

Publication date: 17 June 2014 | Vol.3, Issue 1 (2014) 167-180

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# A Model for the Interest Margin of a Risk-neutral Bank. The Role of the Bank Orientation

## ABSTRACT

This paper examines the impact of the bank orientation on classical banking business, distinguishing between shareholder and stakeholder banks, and analyzes the preconditions for positive social welfare effects from the existence of stakeholder banks. For this reason we develop a theoretical bank decision model based on the utility approach and focus on the determination of the interest margin. *Vis-à-vis* previous studies, we connect to the recent literature on the agency view considering the lessons from recent financial developments. Moreover, we study the influence of the social mission on the bank pricing strategy, merging these two different fields for the first time. The results highlight the fundamental role of a strict and prudential regulation of the social mission as well as of the existence of internal and external control mechanisms, in order to avoid a misuse of stakeholder banks for distorting aims, to increase the system stability and to reduce market failures. Therefore, a correct implementation of these aspects represents a precondition for a positive contribution of stakeholder banks to the social welfare.

## KEY-WORDS

SOCIAL WELFARE; STAKEHOLDER BANKS; SHAREHOLDER BANKS; COOPERATIVE BANKS; SAVINGS BANKS; INTEREST MARGIN

JEL Classification: G21, G34, H81, P13 | DOI: <http://dx.doi.org/10.5947/jeod.2014.008>

## 1. Introduction

The shocks of the global financial crisis led to a reconsideration of the widely held perceptions about the superiority of certain forms of bank ownership and gave an impulse to the research in this field (Ayadi *et al.*, 2010). In the past, cooperative and savings banks contributed to the economic and social progress of many countries and nowadays represent important elements of many financial systems. It is therefore important to investigate their business strategy with respect to the economic and social effects of their operations on different stakeholders. The aim of this study is to model the influence of the bank orientation on the bank pricing strategy, focusing on the credit and deposit business through the study of the interest margin.

We make a distinction between shareholder and stakeholder banks with respect to their target function. Since shareholder banks aim at the maximization of shareholders interests through profit distribution, their target function maximizes the expected profits under the balance sheet constraint. On the contrary a stakeholder bank has to consider the profits and also in addition the claims of other stakeholders, which are modeled through the introduction in the utility function of a social component. This focuses on the stakeholder “customers” and measures the dimension of the opportunity costs for this category arising from the transaction with the bank<sup>1</sup>. This extension of the target function influences the optimal bank spread, represented by the interest margin.

The results from the comparative statics show that the social component reduces the interest margin and thereby serves one of the stakeholder claims if and only if following aspects necessary for a sufficient efficiency grade are regulated<sup>2</sup>:

- a detailed definition of the social mission;
- a clear definition of the independence criteria for the bank management;
- an internal supervisory board containing representatives of the stakeholders;
- a stringent supervision from an external supervising authority of the bank’s risk exposition.

If such requirements are not satisfied the achievement of the efficiency condition will be obstructed, so that the social component within the target function of stakeholder banks won’t produce the expected decrease in the interest margin.

Section 2 summarizes the literature, section 3 presents the model framework and section 4 develops the comparative statics properties of the model and interprets the results. Section 5 summarizes and concludes.

## 2. Literature review and conceptual framework

This work refers to two different research fields in banking studies; we shortly describe the literature of both sectors: (1) the interest margin and (2) the influence of bank orientation on the bank business model.

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<sup>1</sup> “Customers” represent only one of many groups of possible stakeholders of the bank. In addition to this group the literature usually considers other groups and their various claims, like for instance the regional economy, the local public institutions, the population and the workers (Brämer *et al.*, 2010; Christen *et al.*, 2007; Stiglitz *et al.*, 1993).

<sup>2</sup> In addition to the reduction of the interest margin the stakeholder claims usually consider also other aspects of the banking business, like for instance the availability of a sufficient variety of financial services for all the customers or the regional presence on the territory (Brämer *et al.*, 2010). However, the consideration of different claims in the model framework would exponentially increase its complexity. For this reason, we concentrate our model analysis on the dimension of the opportunity costs as a representative claim of the stakeholder “customers” (Smith *et al.*, 1981). At the later stage of the results’ interpretation we abstract from the concrete model parameters and refer to fundamental aspects of the stakeholder banking connected to the agency view (Shleifer and Vishny, 1997). Since these aspects are not specifically connected to the interest rates and concern the whole claims of the customers, the conclusions are generally applicable to all the claims of the stakeholder “customers”.

The first model of the interest margin was presented by Ho and Saunders (1981) and adopted the Intermediation/Dealership Approach, focusing on the classical banking business and combining the hedging and the expected utility approaches in order to analyze the determinants of bank margins. Many theoretical extensions and empirical studies followed, which led to the inclusion of the business fee and different risk sources as margin determinants (Maudos and Solís, 2009; Entrop *et al.*, 2012).

