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AN ANALYSIS OF THE EFFECTS OF THE SEVERANCE PAY REFORM ON CREDIT TO ITALIAN SMES

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An analysis of the effects of the severance pay reform on credit to Italian SMEs*

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Abstract

In this paper we study the effects of the reform of the system of severance pay (TFR) currently in use for Italian employees on the cost and the access to credit for Italian small and medium-size enterprises (SMEs). The most direct consequence of the reform will be to reduce the amount of liquid assets available to Italian firms. We argue that this reform, which will produce its first effects in July 2007, will reduce the aggregate investment by SMEs in a more than proportional way in a long run, since it will restrict the access to credit for some of them (Holmstrom and Tirole, 1997). However, we also predict that the reform will not increase the cost of intermediated finance in the long run, coeteris paribus. Nonetheless, in the short-term, if the level of investment by firms can be considered as exogenous, the reform is likely to increase the cost of bank credit for SMEs. In order to perform quantitative estimates of the effect of the reform, we also estimate the future outflows of TFR from the balance sheet of the firms from data covering the whole population of Italian firms.

Keywords: severance indemnities; moral hazard; credit constraints.

1 Introduction

Berger and Udell (1998) observe that small, private businesses are "acutely informationally opaque" and this is a major impediment for them to access the public capital markets. They are then forced to rely only on intermediated finance, because intermediaries have two advantages on investors directly lending through the debt markets: they can offer SMEs complex contracts that reduce the acute adverse selection problem, and they can monitor their activity reducing then the moral hazard problem. For example, Bester (1985) shows that

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lenders can offer different loan contracts with collateral requirements in order to screen the borrowers of best quality.

In this paper we want to assess how a reduction in the liquid assets of firms, and in particular the quota of liabilities that firms nowadays hold in the form of severance pay for the employees, will affect the access and the cost of credit for Italian SMEs. Our final objective is to quantify the effects of a recent reform in the Italian system of severance indemnity. The reform approved by the Italian government in the Financial Budget Law for 2007 will allow employees to choose, with their choice taking effect from the first of July 2007, whether they want the future flows of their severance indemnity ("Trattamento di Fine Rapporto", TFR in the following) to be invested in pension funds, instead of being kept in the firm, as it is currently done, where it receives a rate of return regulated by law[1]. The purpose of the reform is to help the expansion of Italian pension funds, and to stimulate workers to create an additional source of revenue for their retirement age through higher expected returns. From the point of view of the firm, up to now the TFR was a liability towards its employees which provided a cheap source of financing (the rate of return paid on the TFR was lower than the risk-free rate of Treasury bond in most of the past years, at least before the introduction of the Euro). Depending on the amount of workers who will decide to invest their future flows of severance pay in the pension funds, the firm will lose part of this liquid liability.

To study the effects of this reform on Italian SMEs, we start by observing that their debt capacity seems to be positively correlated with the dimension of the assets they can pledge as collateral. Guiso (2003) provides strong evidence that size is a major determinant of the probability of success in obtaining as much bank finance as needed: firms with less than 30-40 employees are two times less likely to have financial debt than bigger firms, and this probability is strongly and positively correlated with the quota of tangible assets over total assets. From these observations, he concludes then that "firms' ability to pledge collateral strengthens their capacity to borrow, in particular when bank-firm relationships are not yet well established"[2]. Similarly, Sapienza (1997) is able to disentangle the determinants of the demand and the supply of credit: she reports that loans supply is significantly correlated with assets tangibility, corroborating the assumption that debt capacity is linked to the ability of the firm to pledge collateral.

In our opinion, these studies justify the use of the model of credit rationing proposed by Holmstrom and Tirole (1997), (HT in the following), to study the

[1] The TFR is capitalized annually at a rate equal to 1.5% plus $\frac{3}{4}$ of the inflation rate measured in the last year by ISTAT. Every year, the employer must set aside in the TFR of each employee a quota approximately equal to one month of the annual gross remuneration earned that year by the employee (more precisely, the quota is 1/13,5 of the gross annual salary, that is 7.41%). Actually, only 6.91% is accumulated each year, as 0.5% is paid to INPS.
As far as the reform is concerned, the law distinguishes between firms with less than 50 employees, and those with 50 employees or more: for those who work in the first category of firms, if they choose not to invest their TFR indemnities in pension funds, these will remain in the firm; for those who work in bigger firms, the same choice will imply that the TFR indemnities are automatically deposited with the INPS, the national institute for social security payments.

