economies. For this purpose, we model competition between an emergent country and a developed country to attract depositors. In this context, we account for the quality of the financial environment by introducing the notion of transparency, defined as the ability of depositors to observe how prudently banks behave. Our approach is motivated by an increasing degree of openness of emergent economies towards OECD countries. Higher level of openness translates into higher levels of capital mobility. It follows that banks must compete with banks of developed countries to keep their depositors domestic[2]. Among the various determinants of capital flight, evidence of a lack of confidence in the banking system appears in countries subjected to banking crisis, such as Russia or East Asian countries (Collier et al. 1999, Loungani and Mauro 2000, Perotti 2002).

[1] The 2008 FSI survey (FSI-BIS 2008, p. 2) indicates that 92 non members of the Basel Committee on Banking Supervision have implemented or are currently planning to implement Basel II. Moreover, 61 % of them intend to offer the Advanced Internal Ratings Based Approach (Advanced IRB).

[2] The increasing financial openness of emerging countries and its consequences are well measured by Prasard et al. (2003). With the exception of FDIs, capital has tended to flow from poor to rich countries over the 2000s. (Prasad et al. 2006).

The effect of international competition for deposits is well documented empirically in emerging economies. These studies test the reaction of depositors to high risk-taking on the part of banks by analyzing changes in the volume of deposits and the corresponding interest rates. In Latin America, empirical evidence is found by Barajas and Steiner (2000) for Colombia, by Calomiris and Powell (2001) for Argentina, and by Martinez-Peria and Schmukler (2001) for Argentina, Mexico, and Chile. More recently, Ungan et al. (2008) show that deposits significantly increase with the improvement of capital and liquidity ratios in Russia. Similar evidence is also found by Onder and Ozyildirim (2008) for Turkey.

Furthermore, pressure exerted through changes in interest rates and the resulting reallocation of deposits may be affected by the *deposit insurance* or by an extensive government guarantee. Thus, to study the effect of international competition on bank risk-taking, we shall take into account that governments may supply deposit insurance. The theoretical literature on deposit insurance draws attention to the occurrence of moral hazard. Moral hazard implies that banks tend to take excessive risks. Moreover, depositors no longer bother to transfer deposits from worse to better institutions. Therefore, it is generally suggested that bank regulation should impose greater transparency to mitigate moral hazard (Bhattacharya, Boot and Thakor, 1998). However, Hyytinen and Takalo (2002) argue that the transparency required by bank regulation comes at a cost, which in turn can reduce the charter value of banks and therefore increase the fragility of the banking system. This means that more transparency may not counteract the negative effect of deposit insurance. Contradictory results are also found in the empirical literature. Indeed, Demirgüç-Kunt and Huizinga (2004) examine this issue for a sample of 30 countries, including developed and developing countries, over the period 1990–1997. They find that deposit insurance weakens the reaction of depositors through deposit interest rates. However, Martinez-Peria and Schmukler (2001) do not find the same effect. This is instead indicative of the low credibility of the deposit guarantee. Meanwhile, Angkinand and Wihlborg (2008) find a U-shaped relationship between explicit deposit insurance coverage and bank risk-taking behavior. In their case, this relationship is influenced by country specific institutional factors such as the type of bank ownership. We analyze the impact of deposit insurance on excessive risk-taking in the banking system of an emerging country, assuming a deposit insurance scheme specific to each country.

The main results of the paper can be summarized as follows. Since behaving prudently is costly, we show that there exists a monitoring cost under which the emergent banking system has no incentive to take excessive risks. Moreover, the impact of financial transparency

on risk-taking depends crucially on the intensity of international bank competition, which is measured by the ease of reallocating financial capital abroad. Interestingly, we do not find a monotonic relationship between information disclosure and risk-taking. If banks in emerging countries are sufficiently exposed to international competition, then greater transparency makes prudent bank behavior more likely. Surprisingly, greater transparency favors excessive risk-taking if financial openness is low. Finally, we show that the claim that deposit insurance encourages banks to take excessive risks is only true when depositors are sufficiently able to observe how prudently banks behave. However, if information disclosure is low, international competition is weak and so increased deposit insurance compels banks to opt for sound risk management.