With respect to the influence of the bank orientation on the business model there is a broad theoretical literature, which ranges from the role of public banks, to the public mission of savings banks and the member value distribution in cooperative banks. Sapienza (2004) and Yeyati *et al.* (2004) present a detailed overview of different theoretical explanations, which comprehend the social, the development, the macroeconomic, the political and the agency view. Focusing on the German savings banks Brämer *et al.* (2010) present a modern interpretation of their public mission and describe the current German literature concerning this topic. On the other hand, Angelini *et al.* (1998) discuss the member value distribution by cooperative banks. Few contributions discuss the theoretical modeling of stakeholder banks<sup>3</sup> and only recent articles present empirical studies of their peculiarities (Ferri *et al.*, 2012).

To our knowledge, this is the first study that explicitly merges these two different fields of literature, using the interest margin as an instrument to study the peculiarities of the business model of stakeholder banks.

In the following we differentiate between shareholder and stakeholder banks on the basis of three different criteria, namely the business orientation, the business objective and the role of profits.

Table 1. Distinguishing criteria between shareholder and stakeholder banks

<i>Criteria</i>	<i>Shareholder banks</i>	<i>Stakeholder banks</i>
Business orientation	Focus on the maximization of shareholders' interests	Focus on the satisfaction of the claims of a broader category of subjects (stakeholders) than only the owners
Business objective	Management is subject to the bank value maximization	Management follows a "double-bottom line" approach, which describes a multistage target system <sup>4</sup>
Role of profits	Profit realization is the main business objective	Profit realization is sought only to reach long-term cost coverage, in order to ensure the continuity of the banking business <sup>5</sup>

Source: Own representation on the basis on Ayadi *et al.* (2009) and Ferri (2010)

<sup>3</sup> Taylor (1971) and Smith *et al.* (1981) model the behavior of cooperative banks, whereas Barros and Modesto (1999) study public banks.

<sup>4</sup> Christen *et al.* (2007) were the first authors to define stakeholder banks as "double-bottom line Institutions": "In addition to a financial objective, they also have a developmental or social objective. If their managers were asked which of the objectives is primary, most of them would say that the non-financial objective - extending outreach to people not normally served by banks - is the crucial one, and that solid financial performance is a mean to that end rather than an end in and of itself" (Christen *et al.*, 2007, p. 2). Following contributions extended the non-financial objective to other fields, like for instance sustaining local development (Goglio, 2009) or granting a stable and long-term oriented offer of banking products to all classes of population (Brämer *et al.*, 2010).

<sup>5</sup> Profits of stakeholder banks are usually allocated to the accumulation of reserves, which ensures the bank's solvency in case of losses or crisis situations.

The group of shareholder banks consists of private profit-oriented banks, whereas cooperative and savings banks aim to satisfy the claims of their stakeholders and are therefore defined as stakeholders-oriented. In detail, cooperative banks usually focus on the member surplus and savings banks on the social welfare. Since we consider both kinds of stakeholder banks, we do not focus as in Smith *et al.* (1981) only on the claim of the members, but on the claim of the broader category “customers”. Therefore, the stakeholders considered in the model include, with respect to cooperative banks, customer-members with voting rights in the assembly as well as customers without membership status<sup>6</sup>.

### 3. Model framework

#### 3.1. A basic bank model

In order to first model the bank profits we use an adapted version of the basic bank model from Gambacorta (2004)<sup>7</sup>. For simplicity reasons we focus on the traditional banking business, excluding bonds from the balance sheet<sup>8</sup>. In line with Melitz and Pardue (1973) the loan and deposit demand functions depend only on the permanent part of the income, whereas the transitory income is associated with a self-financing or a consuming effect and does not affect the bank business. Moreover, we measure the balance sheet sensitivity to changes in the money market rate through an altered version of the modified duration.

$$\delta = \frac{\sum_{t_{CF}>0} t_{CF} \left( \frac{\sum_{A_i} CF(A_i, 0 \rightarrow t_{CF}) - \sum_{Liab_i} CF(Liab_i, 0 \rightarrow t_{CF})}{(1 + r_m(t_{CF}))^{(t_{CF}+1)}} \right)}{\sum_i A_i} \quad (1)$$

Where CF are the cash-flows,  $A_i/L_i$  the corresponding asset/liability,  $t_{CF}$  the considered time span and  $r_m$  the money market rate. Considering these changes the profit function of a bank is determined by the revenue from the credit business ( $r_l L$ ) net of the credit risk ( $wL$ ), the revenue from the risk-free securities ( $r_m S$ )<sup>9</sup>, the cost of deposits funding ( $r_d D$ ), the cost from the interest rate risk ( $TT$ ) and the operative costs ( $C$ ):

$$\Pi = (r_l - w)L + r_m S - r_d D - TT - C \quad (2)$$

#### 3.2. Utility function: shareholder vs. stakeholder banks

The utility function of the bank is defined as a linear combination of a profit ( $\Pi$ ) and a social costs

<sup>6</sup> Since the latter are non-members, they cannot vote in the assembly, but can withdraw from their relationship with the bank.

<sup>7</sup> A short description of the basic bank model is shown in Appendix 1.