[2] Other variables which are strongly significant in Guiso (2003) are the return on assets (which is lower when financial debt is high, since outside capital is more expensive), ownership concentration, the status of listed company and the investment in R&D.

impact of the reform of severance payments on SMEs[3].

Since it is well documented that Italian SMEs have almost no access to public debt, we use a modified version of HT assuming that the supply of capital to firms is due only to financial intermediaries (in particular banks) who typically perform an activity of costly monitoring of firms' decisions. We show that in the long run the lower amount of liquid assets available to each firm makes the credit constraints for the smaller firms more severe, reducing their total investment; in turn, this decreases their demand of external finance, and the interest rate. The main intuition of the result is that since debt capacity is increasing in the amount of liquid assets invested by the firm itself, reducing the latter also reduces the former, so that SMEs will be able to make less investments on aggregate. However, if we consider the level of investment as exogenous to the financial structure of the firm (which is probably the case in the very short-term), a decrease in the liquid assets increases the demand of external capital, as well as the interest rate (depending on the elasticity of the banks supply of capital). Our theoretical framework allows us to quantify the reduction in investment SMEs will suffer as a function of the predicted outflow of severance indemnity (which for the purposes of the present article is considered as an exogenous variable). We predict that in the long run (when the level of investment can be considered as endogenous) the flow of new investments will decrease by more than proportionally to the TFR outflow.

In order to show a quantitative estimate of these effects, we collect from Bank of Italy data about the total credit granted, divided by class of the total amount of credit each client has received. Assuming that most of the SMEs receive a total annual credit which is inferior than 125,000 euros, we obtain an upper bound of their total bank borrowing. Using then data from Guiso (2003) to obtain the aggregate average leverage of SMEs towards financial institutions[4], we can predict that the decrease of SMEs investment due to the reform will be 130-147% of the outflow of TFR in the long run. Our model with endogenous level of investment also forecasts that at equilibrium the loan rate will decrease in the long run, in an amount inversely proportional to the elasticity of the supply of bank capital. As a robustness check, we finally consider the case in which banks can optimally choose their monitoring level, and we conclude that with this extension both the effects produced in the long run on the investment level and the interest rate are exacerbated[5].

[3] According to HT, credit constraints should be binding for firms with low level of liquid assets and assets that can be pledged as collateral. Indeed, Angelini and Generale (2005) find that financial constraints hit more severely younger and smaller firms.

[4] We have elaborated our independent estimate of this parameter from the database AIDA, which collects company accounting data and economic results for about 550,000 limited companies in Italy: our estimate are slightly higher than the ones in Guiso (2003), but due to the presence of many outliers in this database we prefer to refer to Guiso (2003) at this stage of the research.

[5] In our analysis, we kept constant both the structure of the banking industry, the regulatory environment of banks, and the characteristics of the relation between the single SME and the banks, which is quite peculiar in Italy (Detragiache et al. (1999) multiple banks relations). The first two elements are actually changing right at this moment, either due to the opening of the Italian banking system to foreign banks, or due to the introduction of the Basel II regulation framework. However, a full understanding of these changes would require a much more general analysis, in which it would probably be difficult to disentangle the effects of the reform of severance payments which are the object of our study.

However, following the logic behind Rajan (1992) and Petersen and Rajan (1995), one can predict that Italian SMEs are likely to reduce the number of bank relations they are currently

In the second part of the paper, we quantify the effects of the reform on loan rates and firms investments (particularly focusing on SMEs). To do this, we need information on two variables considered as exogenous in our theoretical analysis: first, the predicted outflow of TFR and, secondly, the elasticity of loans supply.

From Istat data showing the distribution of earnings across firms' size (defined by the number of employees) and sectors for the whole population of Italian firms in 2004 we recover the annual flow of TFR in 2004. With some simplified hypotheses on the macroeconomic development of employment and wages, we then project TFR flows for the period 2008-2010 and assess the magnitude of TFR funds that firms would lose as a result of the reform.