Our paper is well related to the literature on indirect market discipline in banking[3]. Indeed, international competition is in the same spirit of Vives (2002 and 2006), who introduced the notion of "external discipline": depositors may exert pressure on home banks by reallocating their savings to an external (i.e. foreign) banking system that is more protective. The disciplining role of depositors on banks has been studied in Calomiris and Kahn (1991), Allen and Gale, (1999); Chen, (1999) and in a critical view in Hellwig (2005). The existing literature argues that depositors can punish banks by withdrawing their funds whenever they do not approve of bank behavior. However, the effectiveness of such behavior depends crucially on the transparency of the banking system. Our paper specifically studies the interaction between transparency in bank risk-taking and the disciplining role of depositors in the context of international bank competition.

Finally, after building a bank disclosure index, we test empirically the impact of disclosure and financial openness on bank risk-taking. We focus our empirical study on Middle East and North Africa (MENA) countries and Turkey. For these countries, we collected individual financial data for 288 banks over the period 2005-2008. In this region, a lot of economies have experienced financial liberalization (Crean et al. 2007) and some of them

[3]Rochet (2004) defines direct market discipline as the behaviour of stakeholders that affects the strategy of managers and works as a substitute for prudential supervision. In contrast, indirect market discipline, which provides new objective information, works as a complement to prudential supervision. In our model we use the notion of direct market discipline since depositors may punish the bankers by reallocating of their investments. Thus, we do not use the term "market" discipline refering to a well functioning market described by the law of supply and demand, but as a device to discipline the behaviour of bankers so as to reduce excessive risk taking. This is in line with Hellwig (2005).

are characterized by a massive capital flight (Almansour 2008).

This paper is organized as follows. The next section presents the model. Section 3 discusses the behavior toward risk of the banking system in the emergent country. Section 4 studies the theoretical impact of Deposit insurance. Empirical evidences are presented in section 5.

# 2 The Model

Consider two countries $h$ and $f$, where $h$ is the emergent country and $f$ is the developed one. The banking system[4] in the emergent country is not attractive to investors in the developed region. However, depositors in the developing country may decide to invest their savings in the developed region.

Banks offer an interest rate $r_i\,(i = h, f)$ to depositors and lend the deposited funds out to borrowers. Like Chiesa (2001), we assume that lending consists of project financing. A bank is presumed to take excessive risks if it does not monitor the funded project. Since we focus on the potential risk behavior within the emerging country, we assume without loss of generality that banks in the developed country do not take excessive risks[5]. More precisely, the bank in $h$ chooses strategy $s \in \{m, M\}$, where $s = m$ stands for "excessive risk-taking" and $s = M$ indicates "safe risk management" in the case of monitoring. We consider that choosing a safe risk management strategy $M$ means complying with international prudential rules. Banks in both countries are supposed to be risk-indifferent and have limited liability. If action $m$ is chosen, one unit of resources is invested in a portfolio that yields $r$ with probability $p_m$ and is zero otherwise. Opting for $M$ delivers a return $r$ with probability $p_M$, with $p_M > p_m$ but it also entails a monitoring cost equal to $c > 0$ (with $r > c$) . For the sake of simplicity, we assume that the action $M$ eliminates the credit risk while action $m$ does not[6], that is $p_m = p$ and $p_M = 1$. In what follows, we also assume that $p \in \left(\frac{1}{2}, 1\right)$.

Since emerging economies are characterized by weak institutional environments, we suppose that there is much less financial transparency in country $h$ than in the developed

[4]For the purpose of simplicity, we suppose that the banking system in each jurisdiction contains one bank. This assumption allows us to concentrate on international bank competition.

[5]This must not be interpreted in absolute terms but in comparison to the behavior of the emerging banking system.

[6]This is not equivalent to perfect risk diversification since risk-mitigating costs are incurred.

country[7]. For sake of simplicity and without loss of generality, we assume perfect financial transparency in the country $f$. To model imperfect transparency we assume that the banking authority in country $h$ officially declares if it complies with international prudential standards or not. Formally, depositors observe either a signal $S_m$ stating that there is no compliance (strategy $m$) or a signal $S_M$ meaning that there is compliance (strategy $M$). Evidently, compliance does not take place if the country signals not compliance. However, the signal $S_M$ is not fully revealing, since depositors do not perfectly perceive if the bank really behaves prudently. We assume that the signal is revealing with probability $P(M/S_M) = \alpha$, and it is misleading with probability $P(m/S_M) = 1 - \alpha$. In other words, when country $h$ officially complies with an international prudential banking agreement, it applies it with probability $\alpha$, adopting strategy $M$, and otherwise applies strategy $m$. The level of $\alpha$ ( $0 \leq \alpha \leq 1$) depends on the ability of investors to perceive safe risk-taking behavior of banks which is closely related to the level of financial transparency [8].