<sup>8</sup> One could argue that bonds influence the profit of a bank and for this reason they have to be considered within the balance sheet. However, the net effect of the bond business on the optimal solution would be strongly reduced by its multiplication with the reserve coefficient. Since the reserve coefficient usually assumes very low values, an inclusion of the bond business would not have a significant impact on the optimal interest margin. For a modeling of the bond business see Gambacorta (2004).

<sup>9</sup> As in Gambacorta (2004) we consider the risk-free securities either as reserves deposited by the central bank or as risk-free investments. Since in both cases the interest yield corresponds to the risk-free rate, both alternatives generate the same revenue.

component ( $\theta$ ) and is directly influenced by the loan ( $r_l$ ) and the deposit rate ( $r_d$ ).

$$U(r_l, r_d) = \Pi(r_l, r_d) - \theta(r_l, r_d) \quad (3)$$

The social costs component ( $\theta$ ) measures the opportunity costs of the transaction with the bank for the customers and considers thereby borrowers as well as depositors. The opportunity costs for the single borrower (OCL) are represented by the difference between the loan rate ( $r_l$ ) and the cheapest market alternative, which is assumed to be the money market rate ( $r_m$ )<sup>10</sup>.

$$OCL = r_l - r_m \quad (4)$$

Using the same approach we define the opportunity costs for the single depositor as the difference between the most profitable market alternative ( $r_m$ ) and the deposit rate ( $r_d$ ).

$$OCD = r_m - r_d \quad (5)$$

The social costs component ( $\theta$ ) is expressed by the sum of both opportunity costs multiplied with the respective sensitivity ( $\theta_l / \theta_d$ )<sup>11</sup> and the amount granted/collected ( $L / D$ ).

$$\theta = \theta_l \cdot OCL \cdot L + \theta_d \cdot OCD \cdot D \text{ with } 0 \leq \theta_l, \theta_d \leq 1 \text{ and } \theta_l + \theta_d \leq 1 \quad (6)$$

The bank aims to maximize the utility function through the determination of the optimal credit and deposit rate, considering both profit ( $\Pi$ ) as well as the social costs component at the same time ( $\theta$ ).

$$\text{Max}_{r_l, r_d} U = \text{Max}_{r_l, r_d} (\Pi - \theta) = \text{Max}_{r_l, r_d} \pi(r_l, r_d) + \text{Min}_{r_l, r_d} \theta(r_l, r_d) \quad (7)$$

Through this utility function we can differentiate between shareholder and stakeholder banks. Shareholder banks are bound to profit maximization, so that the social component disappears ( $\theta = 0$ ) and their utility depends only on the generated amount of profits. On the contrary, stakeholder banks follow a “double-bottom line” approach and must also consider the social component in their multistage target system ( $\theta > 0$ ). Their utility is therefore a combination of profits and social costs<sup>12</sup>.

Substituting (4) and (5) into (6) and (2) and (6) into (7) and maximizing (7) through the first order condition we obtain the optimal interest margin, calculated as the difference between the optimal credit ( $r_l^*$ ) and deposit rate ( $r_d^*$ )<sup>13</sup>.

<sup>10</sup> Smith *et al.* (1981) also discuss the dependence of the Credit Union objective function from the value of the transaction for its members. They calculate the Net Gain on Loans, defined as “the difference between the CU loan rate and the best alternative market rate times the level of loan activity” (Smith *et al.*, 1981, p. 520). Since a customer usually does not have access to the money market, we consider the bank as an agent, which enables such refinancing form. The bank has to refinance itself on the money market and its surplus from the intermediation activity is measured by the difference between the loan rate and the money market rate. For this reason, the money market rate represents in our opinion a better choice as reference rate for the measurement of the opportunity costs for the customers from the bank transaction.

<sup>11</sup> The sensitivity of the utility function to the opportunity costs of the credit ( $\theta_l$ ) and the deposit market ( $\theta_d$ ) summarizes the orientation of the bank with respect to two different customer categories. A value of  $\theta_l = 1$  indicates a complete borrower orientation, whereas a value of  $\theta_d = 1$  implies the consideration of only the depositors’ claims (Smith *et al.*, 1981).

<sup>12</sup> In the literature about stakeholder banks many authors consider profits as necessary in order to cover the costs of the banking activity, to build up reserves thereby ensuring continuity in the pursuit of the social aims (Ayadi *et al.*, 2009).

<sup>13</sup> For the derivation of the optimal interest margin see Appendix 2.

$$IM^* = -\frac{1}{l_0}(l_1 y^p + l_2 p) + \frac{1}{2(1-\theta_l)} w + \frac{1}{2} \left( \frac{1+\alpha-\theta_d-\alpha\theta_l}{(1-\theta_d)(1-\theta_l)} \right) \delta_{t-1} \Delta r_m + \frac{1}{2} \left( \frac{1}{(1-\theta_l)} c_1 + \frac{1}{(1-\theta_d)} c_2 \right) + \frac{1}{2} \left( -\frac{\theta_l}{(1-\theta_l)} + \frac{\alpha-\theta_d}{(1-\theta_d)} \right) r_m \quad (8)$$

The optimal interest margin depends on two factor classes:

- factors independent from the ownership-type (macroeconomic factors, i.e. permanent income and price level and reserve coefficient, as well as money market rate);
- factors depending on the ownership-type (bank-specific factors, i.e. credit risk, social component, interest rate risk and operative costs).