As this paper focuses on the loss of TFR funds experienced by firms, we consider not only funds paid by workers to pension funds but also those paid to INPS by larger firms. However, in the present paper our objective is not to predict how employees will react to the reform, that is how much of the future annual flow of TFR they will invest in pension funds, so we will propose different scenarios based on surveys conducted in 2005 among samples of workers (see Pammolli and Salerno (2006) and ISAE (2005) surveys).

The paper is organized as follows. Section 2 presents the basic theoretical framework for the analysis, which is a simplified version of HT (1997), while section 3 describes the effects of the policy change predicted by the model. Section 4 describes the data and our estimates for the future outflows of TFR, together with a quantitative assessment of the main effects of the reform on the future investment and the loan rate. Section 5 concludes.

2 The basic model

As theoretical framework for the analysis of the effects of the reform we use a simplified version of the model in Holmstrom and Tirole (1997). In our version of the model there are two sets of agents: (small) firms and financial intermediaries[6] and two periods: in the first period a financial contract between each single firm and a competitive intermediary (a bank in the following) is signed, and firms invest; in the second period the returns of investment are realized and are distributed. Each firm has an initial amount of capital A_0, representing the market value of all assets that can be pledged as a collateral to the financing contract (a loan in the following). The distribution of assets across firms is described by the c.d.f. $F(A)$, and the aggregate amount of firm capital is denoted by $K_f = \int A dF(A)$. All banks are identical in any relevant respect for the analysis.

Each firm is endowed with the same set of investment projects[7]: a good project G and a bad project W. The firm can undertake any of them paying

keeping. Indeed, Petersen and Rajan (1995) show that when the ex-post rents for the financiers are higher, these have more incentives to grant credit in the first place, alleviating the credit constraints of the most opaque firms. Firms with sudden reduction of assets could well accept to pay higher rents in the future in exchange for credit today, and they can (costly) commit to leave higher rents to the financing bank restricting themselves to a unique relation with this bank.

[6] Contrarily to HT, we exclude investors from the analysis since Italian SMEs have very restricted access to public external finance (see Guiso (2003)).

[7] The returns of all projects (both good and bad) are then perfectly correlated.

an initial amount $I > A_0$, which represents the scale of the project. In the following, we study both cases with the level of investment I as fixed (that can be interpreted as a short-run case) and with variable (and endogenous) I, which is the more realistic assumption in the medium and long run.

The firm with own capital A_0 needs then to borrow (at least) $I - A_0$ from the bank in order to undertake the investment at level I. Investing I in the good project generates at $t = 2$ a verifiable return, equal either to 0 (with probability $1 - p_H$) or to $R(I)$ (with probability p_H), while the investment I in the bad project pays 0 with probability $1 - p_L$ and $R(I)$[8] with probability p_L, with $p_L < p_H$.

In each firm a risk-neutral entrepreneur selects his preferred project. Moral hazard between the entrepreneur and the investor is formalized as in HT: for any unit of investment in the bad project, the entrepreneur enjoys private benefits B. The choice of the good project by the entrepreneur reduces his private benefits to zero.

The rate of return on bank loans is denoted by β. On the public capital markets investors and banks can earn a rate of return exogenously fixed and normalized to one: hence $\beta \geq 1$ in order to make economically profitable for the bank to invest in the SMEs' projects. All individuals are risk-neutral, and due to portfolio optimization, the aggregate supply of credit to SMEs is (weakly) increasing with β: the higher β, the more restricted is the set of alternative projects which provide at least the same expected return as the ones undertaken by SMEs. Thus, the higher β, the more capital banks will be willing to invest in SMEs' projects[9].