The perceived probability of no credit loss if the home country signals $S_M$ is therefore

$$q = \alpha + (1 - \alpha)p.$$

If there is perfect transparency ($\alpha = 1$), investors observe perfectly that the bank selects the safe strategy, and $q = 1$. On the other hand, if there is no transparency, $\alpha = 0$ and thus $q = p$.

Finally, we consider a deposit insurance scheme specific[9] to each country, in which a fraction $\beta_i$ ($i = h, f$) of deposits, $0 < \beta_i < 1$ is refunded to depositors if a bank fails. Moreover, we assume that protection is not higher in the emergent economy than in the developed region, i.e. $\beta_f \geq \beta_h$. Again, without loss of generality assume $\beta_f = 1$ and let $\beta_h = \beta$. Finally, we assume that implementing safe risk management is efficient[10]. This formally means that $(1 - p)(1 + r - \beta) > c$, which implies that $1 + r - \beta > c/(1 - p)$.

The emerging country is represented by a linear segment $[0, 1]$. The domestic bank is located at position 0, and the foreign bank is located at position 1, which denotes the border

[7]The banking sectors in developed countries are characterized by less asymmetry of information and better institutional quality than those in developing countries.

[8]The financial transparency in turn increases with the quality of financial environment. For instance, standardized financial statements issued by banks and the existence of credible credit rating agencies may improve the flow of reliable information.

[9]For the sake of simplicity, we assume that the deposit insurance is funded by non-distorting taxation.

[10]In other words, the expected net gain induced by sound risk management $(1 + r - \beta - c)$ exceeds the expected net gain induced by excessive risk-taking $(p(1 + r - \beta)$

between the emergent and developed country. Depositors of $h$ are uniformly distributed with density S along the unit segment according to their preference for proximity so that the "closer" to the origin they are, the more they favor their home financial center. Consequently, the mobility cost of an individual located at a distance $x$ ($x \in [0,1]$) from the origin equals the gap $1-x$ that separates him/her from the border multiplied by a constant unit cost $k$. The higher this coefficient is, the lower is the international mobility of investors. Notice that $k$ may also be used to measure the degree of international financial openness.

Since depositors may invest in their own country or abroad, they exert pressure (i.e., market discipline) on their own banking system. The higher the level of $k$ is, the less is effective market discipline. Investors select the country that offers the highest expected return net of mobility costs. The expected utility of a depositor located at $x$, $x \in [0,1]$ and who invests in his/her own country $h$ is given by

$$U_h(x) = \begin{cases} p(1+r_h) + (1-p)\,\beta & \text{if } s = m \\ q(1+r_h) + (1-q)\,\beta & \text{if } s = M \end{cases}$$

If the same depositor invests in country $f$, his/her expected utility becomes

$$U_f(x) = (1+r_f) - k\,(1-x) \tag{1b}$$

It follows that when the emergent country chooses strategy $m$, the marginal depositor's position is

$$x_h^m = 1 - \frac{(1+r_f) - p\,(1+r_h) - \beta\,(1-p)}{k}$$

When the emergent country adopts strategy $M$, the marginal depositor's position obtains as

$$x_h^M = 1 - \frac{(1+r_f) - q\,(1+r_h) - \beta\,(1-q)}{k}. \tag{1}$$

## 2.1 Excessive risk-taking

Each banking system selects the interest rate that maximizes its own profit taking the rival's rate as given.

$$\underset{r_h}{Max}\ \Pi_h^m = p x_m S(r - r_h)$$
$$\underset{r_f}{Max}\ \Pi_f^m = (1 - x_m)\, S(r - r_f - c).$$