As we can see from (8) the social component influences the determination of the interest margin through a change in the coefficients of different factors. Since the social component is absent in shareholder banks, they determine their interest margin in order to maximize their profits. On the contrary, stakeholder banks are denoted by a positive social component that leads to a modification of the optimal interest margin in comparison to those of shareholder banks. The next section focuses on the influence of the social component through the use of comparative statistics.

#### 4. The influence of the social component

We study the influence of the social component deriving the optimal interest margin over the sensitivity of the utility function both to the opportunity costs of the credit ( $\theta_l$ ) and of the deposit market ( $\theta_d$ ). We also study the conditions under which the social component increases the social welfare through the reduction of the interest margin, which represents the satisfaction of the considered claim of low opportunity costs of the stakeholder “Customers”<sup>14</sup>.

$$\frac{\partial IM^*}{\partial \theta_l} < 0 \text{ if } \frac{1}{2} \frac{w + \delta_{t-1} \Delta r_m + c_1 - r_m}{(1-\theta_l)^2} < 0 \rightarrow \begin{cases} r_m > c_1 + w + \delta_{t-1} \Delta r_m & \text{if } \theta_l < 1 \\ \text{undefined} & \text{if } \theta_l = 1 \end{cases} \quad (9)$$

From (9) we can derive the conditions for a welfare-increasing influence of the borrower-orientation, taking three different elements into consideration: the operative costs for the credit business ( $c_1$ ), the credit risk ( $w$ ) and the interest rate risk ( $\delta_{t-1} \Delta r_m$ ), which together express the total costs of the credit business. The social component with respect to the credit business reduces the interest margin if the money market rate exceeds the total costs and the bank is not completely borrower-oriented ( $\theta_l < 1$ ). These conditions imply the subjection of an increase in the social welfare through the social component to the satisfaction of an efficiency condition: if the bank is efficient enough to produce a surplus investing its funds at the money market rate, it can lower the credit rate  $r_l$  towards  $r_m$  and at the same time cover its total costs.

The first derivative of (8) over  $\theta_d$  leads to the following results for the depositor-orientation, which again consider the money market rate compared to the operative costs for the deposit business ( $c_2$ ) and the interest rate risk ( $\delta_{t-1} \Delta r_m$ ) under the assumption of a not perfect depositor orientation.

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<sup>14</sup> A reduction of the interest margin is also interpreted in the literature as an increase in the social welfare, because of the reduction of the intermediation costs of the banking business (Saunders and Schumacher, 2000). Furthermore, a low interest margin represents in our model the satisfaction of the interest of the stakeholders “customers”, since lower credit rates and higher deposit rates reduce the opportunity costs from their transaction with the bank.

$$\frac{\partial IM^*}{\partial \theta_d} < 0 \text{ if } \frac{1}{2} \frac{\alpha \delta_{t-1} \Delta r_m + c_2 + (\alpha - 1) r_m}{(1 - \theta_d)^2} < 0 \rightarrow \begin{cases} r_m > \frac{c_2 + \alpha \delta_{t-1} \Delta r_m}{(1 - \alpha)} \text{ if } \theta_d < 1 \\ \text{undefined if } \theta_d = 1 \end{cases} \quad (10)$$

Also within the deposit market a positive influence of the social component is subjected to an efficiency constraint. However, in contrast to the credit market the conditions from (10) imply a consideration of the interest rate risk only with respect to the reserves/risk-free securities, since their interest rates cannot be aligned during the period. Furthermore, the efficiency is calculated only with respect to the share of the balance sheet not invested in risk-free securities  $(1-\alpha)$  and therefore available for the banking business<sup>15</sup>. Since an increase in the reserve coefficient will reduce the available funds for loans, the bank will have to increase the level of efficiency in order to reduce the interest margin<sup>16</sup>.

Summing up the conditions for a positive welfare effect of the social component within a matrix, we can highlight the similarities and differences between the credit and the deposit market.

Table 2. Conditions for a positive welfare effect of the social component

<i>Object</i>	<i>Credit market</i>	<i>Deposit market</i>
Stakeholder bank orientation	Not complete borrower-oriented	Not complete depositor-oriented
Cost-revenue relationship (efficiency)	The money market rate exceeds the total costs of the loan business, defined as the sum of operative costs of the loan business, of deductions for the credit risk and the cost from the interest rate risk	The money market rate exceeds the total costs of the deposit business (defined as the sum of operative costs and costs from the interest rate risk on reserves) in relation to the available funds for the banking business <sup>17</sup>
Influence of banking supervision / monetary policy	Supervision of the interest rate risk based on hard data	Supervision of the interest rate risk based on hard data and determination of the reserve coefficient
Art of welfare distribution	If the efficiency condition is fulfilled a stakeholder bank can satisfy the claim of the “borrowers”, reducing the credit rate towards the money market rate	If the efficiency condition is fulfilled a stakeholder bank can satisfy the claim of the “depositors”, increasing the deposit rate towards the money market rate

Source: Own elaboration

As we can see in Table 2 the bank-orientation and the cost-revenue relationship play an important role in the credit and deposit market. Furthermore the cost-revenue relationship is directly influenced by the interest rate risk and for the deposit market also by the reserve coefficient. Both elements are subjected to the control of external authorities, i.e. the banking supervision authority and/or the central bank, which therefore indirectly affect the achievement of the efficiency condition.