Following the logic of HT, only the good project dominates the investment in the public capital market[10] while the bad project has a negative NPV:

$$p_H R(I) - I > 0 > p_L R(I) + BI - I \tag{1}$$

Given (1), a necessary condition for the firm getting external finance is that the entrepreneur chooses the good project:

$$p_H R^f(I) \geq p_L R^f(I) + BI \tag{2}$$

where $R^f(I)$[11] is the share of the project returns paid to the firm. Under (2) each SME chooses the amount of assets $A \leq A_0$ to invest, knowing that the expected return for the bank is bounded by the quota of the proceeds that is paid to the firm R^f, in order to let her choose project G. Furthermore we assume, as in HT, that the total return of the project in case of success is linear in the initial investment, $R(I) = RI$, so that the decision problem of the firm

[8] Of course, if I is exogenously fixed, $R(I) = R$, a positive constant.

[9] As in HT, we exclude from the analysis any issue concerning the specificity of competition among banks (see for example Broecker (1990)) assuming that banks simply compete "*à la*" Bertrand, earning then the same rate of return on their loans.

[10] In the following, for simplicity, we describe the model assuming I as a decision variable. Discussing the short-term effects of the reform, we will reconsider the results assuming I as fixed.

[11] From now on, for easiness of notation, we will drop the functional form $R^f(I)$ to just R^f.

reads:

$$\begin{aligned} & & \max_{A} U(A_0) = p_H R^f + (A_0 - A) \\ s.t. \quad & A & \leq & A_0 \\ & A + I^b & \geq & I \\ & p_H \left(RI - R^f \right) & \geq & \beta I^b \\ & p_H R^f & \geq & p_L R^f + BI \end{aligned}$$

where I^b is the investment financed by the bank, and the third constraint is the participation constraint for the bank. The participation constraint of the bank can also be expressed as $p_H R^b \geq \beta I^b$.

Simply substituting for $R^f = \frac{B}{\Delta p} I$ in the objective function it is immediate to realize that $U(A_0)$ is linear and increasing in the total investment I[12], so that $A = A_0$; moreover, being $\beta \geq 1$, $I^b = I - A_0$[13]. The pledgeable expected income, that is the maximum income that can be promised to the bank such that (2) is satisfied is equal to $p_H \left(R - \frac{B}{\Delta p} \right) I$: in the following we denote the expected payoff for the bank as $E(R^b)I = p_H \left(R - \frac{B}{\Delta p} \right) I$. The initial investment by the bank is $I^b = I - A_0$. Competition among banks ensures that at equilibrium the participation constraint is binding: $I^b = \frac{p_H \left(R - \frac{B}{\Delta p} \right) I}{\beta} = \frac{E(R^b)I}{\beta}$: when the opportunity cost of capital is equal to β, our representative bank invests up to I^b.

Finally, we obtain the highest level of investment I a firm with initial liquid assets equal to A_0 can undertake:

$$\begin{aligned} A_0 + \frac{p_H \left(R - \frac{B}{\Delta p} \right) I}{\beta} &= I \\ I &= \frac{A_0}{1 - \frac{p_H}{\beta} \left(R - \frac{B}{\Delta p} \right)} \end{aligned} \tag{3}$$

A form of "investment multiplier" of internal cash is at work here: each unit invested by the firm allows to attract more than one unit of external capital to invest in the good project. Indeed, A_0 increases the total investment I by $\frac{1}{1 - \frac{p_H}{\beta} \left(R - \frac{B}{\Delta p} \right)} > 1$ thus increasing the final expected payoff. This amount is split between R^f, that goes to the firm, and R^b, paid to the bank, in such a way that it is possible for the firm to attract more bank capital (at any given rate β).

Alternatively, one could argue that, at least in the very short run, I can be considered as exogenous, hence as fixed. Following the same logic as above, one can solve for the demand of capital, $I - A_0$ by a firm with initial assets A_0, which has undertaken an investment equal to I:

$$I - A_0 \leq \frac{p_H \left(R - \frac{B}{\Delta p} \right)}{\beta} \tag{4}$$

[12] Since $\beta \geq 1$ we are implicitly assuming that the total return on investment for the firm, $\frac{R^f + BI}{A_0}$ is not lower than the return on investment obtained by the intermediary.

[13] In other words, it is never optimal for the firm to borrow more than $I - A_0$ once she has decided to invest I.

that can be interpreted in the following way. Given the required return β, only firms with assets A_0 satisfying (4) have access to credit. Their demand is equal to $I - A_0$, thus independent of the rate β.