Solving the system of first order conditions yields the equilibrium interest rates $r_h^m$ and $r_f^m$[11]

$$r_h^m = r - \frac{2k - (1-p)(1+r-\beta) + c}{3p} \tag{2}$$

$$r_f^m = r - c - \frac{k + (1-p)(1+r-\beta) - c}{3} \tag{3}$$

The equilibrium market share of $h$ is

$$x_h^m = \frac{2k - (1-p)(1+r-\beta) + c}{3k}, \tag{4}$$

Consequently, the market share for $f$ is $x_f^m = 1 - x_h^m$. Since sound risk management is efficient, we have $x_h^m \in (0,1)$ if and only if

$$k > \bar{k}_1 = \frac{1}{2}\left((1-p)(1+r-\beta) - c\right). \tag{5}$$

The equilibrium profits of $h$ and $f$ can be written as

$$\begin{aligned} \Pi_h^m &= (x_h^m)^2 kS \\ \Pi_f^m &= (1 - x_h^m)^2 kS \end{aligned}$$

## 2.2 Sound risk management

When depositors receive the noisy signal, the market share of the bank in the emergent country is given by (1). Consequently, each banking system selects the interest rate that maximizes its own profit by taking the rival's rate as given.

$$\begin{aligned} \underset{r_h}{Max}\ \Pi_h^M &= x_M S\left(r - r_h - c\right) \\ \underset{r_f}{Max}\ \Pi_f^M &= S\left(1 - x_M\right)\left(r - r_f - c\right) \end{aligned}$$

After solving the system of best replies, we obtain the following equilibrium interest rates

$$r_h^M = r - c - \frac{2k - (1-q)\left(1+r-c-\beta\right)}{3q} \tag{6}$$

$$r_f^M = r - c - \frac{k + (1-q)\left(1+r-c-\beta\right)}{3} \tag{7}$$

[11] The offered interest rates $r_i^m (i = h, f)$ are positively signed for a sufficiently large $r$.

The equilibrium market share of $h$ becomes

$$x_h^M = \frac{2k - (1-q)(1+r-\beta-c)}{3k},$$

which belongs to the interval $(0,1)$ if and only if $k > \frac{(1-q)(1+r-c-\beta)}{2}$. The feasibility set of $k$ reduces to $k > \bar{k} = \max\left\{\bar{k}_1, \bar{k}_2\right\}$ where $\bar{k}_1 = \frac{(1-p)(1+r-\beta)-c}{2}$ and $\bar{k}_2 = \frac{(1-q)(1+r-\beta-c)}{2}$. Notice that $\bar{k} = \bar{k}_1$ if $1+r-\beta \in \left(\frac{c}{1-p}, \frac{qc}{q-p}\right)$ and $\bar{k} = \bar{k}_2$ if $(1+r-\beta) \in \left(\frac{qc}{q-p}, +\infty\right)$ with $p \leq q < 1$.

The equilibrium profit functions are given by

$$\begin{aligned} \Pi_h^M &= \left(x_h^M\right)^2 \frac{kS}{q}, \\ \Pi_f^M &= \left(1 - x_h^M\right)^2 kS. \end{aligned}$$

Notice that decreasing transparency ($q$) increases the profit function $\Pi_h^M$. The reason is that lower transparency softens international bank competition and makes depositors more captive.

# 3 Choice of risk management strategy

In this section, we study the incentives of the emergent country to comply with a safe risk management strategy. This strategy is selected if $\Pi_h^m < \Pi_h^M$. We saw in the above sections that the profitability of strategy $m$ depends negatively on the degree of financial integration because integration fosters competition. However, the degree of financial integration negatively affects the profitability of strategy $M$. Thus, the effect of the size of $k$ on the choice of the risk strategy is ambiguous. Furthermore, the profit function $\Pi_h^M$ is not monotonic with respect to the level of disclosure $q$. The effects of disclosure $q$ and competition depending on $k$ can thus reinforce or offset each other, ultimately determining which strategy prevails.

By comparing $\Pi_h^m$ to $\Pi_h^M$, we observe the following proposition.

**Proposition 1.** *There exists a cost threshold ($c^* > 0$) under which the banking system of country $h$ adopts safe risk management.*

*Proof.* The threshold-value $c^* = \frac{2k-(1-q)(1+r-\beta)-\sqrt{q}(2k-(1-p)(1+r-\beta))}{q+\sqrt{q}-1}$ is derived from the equality $\Pi_h^m(c) = \Pi_h^M(c)$.