In order to increase the social welfare for the considered stakeholders through a reduction of the interest margin, stakeholder banks have to reach an efficient cost structure, which subjects the effect of the social

<sup>15</sup> We assume a reserve coefficient  $\alpha < 1$ .

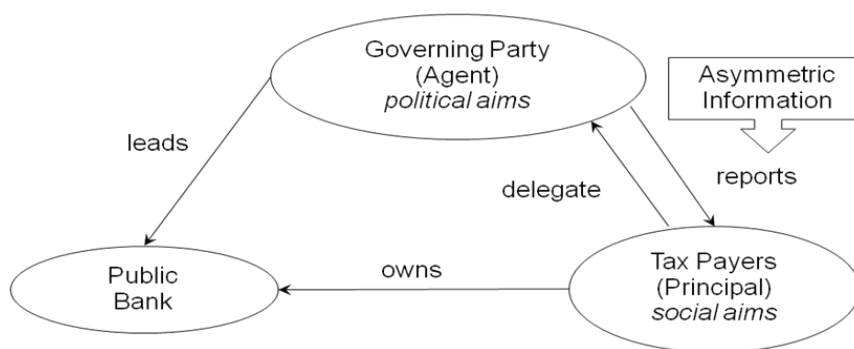
<sup>16</sup> On the other hand, a decrease of the reserve coefficient would imply an increase in the available funds for loans. As a consequence, the same operative costs could be covered by revenues originating from a larger amount of granted loans, decreasing the cost fraction per loan unit and enabling a reduction of the interest margin.

<sup>17</sup> The available funds are defined as the total assets net of the reserve coefficient.



component to an efficiency precondition. The role of an external control and the consideration of the efficiency condition provide a connection between our work and the literature on the different explanations of public ownership in banking, particularly to the recent contributions to the agency view (Andrianova *et al.*, 2010).

Figure 1. Agency problems by public savings banks<sup>18</sup>



Source: Own elaboration

According to the classical approach to the agency view and to Figure 1 public savings banks are subjected to increasing agency conflicts as a consequence of the separation between the ownership and the control of these banks and the double role covered by the governing party. Tax payers (Principal) own public saving banks and aim to the achievement of social objectives through the banking activity. Due to their dispersed ownership they delegate the control of the bank to the governing party (Agent), whose members usually follow political aims and have to report to the owners. Furthermore, the governing party also acts as principal with respect to the bank's management, whose objectives differ from those of the governing party as well as from those of the tax payers. As a result of this double separation public saving banks have two different agency conflicts: on the one hand the conflict between the management of the public bank and the governing party, on the other hand the conflict between the governing party and the tax payers. This fact leads to an increase in the asymmetric information, making the control of the bank more difficult, and decreases the internal efficiency and thereby the social welfare from the banking activity<sup>19</sup>. If the internal efficiency losses exceed the welfare gains from the achievement of social aims, the net welfare effect from the activity of public banks will be negative (Shleifer and Vishny, 1997). Based on the lessons from the recent financial crisis Andrianova *et al.* (2010) criticize this approach, stating that in the 21<sup>st</sup> century and in a context of weak corporate governance, opportunistic politicians can extract more private

<sup>18</sup> The agency view usually refers to public banks in general (Shleifer and Vishny, 1997). However, since we consider only savings banks and cooperative banks as stakeholder banks, we refer in the explanation of the agency view to public savings banks as members of the broader group of public-owned banks.

<sup>19</sup> “[...] *de facto* control rights belong to the bureaucrats. These bureaucrats can be thought of as having extremely concentrated control rights, but no significant cash flow rights because the cash flow ownership of state firms is effectively dispersed amongst the taxpayers of the country. Moreover, the bureaucrats typically have goals that are very different from social welfare, and are dictated by their political interests [...] State ownership is then an example of concentrated control with no cash flow rights and socially harmful objectives” (Shleifer and Vishny, 1997, p. 768).



rents using privately owned banks as a mechanism<sup>20</sup>. On the contrary, in a democracy with public sector accountability and strict control procedures the distortion of resources for own personal advantage would be more difficult to implement and the positive role of public banks would be granted (Andrianova *et al.*, 2010). Our finding of a direct connection between the institutional framework, the efficiency level and the welfare effect of stakeholder banks is in line with this approach to the agency view. Also according to the agency view, we subordinate a positive effect of the social component on the social welfare to an internal efficiency precondition, which guarantees that the reduction of the interest margin is possible only if the bank can produce a surplus from the investments on the money market<sup>21</sup>. Furthermore, in accordance with the agency view, we highlight the influence of an external and internal regulatory environment on the fulfillment of the social mission.