To find the equilibrium on the market for intermediated capital, we solve for the rate β^* that equalizes demand and supply of bank capital. In the case I is an endogenous variable, we assume that all firms are identical in their initial liquid holdings A_0, so that the demand of capital is obtained simply by aggregating the external investment of each firm $I - A_0$ (the integral represents the sum over the population of SMEs):

$$D(\beta) = \int (I - A_0)\, dA_0 = \frac{1}{A_1} \frac{p_H \left(R - \frac{B}{\Delta p}\right)}{\beta} \int A_0 dA_0 = \frac{K_f}{A_1} \frac{p_H \left(R - \frac{B}{\Delta p}\right)}{\beta} \tag{5}$$

while the supply of bank capital is exogenously given and equal to $K_b(\beta)$, where $K_b' = \frac{\partial K_b(\beta)}{\partial \beta} > 0$. The aggregate demand of intermediated capital is monotone decreasing in β[14].

Let $p_H \left(R - \frac{B}{\Delta p}\right) = E(R^b)$ be the expected payment the bank receives for each unit of total investment. The equilibrium on the (intermediated) capital market is:

$$\begin{aligned} \frac{K_f}{A_1} \frac{E(R^b)}{\beta} &= K^b(\beta) \\ K_f \frac{E(R^b)}{\beta} &= K_b(\beta) \left(1 - \frac{E(R^b)}{\beta}\right) \\ E(R^b)\left(K_f + K_b(\beta)\right) &= \beta K_b(\beta) \end{aligned} \tag{6}$$

The bank capital is rewarded at rate $\beta > 1$: this implies $E(R^b)\left(1 + \frac{K_f}{K_b(\beta)}\right) > 1$, that gives a condition on the pledgeable expected income per unit of investment[15] we assume verified.

The market clearing is obtained varying the return β or the aggregate supply of capital $K_b(\beta)$ alternatively, while K_f is fixed. One can interpret the equilibrium condition as follows: if β is "too" high, the supply of capital banks are willing to invest in SMEs is higher than the demand; reducing β increases the maximum investment I a firm with initial liquid assets A_0 can sustain, by (3); thus in turn increases the demand $D(\beta)$, and reduces the supply $K_b(\beta)$ until the equilibrium is reached. Notice finally that the aggregate level of investment, $K_f + K_b(\beta)$, depends only on the aggregate level of firm capital K_f, since $K_b(\beta)$ adjusts to guarantee the equilibrium on the market.

If we assume that I is fixed, then recall that the distribution of firms per value of assets is $F(A)$. From (4), denote with $\underline{A}(\beta)$ the marginal firm, that

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[14] Substituting $p_H \left(R - \frac{B}{\Delta p}\right) = E(R^b)$ we have: $\frac{\partial \left(\frac{K_f}{1 - \frac{E(R^b)}{\beta}} \frac{E(R^b)}{\beta}\right)}{\partial \beta} = \frac{E(R^b) K_f}{E(R^b) - \beta} \frac{1}{\beta - E(R^b)} < 0$ if $\beta < E(R^b)$; this is always true since $I^b < I$.

[15] $E(R^b)\left(1 + \frac{K_f}{K_b(\beta)}\right) > 1 \Rightarrow$
$E(R^b) > \frac{K_b(\beta)}{K_b(\beta) + K_f}$

is the firm with the minimum amount of assets such that (4) is satisfied with equality, for any given β. The aggregate demand of credit is then equal to

$$\int_{\underline{A}(\beta)} (I - A) dF(A)$$

which, at equilibrium, must equalize the (upward sloping) supply $K_b(\beta)$:

$$\int_{\underline{A}(\beta)} (I - A) dF(A) = K_b(\beta) \tag{7}$$

Notice that a higher rate β does not decrease the demand of capital by each individual firm (which is inelastically equal to $I - A_0$), but it increases the threshold $\underline{A}(\beta)$ under which firms with less liquid assets can obtain external credit, reducing then the aggregate demand of capital by firms.