It follows that $c^* > 0$ if $k > \max\left\{\bar{k}, \tilde{k}\right\}$, where $\tilde{k} = (1 + r - \beta)\,\frac{(1-q)-(1-\pi)\sqrt{q}}{2-2\sqrt{q}}$[12]. □

Consequently, the sound strategy $M$ is chosen if the cost of monitoring is not too high (i.e. $c \leq c^*$), whereas the banking system opts for risk-taking ($m$) if $c > c^*$.

Let us now investigate the influence of increased transparency (that is, information disclosure) on the choice of sound risk management ($M$). Considering the derivative of threshold cost $c^*$ with respect to $q$ and with respect to $\pi$ shows that $\frac{\partial c^*}{\partial q} > 0$ if $\max\left\{\bar{k}, \tilde{k}\right\} < k < k^*$[13], while $\frac{\partial c^*}{\partial q} < 0$ if $k > k^*$ where $k^* = \frac{p(1+q)(1+r-\beta)}{2\left(2\sqrt{q}-q\right)}$. We can thus observe the following proposition.

**Proposition 2.** *Given sufficient financial openness (i.e.* $\max\left\{\bar{k}, \tilde{k}\right\} < k < k^*$*), more disclosure increases the likeliness that the emergent banking system opts for sound risk management. In contrast, if capital mobility is low (i.e.* $k > k^*$*), more disclosure decreases the likeliness of sound risk management.*

To understand the intuition behind Proposition 2, we first totally differentiate the equality $\Pi_h^M(c^*, q) - \Pi_h^m(c^*) = 0$ with respect to $q$ and $\pi$. This yields

$$\frac{dc^*}{dq} = \frac{\frac{\partial \Pi_h^M}{\partial q}}{\frac{\partial \Pi_h^m}{\partial c^*} - \frac{\partial \Pi_h^M}{\partial c^*}}.$$

It can be shown that $\frac{\partial \Pi_h^m}{\partial c^*} - \frac{\partial \Pi_h^M}{\partial c^*} = \frac{2S}{3}\left[x_h^m - x_h^M \frac{(1-q)}{q}\right] > 0$ for all $q \in [p, 1]$[14]. Then $\frac{dc^*}{dq} + \frac{dc^*}{d\pi}$ has the same sign as $\frac{\partial \Pi_h^M}{\partial q} - \frac{\partial \Pi_h^m}{\partial \pi}$. Analyzing this last term gives

$$\frac{\partial \Pi_h^M}{\partial q} = \underbrace{\frac{2S}{3q} x_h^M (1 + r - \beta - c)}_{+} + \underbrace{\left(x_h^M\right)^2 \frac{-kS}{q^2}}_{-},$$

Thus, greater transparency has two effects that act in opposite directions. On the one hand, banks have an incentive to behave more prudently, since greater transparency regarding the way in which they manage risk increases their attractiveness to depositors. On the other hand,

[12]Notice that $\tilde{k}$ is strictly positive if $q \geq p > \frac{1}{\sqrt{q}}\left(q + \sqrt{q} - 1\right)$. If $q \geq \frac{1}{\sqrt{q}}\left(q + \sqrt{q} - 1\right) > p$ holds, we have $\tilde{k} < 0$. In this case it follows that for any value of the net return $1 + r - \beta$ we get $c^* > 0$.

[13] Since we assume that $p \in \left(\frac{1}{2}, 1\right)$, it is easy to check that $k^* > \max\left\{\bar{k}_1, \bar{k}_2\right\}$and $k^* > \tilde{k}$. For a detailed proof see the Appendix.

[14]The equality $\Pi_h^M(c^*, q) = \Pi_h^m(c^*)$ implies $x_h^M(c^*)\frac{1}{\sqrt{q}} = x_h^m(c^*)$. Since $p \leq q \leq 1$, and $p \in \left(\frac{1}{2}, 1\right)$, it follows that $x_h^m \geq x_h^M$ at $c^*$.

greater transparency spurs bank competition[15], which squeezes profit margins and thus leads to more risk-taking. Notice that the higher the mobility cost $k$ is, the stronger is the profit squeeze[16]. Which effect will ultimately dominate thus depends on the degree of financial openness. When the level of financial openness is high ($k < k^*$), the profit squeeze on the banks induced by the increased transparency (that is increased $q$) will be overweighted by the attractiveness effect. However, when capital mobility is low ($k > k^*$) the opposite effect emerges.