Combining the results of our model with the conclusions from the agency view, we can state that in order to avoid a misuse of stakeholder banks for distorting aims and to reach a positive effect from the social component in banking the following four aspects regarding the regulatory environment are fundamental<sup>22</sup>:

- a strict internal definition of the social mission must be included in the statute of the bank;
- the statute of the bank must define strict independence criteria for the management, which protect it from external distorting influence;
- within the bank's governance structure an internal supervisory board containing representatives of the stakeholders must be created;
- an external supervising authority must pursue a constant control of the bank's risk exposition.

The first aspect refers to the need of a concretization of the social mission in the bank's statute through the determination of the considered stakeholders, of their claims and of the instruments adopted to fulfill them<sup>23</sup>. In our model and depending on the bank orientation this would correspond to the commitment for the bank to satisfy the claim of the borrowers/customers for mostly favorable deposits/credit rate conditions, which should be achieved through a reduction of the interest margin if the efficiency condition is satisfied. A concrete definition of the social aims as well as of the necessary preconditions for their fulfillment would enable a neutral external evaluation of the bank's performance and an increase in the transparency level. Furthermore, the definition of independence criteria in the statute should protect the management from political influences, which would distort their activity from the achievement of the social mission. The third aspect regards the control of the management activity through reporting to an internal supervisory board, which should include representatives of the different stakeholders affected by the social mission. The direct inclusion of the affected stakeholders in the monitoring of the management activity would enable a control of the congruity between the guidelines in the statute and their practical implementation by the management. Moreover, this control mechanism would also increase the transparency level and the

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<sup>20</sup> The developments in the American financial system represent an explanatory case of extracting private rents from private banks. In the last decades regulation was weakened and many private banks became public subsidies to overcome the financial crisis. At the same time the bank donations to political parties increased and many politicians became members of the boards of private banks, participating thereby to their increasing short term profits (Andrianova *et al.*, 2010).

<sup>21</sup> In other words, an increase of the social welfare through a reduction of the interest margin can take place only if the bank is able to extract a net positive rent from its investments on the money market, which is distributed to the stakeholder "Customers". On the contrary, in case of a negative net rent, losses have to be covered by an increasing margin, what takes to increasing intermediation costs and a decrease in the social welfare. Through this mechanism, a neutral evaluation of the bank's performance can take place and the transparency level of the activity of stakeholder banks is increased.

<sup>22</sup> Here we abstract from the specific stakeholders "Customers" considered in the model (and their claim to most low opportunity costs from the transaction with the bank) and derive general conclusions applicable to different claims and stakeholders.

<sup>23</sup> Also Yeyati *et al.* (2004) underline the importance of the definition of the bank's objective and mission for the success of a state-owned bank.

asymmetric information arisen from the principal-agent conflict could be reduced<sup>24</sup>. In our theoretical model this aspect would imply a reporting activity to representatives of the borrowers/customers about the determination of the interest margin and the explanation of its changes connected to the fulfillment of the efficiency condition. The last aspect considers the control for the risk exposition of the bank, which is represented in the model by the credit and the interest risk components and directly influences the efficiency condition<sup>25</sup>. Since an effective control requires specific skills and a reliable and long-term collection of hard data, the permanent monitoring of the risk measures should be pursued by an external supervising authority.

In conclusion, thanks to these control mechanisms a distorting use of the bank resources could be limited and thereby a more efficient activity of the public bank would be granted. On the contrary, the lack of one of the four aspects would favor a misuse of the bank for purposes different from the stakeholder claims, distorting its resources from the original aims. As a result, a suboptimal contribution to the social welfare from the intervention of the stakeholder bank would be reached<sup>26</sup>.

## 5. Conclusions

In this work we present a theoretical model for the study of the influence of the bank orientation on the classical banking business, adopting the interest margin as instrument. Extending the basic bank model of Gambacorta (2004) and considering the contributions of Barros and Modesto (1999) and Smith *et al.* (1981) we develop a one-period decision model for banks based on the utility approach, which is able to differentiate between shareholder and stakeholder banks.

To our knowledge this is the first theoretical model that analyzes the relationship between the social mission and the bank pricing strategy, focusing on the conditions under which a stakeholder-orientation produces an increase in the social welfare. The results highlight the fundamental role of a strict and prudential regulation of the social mission as well as of the existence of internal and external control mechanisms, in order to avoid a misuse of stakeholder banks for distorting aims. We therefore refer to the literature on the agency view, particularly to its recent developments considering the lessons from the last financial crisis. The dramatic developments of the last years showed that an extreme profit orientation within the banking system can lead to the formation of massive agency conflicts by private banks and thereby endanger the stability of the entire financial system, producing giant social costs for bank rescues (Andrianova *et al.*, 2010). The negative externalities deriving from an excessive profit orientation can be compensated by a stakeholder-orientation, which through a long-term multistage target system can help to increase the systems' stability. Moreover, the consideration of the stakeholders' claims can reduce the intermediation costs of the banking activity, positively contributing to a reduction of the market failures

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<sup>24</sup> Also within the agency view a clear accounting and a constant evaluation of the mission fulfillment are defined as important preconditions for a reduction of the principal-agent conflicts and thereby for a successful intervention of state-owned banks (Yeyati *et al.*, 2004; Andrianova *et al.*, 2010).