3 The predictions on the effects of the reform

The reform approved by the Italian Parliament will allow each employee in the private sector to invest in Pension Funds (or in the public fund INPS, if the employee operates in a firm with 50 employees or more, see section 4 for more details) the future annual flow of severance indemnities the firm is nowadays managing as its own liabilities. Thus, each firm will suffer a reduction in the amount of liquid assets available for its investments. In terms of the model presented above, the most direct consequence of this reform is that, from the 1st of July 2007, A_0 will decline (with respect to the case of no reform).

3.1 Short term effects

In the very short term, it is realistic to assume that the amount of investment I is fixed. Since the reform was approved by the government at the end of 2006[16], and it will produce its first effects just after July 2007, we believe that this short-term should not be too extended in time, since firms already had several months to anticipate and react to the shock caused by the change in legislation.

Consider the pre-reform equilibrium as characterized in equation (7). Solving for β gives the pre-reform credit rate:

$$\beta = K_b^{-1}\left(\int_{\underline{A}(\beta)} (I - A) dF(A)\right) = K_b^{-1}\left(I - \int_{\underline{A}(\beta)} A dF(A)\right) = K_b^{-1}\left(I - E_F[A \,|A \geq \underline{A}(\beta)]\right) \tag{8}$$

where E_F is the (conditional) expected value of A under the pre-reform c.d.f. $F(A)$. Depending on workers' decision to transfer their annual flow of TFR to pension funds and on firm size, the distribution $F(A)$ moves to the left, to a post-reform distribution $F^{post}(\beta)$. Differentiating (8) w.r.to F one obtains:

$$d\beta = -\frac{1}{\frac{\partial K_b}{\partial K_f}} \frac{\partial E_F[A \,|A \geq \underline{A}(\beta)]}{\partial F} < 0 \tag{9}$$

[16] The discussion about this reform started several years ago, and it was even amended by the previous government, in a slightly different form, already in 2005.

Thus, since after the reform $F(A)$ moves to the left, both $E_F[A\,|A \geq \underline{A}(\beta)]$ and the rate of return on loans β increase. The intuition of this effect is the following: if I is a pre-defined variable for each firm, the reform will cause an increase in the demand of bank capital by SMEs. In turn, this causes an increase in the loan rate firms will pay conditioned on the fact that they are granted access to bank financing.

3.2 The medium and long term effects

In a longer period, it is reasonable to assume that firms decide the scale of the investment project (i.e. I variable): from (3) is clear that a reduction of one unit in A_0 decreases I by more than one unit[17]. As a consequence, less bank capital can be attracted due to the binding participation constraint of the bank: $I^b = \frac{p_H\left(R - \frac{B}{\Delta p}\right)I}{\beta}$. This in turn reduces the aggregate demand of intermediated capital. We can then predict the change in the equilibrium rate β[18] and the reduction in the aggregate volume of bank credit, $K_b(\beta)$, caused by a fall in the aggregate amount of liquid assets of firms K_f using the equilibrium condition (6) and equation (3):

$$\frac{d\beta}{dK_f} = \frac{E(R^b)}{K_b^* + (\beta^* - E(R^b))K_b'(\beta^*)} \geq 0 \tag{10}$$

$$\frac{dI}{dA_0} = \frac{1}{1 - \frac{E(R^b)}{\beta^*}} > 1 \tag{11}$$

The starred variables represent the pre-reform equilibrium, and the aggregate reduction in investment by SMEs is simply equal to $\frac{dI}{dA_0}dK_f$.

To estimate relations (10)-(11), notice that, according to the model, $\frac{E(R^b)}{\beta^*} = \frac{I^b}{I}$, while the elasticity of the supply of capital to SMEs $\frac{K_b'}{K_b^*/\beta^*}$ must be calibrated on real data.

The model predicts then that the reform will cause a fall of total investment by SMEs (more than proportional to the outflow of TFR), but it will not raise

[17] One of the tests checking whether firms are subjects to credit constraints analyzes whether the firm investment reacts to the retained earnings. A positive reaction (if one can exclude that high past retained earnings signal high marginal productivity of capital in the future) clearly indicates that firms are credit constrained. There is quite an extensive evidence (see for example Sembenelli et al., Guiso, and Bianco) that for Italian SMEs investment positively reacts to earnings, confirming the assumption that the investment scale I can be considered as variable.