To conclude, we recover the first result of Cordella and Yeyati (2002), in the first part of Proposition 2, but we further show how the link between the level of transparency and the risk attitude of banks depends on the degree of financial openness $k$.

# 4 Deposit insurance

It is generally believed that the higher is the level of deposit insurance and the lower is the transparency of risk management, the higher the level of risk-taking in banking is. Therefore, the claim is often made that bank regulation should impose more transparency to mitigate moral hazard (Bhattacharya, Boot and Thakor, 1998). However, Hyytinen and Takalo (2002) argue that transparency required by bank regulation comes at a cost, which, in turn, can reduce the charter value of banks and thus increase the fragility of the banking system. This means that greater transparency may not counteract the negative effect of deposit insurance.

In our model, we show that more deposit insurance may or may not increase the likelihood of excessive risk-taking. We show that if transparency is high enough, increasing deposit insurance paradoxically leads to excessive risk-taking. However, the opposite occurs if the level of disclosure is low. This result is similar to that of Hyytinen and Takalo (2002); in our case, this arises from increased competition rather than from increased disclosure costs.

[15]Increasing market transparency increases deposit supply elasticity and thus intensifies competition perceived by the emerging country's bank. Indeed, it is easy to check that $\frac{\partial e_h}{\partial q} > 0$ with $e_h = \frac{\partial x_h^M}{\partial r_h} \frac{r_h}{x_h^M}$. A similar argument is developed by Schultz (2004) .

[16]This is because the larger profit margins (induced by high mobility costs) imply larger losses if transparency increases.

The analysis of the sign of $\frac{\partial c^*}{\partial \beta}$ leads to the following proposition.

**Proposition 3.** *If the level of disclosure is high (i.e. $q > \tilde{q}$), more deposit insurance increases the likelihood of excessive risk-taking. In contrast, if the level of disclosure is low (i.e. $q < \tilde{q}$), more deposit insurance increases the likelihood of sound risk management.*

*Proof.* Notice that $\frac{\partial c^*}{\partial \beta} = \frac{1-q-\sqrt{q}(1-p)}{q+\sqrt{q}-1}$ is negative (positive) if $p < (>) 1 - \frac{1-q}{\sqrt{q}}$.

Solving $p = 1 - \frac{1-q}{\sqrt{q}}$ with respect to $q$ gives the threshold $\tilde{q} = 1 - (1-p)\frac{1}{2}\left[\sqrt{p^2-2p+5} - (1-p)\right]$ with $\tilde{q} > p$ for $p \in \left(\frac{1}{2}, 1\right)$. □

To grasp the rationale behind this proposition, we totally derivate the equality $\Pi_h^M(c^*, \beta) - \Pi_h^m(c^*, \beta) = 0$ with respect to $\beta$ and $c^*$. It follows[17] that $\frac{dc^*}{d\beta}$ has the same sign as $\frac{\partial \Pi_h^M}{\partial \beta} - \frac{\partial \Pi_h^m}{\partial \beta}$. It is also easy to show that increasing deposit insurance augments the bank profit in the emerging country (that is $\frac{\partial \Pi_h^m}{\partial \beta} > 0$ and $\frac{\partial \Pi_h^M}{\partial \beta} > 0$) regardless of which risk behavior is chosen. The reason is that more deposit insurance makes depositors more captive. In addition, it is true that $\frac{\partial \Pi_h^M}{\partial \beta}$ increases if $q$ declines, while $\frac{\partial \Pi_h^m}{\partial \beta}$ does not depend on $q$. Consequently, if the level of transparency is sufficiently low (i.e. $q < \tilde{q}$), international competition is weak and the additional profit induced by increased deposit insurance is highest when the bank in the emergent country chooses safe risk behavior $M$. In other words, if $q < \tilde{q}$, then the impact of $\beta$ on bank profit is such that $\frac{\partial \Pi_h^M}{\partial \beta} > \frac{\partial \Pi_h^m}{\partial \beta}$ ($\frac{\partial c^*}{\partial \beta} < 0$). This is because profits induced by increased deposit insurance are principally monopolized by the bank of the emergent country (or, to a small degree passed on to depositors) when competition is weak (i.e. the level of disclosure is low). In contrast, if $q > \tilde{q}$, then international competition is intense and the impact of $\beta$ on profit is highest when the bank in the emergent country takes excessive risk ($m$).