<sup>25</sup> An excessive increase in the risk exposition would hamper the fulfillment of the efficiency condition. Furthermore, it could also endanger the stability of the financial system (Andrianova *et al.*, 2010). For this reason, their measurement should be subjected to an external supervision.

<sup>26</sup> In our model, the fulfillment of these aspects would favour the achievement of a sufficient efficiency grade of the bank and the reduction of the opportunity costs would be facilitated. On the contrary, the failing of one of these aspects would reduce the bank's transparency, favoring an increase in the cost components and taking to suboptimal level of the interest margin.

and therefore to an increase in the social welfare (Stiglitz *et al.*, 1993).

In order to empirically prove the validity of the results, we will pursue an empirical study of the interest margin within the German and the Italian banking markets. The particular developments of both banking markets during the last decades offer us a useful sample for the analysis of the influence of banking regulation on the functioning of the social component.

## Appendix 1

We present an adapted version of the basic bank model by Gambacorta (2004). We consider ourselves to be in a one period model of a risk neutral bank, which is part of an oligopolistic market. Its balance sheet is defined by:

$$L + S = D + K \quad \text{with } S = \alpha D \text{ and } K = \bar{K} \quad (\text{A1.1})$$

where L = loans, S = risk free securities, D = Deposits, K = equity (exogenous and bigger than the regulatory capital)<sup>27</sup>,  $\alpha$  = reserve requirements / risk-free investments.

The loan demand depends negatively on the interest rate on loans ( $r_l$ ) and positively on the permanent income ( $y^p$ ), the price level (p) and the money market rate ( $r_m$ ).

$$L^d = l_0 r_l + l_1 y^p + l_2 p + l_3 r_m \quad \text{with } l_0 < 0, l_1 > 0, l_2 > 0, l_3 > 0 \quad (\text{A1.2})$$

The deposit demand depends positively on the interest rate on deposits ( $r_d$ ), the permanent income ( $y^p$ ) and the price level (p). It depends negatively on the money market rate ( $r_m$ ).

$$D^d = d_0 r_d + d_1 y^p + d_2 p + d_3 r_m \quad \text{with } d_0 > 0, d_1 > 0, d_2 > 0, d_3 < 0 \quad (\text{A1.3})$$

In addition to the quantities granted/collected other risk and costs factors affect bank profits. With respect to the interest risk we consider an adapted concept of the modified duration, which measures the balance sheet sensitivity to changes in the money market rate.

$$TT = \delta_{t-1} \Delta r_m (L + S) \text{ where } \delta = \frac{\sum_{t_{CF} > 0}^{t_{CF}} \left( \sum_{A_i} CF(A_i, 0 \rightarrow t_{CF}) - \sum_{Liab_i} CF(Liab_i, 0 \rightarrow t_{CF}) \right)}{\sum_t A_i (1 + r_m(t_{CF}))^{(t_{CF}+1)}} \quad (\text{A1.4})$$

$\delta_{t-1}$  is the loss pro unit of assets in the event of a 1% increase in the money market rate on the basis of the modified duration (derived from the maturity composition of the balance sheet),  $A_i$  is the asset i,  $Liab_i$  represents the liability i, CF are the cash-flows and  $t_{CF}$  the considered time span.

The production costs are different for the credit and deposit market and are described as a linear

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<sup>27</sup> The exogeneity of the equity partly contradicts the current equity definition. If we consider the difference between the regulatory and the effective equity, we can assume that a bank usually holds more equity than required by the current regulation in order to avoid possible reputation costs and to be able to profit from future investment chances. The “voluntary” part of the equity reduces its dependency from the sum of risk-weighted assets, so that the assumption of an exogenous equity can be classified as realistic (Dewatripont and Tirole, 1994; Van den Heuvel, 2001).

function of the quantity produced.

$$C = c_1L + c_2D \quad \text{with } c_1 > 0, c_2 > 0 \tag{A1.5}$$

As the last component we add credit risk, modeled as the percentage of loans, which is written off ( $w$ ).

$$(r_l - w)L \quad \text{with } w \geq 0 \tag{A1.6}$$

Summing up equations (A1.1) to (A1.6) we obtain bank profits as a function of the sold quantities, the refinancing and operative costs and the interest rate and credit risk.