[17] We obtain $\frac{dc^*}{d\beta} = \frac{\frac{\partial \Pi_h^M}{\partial \beta} - \frac{\partial \Pi_h^m}{\partial \beta}}{\frac{\partial \Pi_h^m}{\partial c} - \frac{\partial \Pi_h^M}{\partial c}}$ and it already was shown that $\frac{\partial \Pi_h^m}{\partial c} - \frac{\partial \Pi_h^M}{\partial c} > 0$.

# 5 Empirical Evidence (Caution: work in progress!)

## 5.1 Estimated equation and data coverage

We examine the relationship between disclosure (Discl), financial openness (Kaopen) and bank risk-taking (proposition 2 of our model) using the following equation for a cross country sample of banks *i*:

$\text{Risk}_i = f(Discl_i, Kaopen_k, Z_i, Z_k)$

$Z_i$ and $Z_k$ are vectors of control variables at bank-level and country-level respectively. Subscripts i and k refer to bank and country respectively

Our data set comprise 288 banks in 13 MENA countries and Turkey: Algeria, Egypt, Israël, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, Turkey, United Arab Emirates.

All data for the bank-level variables are collected from Bankscope and country-level variables from the World Bank and IMF.

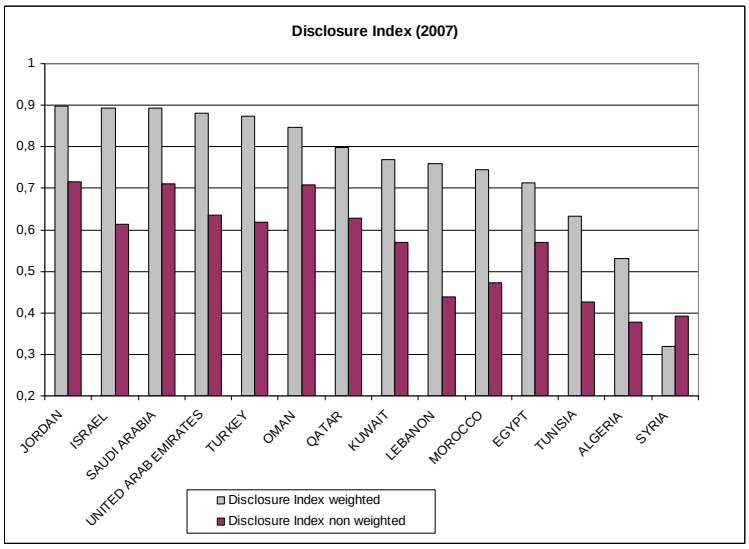
All variables except Discl (2007) and Kaopen (2007) are averaged for each bank over the period under study: 2005-2007 and 2008-2009.

Because of the lack of variability of disclosure and financial openness variables, we conduct our analysis on a cross-sectional basis.

## 5.2 Measuring disclosure

We construct a Bank Disclosure Index based on the measurement framework originally proposed by Erlend Nier from the Bank of England (Bauman and Nier 2004), and used by the World Bank (Huang, 2006).

The Disclosure Index is a composite disclosure index that aggregates information from six categories of disclosures, including: (1) LOANS: breakdown of loans by maturity, type, counterparty, credit risk, problem loans, etc; (2) OTHER EARNIGN ASSETS: breakdown of securities by type, and hold purpose; (3) DEPOSITS: breakdown of deposits by maturity, type of customer; (4) OTHER FUNDING: breakdown of money market funding, and long-term funding; (5) MEMO LINES: disclosures of capital ratio, reserves, contingent liabilities, off-balance-sheet, etc; (6) INCOMES: breakdown of non interest income and disclosure of




loan loss provisions. A sub-index is created for each category of disclosures. These sub-indices further contain a total of seventeen disclosure items, which are listed in Annex 1. These indexes thus measure the level of detail that banks provide on seventeen dimensions of accounting information in their published accounts and provided by Bankscope database.

For all indexes, zero was assigned if there was no entry in any of the corresponding categories and 1 otherwise, except for the index for securities by "type" and the "capital" index. For the "securities by type" item, a 0 was assigned if there was no entry for any of the associated disclosure categories, a 1 if there was only an entry for the coarse breakdown and a 2 if there was an entry for the detailed breakdown. For the "capital" item, a 0 was assigned if there was no entry in any of the categories, a 1 if there was one entry only, a 2 if there were two entries and a 3 if there were three or four entries. Aggregating the information scores on the 17 disclosure items, the composite index can be created with the following formula: $Discl = \frac{1}{21}\sum_{i=1}^{17} s_i$

Our Bank disclosure index is used at individual bank-level, but to give a picture of the situation of MENA countries, we created a national index by averaging the index values of individual banks in a country, weighted by their assets (figure 1)

## 5.3 Risk taking variables

During the financial crisis, bank distress were explained to a large extent by such of bank fundamental ratios:

- Liquidity ratio (LIQUID-TA): Generally, bank regulators tend to view liquidity as one of the more reliable accounting measure of bank soundness (Demirgüc Kunt and Huizinga, 2004, Martinez Peria and Schumhler, 2001). We use the ratio of liquid assets to total assets.

- Non Performing loans (NPL): Ratio on non-performing loans to total assets, reflects the quality of bank asset.

- Solvability ratio (EQUITY): Ratio of Equity plus Loans reserves minus non performing loans to total assets.

- Leverage (LEV): Ratio of borrowed funds to total assets

- Off balance sheet ratio (OFFBAL): Off balance sheet ratio liabilities to total assets.

## 5.4 Other banks and countries variables

- KAOPEN: Index of openness in capital account transactions built by Chin and Ito (2006 and 2007) aimed at measuring the extensity of capital controls based on the information from

the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).This proxy of financial openness is a country-level variable.

- INSURANCE: Deposit insurance system (dummy)

- SIZE: ln(total assets) of each bank

- SHARE: Contribution of each bank to the total assets in the banking sector of each country

- LOANS: Total loans to total assets (composition of assets)

- FOREIGN: Foreign owned (dummy = 1 when foreign ownership >50%)

- PUBLIC: Public owned (dummy)

*Macroeconomic variables:*

- GDPCAP: Ln(GDP per capita) of each country

- INFL: Inflation rate of each country

- GDPGR: Real GDP growth of each country.

## 5.5 Results (A very first look !)

Our very preliminary results are promising. The variable “disclosure” appears significant and with a positive sign.

Sorry... our work is in progress... At present, we have conducted few simple OLS regressions, on only one dependent variable (Liquidity), only under the pre-crisis period (2005-2007) and without working on potential endogeneity of some variables.

We have to explain and justify each variables.

In the next weeks, we have to deepen this econometric work by conducting all standard tests, by extending the period under study to cover crisis period, and by testing other risk-taking variables...

## ANNEX 1

### Information Subindex Categories: (Baumann and Nier 2004)

**Loans:**

**S1:** Loans by maturity:

Less than three months, three to six months, six months to one year, one to five years, more than five years

**S2:** Loans by type:

Loans to municipalities/government, mortgages, HP/lease, other loans

**S3:** Loans by counterparty:

Loans to group companies, loans to other corporates, loans to banks

**S4:** Problem loans:

Total problem loans

**S5:** Problem loans by type:

Overdue/restructured/other nonperforming

**Other earning assets:**

**S6:** Securities by type:

Detailed breakdown: Treasury bills, other bills, bonds, CDs, equity investments, other investments Coarse breakdown: government securities, other listed securities, non listed securities

**S7:** Securities by holding purpose:

Investment securities, trading securities

**Liabilities Deposits**:

**S8:** Deposits by maturity:

Demand, savings, less than three months, three to six months, six months to one year, one to five years, more than five years

**S9:** Deposits by type of customer:

Bank deposits, municipal/government

**Other funding**

**S10:** Money market funding:

Total money market funding

**S11:** Long-term funding:

Convertible bonds, mortgage bonds, other bonds, subordinated debt, hybrid capital

**Memo lines**

**S12:** Reserves: Loan loss reserves (memo)

**S13:** Capital: Total capital ratio, tier 1 ratio, total capital, tier 1 capital

**S14:** Contingent liabilities: Total contingent liabilities

**S15:** Off-balance-sheet items: Off-balance-sheet items

Income statement

**S16:** Noninterest income: Net commission income, net fee income, net trading income

**S17:** Loan loss provisions: Loan loss provisions

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