$$\Pi = (r_l - w)L + r_m S - r_d D - TT - C \tag{A1.7}$$

## Appendix 2

Substituting (4) and (5) into (6) and (2) and (6) into (7) we obtain the following utility function:

$$\begin{aligned} \text{Max}_{r_l, r_d} U = \text{Max}_{r_l, r_d} & \left\{ (r_l - w)(l_0 r_l + l_1 y^p + l_2 p + l_3 r_m) + r_m \alpha (d_0 r_d + d_1 y^p + d_2 p + d_3 r_m) - (r_d d_0 r_d + d_1 y^p + d_2 p + d_3 r_m) + \right. \\ & - \delta_{i-1} \Delta r_m [l_0 r_l + l_1 y^p + l_2 p + l_3 r_m + \alpha (d_0 r_d + d_1 y^p + d_2 p + d_3 r_m)] - (c_1 l_0 r_l + l_1 y^p + l_2 p + l_3 r_m) + \\ & \left. - c_2 (d_0 r_d + d_1 y^p + d_2 p + d_3 r_m) - \theta_l (r_l - r_m)(l_0 r_l + l_1 y^p + l_2 p + l_3 r_m) - \theta_d (r_m - r_d)(d_0 r_d + d_1 y^p + d_2 p + d_3 r_m) \right\} \end{aligned} \tag{A2.1}$$

The first order conditions for the credit and deposit rate are:

$$\begin{cases} \frac{\partial U}{\partial r_l} = 0 \Rightarrow 2l_0 r_l + l_1 y^p + l_2 p + l_3 r_m - l_0 w - l_0 \delta_{i-1} \Delta r_m - l_0 c_1 - \theta_l (2l_0 r_l + l_1 y^p + l_2 p + l_3 r_m - l_0 r_m) = 0 \\ \frac{\partial U}{\partial r_d} = 0 \Rightarrow d_0 \alpha r_m - (2d_0 r_d + d_1 y^p + d_2 p + d_3 r_m) - d_0 \alpha \delta_{i-1} \Delta r_m - c_2 d_0 + \theta_d (2d_0 r_d + d_1 y^p + d_2 p + d_3 r_m - d_0 r_m) = 0 \end{cases} \tag{A2.2}$$

In order to control for the second order conditions we calculate the Hessian matrix:

$$H = \begin{bmatrix} \frac{\partial^2 U}{\partial r_l^2} & \frac{\partial^2 U}{\partial r_l \partial r_d} \\ \frac{\partial^2 U}{\partial r_l \partial r_d} & \frac{\partial^2 U}{\partial r_d^2} \end{bmatrix} = \begin{bmatrix} 2l_0(1-\theta_l) & 0 \\ 0 & 2d_0(\theta_d-1) \end{bmatrix} \tag{A2.3}$$

From the equations (A1.2) and (A1.3) we know that  $l_0 < 0$  and  $d_0 > 0$ , so that we can define the sign of its principal minors:

$$\begin{aligned} |H_1| &= 2l_0(1-\theta_l) < 0 \quad \text{if } \theta_l < 1 \\ |H_2| &= [2l_0(1-\theta_l)][2d_0(\theta_d-1)] > 0 \quad \text{if } \theta_l, \theta_d < 1 \end{aligned} \tag{A2.4}$$

Since the Hessian matrix is negatively defined, we can state that the solutions derived in (A2.2) represent a local maximum of the utility function.

Rearranging (A2.2) we obtain the optimal credit ( $r_l$ ) and deposit rate ( $r_d$ ):

$$\begin{cases} r_l^* = -\frac{1}{2l_0}(l_1 y^p + l_2 p + l_3 r_m) + \frac{1}{2(1-\theta_l)}(w + \delta_{t-1} \Delta r_m + c_1) - \frac{\theta_l}{2(1-\theta_l)} r_m \\ r_d^* = -\frac{1}{2d_0}(d_1 y^p + d_2 p + d_3 r_m) - \frac{1}{2(1-\theta_d)}(\delta_{t-1} \alpha \Delta r_m + c_2) - \frac{\alpha - \theta_d}{2(1-\theta_d)} r_m \end{cases} \quad (\text{A2.5})$$

We meet following assumptions about the deposit demand:

- the reactivity to the deposit/money market rate is symmetric to the reactivity of the credit demand to the credit/money market rate ( $d_0 = -l_0$ ;  $d_3 = -l_3$ );
- the reactivity to changes in the permanent income and in the price level is equal to the reactivity of the credit demand to the same factors ( $d_1 = l_1$ ;  $d_2 = l_2$ ).

The optimal interest margin is then calculated as the difference between the optimal credit and deposit rate.

$$\begin{cases} IM^* = r_l^* - r_d^* \\ d_0 = -l_0 \\ d_3 = -l_3 \\ d_1 = l_1 \\ d_2 = l_2 \end{cases} \Rightarrow IM^* = -\frac{1}{l_0}(l_1 y^p + l_2 p) + \frac{1}{2(1-\theta_l)} w + \frac{1}{2} \left( \frac{1 + \alpha - \theta_d - \alpha \theta_l}{(1-\theta_d)(1-\theta_l)} \right) \delta_{t-1} \Delta r_m + \frac{1}{2} \left( \frac{1}{(1-\theta_l)} c_1 + \frac{1}{(1-\theta_d)} c_2 \right) + \frac{1}{2} \left( -\frac{\theta_l}{(1-\theta_l)} + \frac{\alpha - \theta_d}{(1-\theta_d)} \right) r_m \quad (\text{A2.6})$$

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