[18] The version of HT with fixed investment scale provides more ambiguous predictions about the effect of a generalized collateral squeeze on the interest rates. Capital-poor firms will lose their financing, and this reduces the demand for intermediated capital. But other firms, with more capital, are now forced to get (more expensive) intermediated capital instead of uninformed capital. The distribution of firms $G(A)$ plays then a crucial role (see HT equation (6)).

Assuming, as we do here, that the supply of uninformed capital is perfectly elastic, however, allows to conclude that the interest rate β at equilibrium will increase. The reasoning behind this is that a decrease in the liquid asset of firms *increases* the demand of intermediated capital in such a model.

In the version with I endogenous, a decrease in the assets A reduces the investment more than proportionally, *reducing* as well the demand for intermediated capital: β must then decrease to push down $I_b(\beta)$ when the supply of bank capital is not perfectly elastic.

the interest rate on bank credit for SMEs in the long run, if they already had access to credit before[19].

3.3 A robustness check: the role of banks as monitors

We now check whether the role of banks as firms monitors (Diamond (1984)) may alter the predictions obtained before. For simplicity we consider monitoring as essential for receiving bank finance (because SMEs do not have access to uninformed finance in our model), but in their role of delegated monitors, banks also suffer of a moral hazard problem towards the depositors (Diamond (1984); Chiesa (2001)).

We restrict our analysis to an exclusive bank-firm relationship[20], and we consider I as endogenous. We first show that the monitoring intensity of banks increases with the ratio of own capital to the total invested capital[21]. To illustrate this point, let us write the profit function of a representative bank:

$$\Pi^{bank} = E\left[\max\{\widetilde{R}^b I - r_D D; 0\}\right] - \frac{cI}{2}m^2 \tag{12}$$

where

$$\widetilde{R}^b = \begin{cases} R - \frac{B}{\Delta p} & \text{with proba. } p_H(m) \\ 0 & \text{with proba. } 1 - p_H(m) \end{cases}$$

given that, to provide the entrepreneur with the right incentives, the maximum payoff obtained by the bank is $R - \frac{B}{\Delta p}$ for each unit invested. The probability of success of the good project is increasing in the level of monitoring effort by the bank. We denote with r_D the rate of return paid on deposits, and with D the amount of deposits raised by the bank. The cost of monitoring activity is linear in the dimension of the project (the investment I) and convex in the monitoring intensity m[22].

The rationale of this formalization is that by performing a high monitoring activity the bank can improve the expected cash flow of the project (increasing the probability of success).

[19] A questionable assumption in HT (hence in our simplified version of HT) is that the only problem SMEs actually suffer in reality is moral hazard towards the financiers. However, we assume that SMEs have projects that *are potentially* efficient, once the moral hazard is solved. The only way to solve this moral hazard problem is that the firm invests its own assets in the project (or through bank monitoring, see Section 2.3). In reality, it is plausible that some SMEs have investment opportunities *per se* inefficient. Whether they did not get credit because their investment opportunities were inefficient, or because they did not have enough assets to pledged the financiers, is a crucial problem in order to evaluate the effect of the reform on aggregate efficiency.

[20] We assume here that SMEs will not change the number of bank relationships following the reform. Hellwig (1991), Rajan (1992) and Petersen and Rajan (1995) show that a unique bank relationship helps the access to credit, but it can be more expensive in the long run (a "hold up" problem). However, Detragiache et al. (1997) find that Italian firms typically maintain multiple relations with banks: in principle, we cannot exclude then that, if the firms access to credit will decrease in the future, some of the smallest firms will react by restricting themselves to a unique relation with a bank.

[21] As in Chiesa (2001), Carletti (2004), Carletti et al. (2005), among others.

[22] We choose such a formalization for the costs of monitoring since without moral hazard between bank and depositors the optimal monitoring intensity would be independent of I.

Rewriting (12) gives

$$\begin{aligned}\Pi^{bank} &= p_H(m)\left(R^b I - (r_D - S)D\right) - \frac{cI}{2}m^2 \\ &= p_H(m)\left(R^b(A_0 + E + D) - (r_D - S)D\right) - \frac{cI}{2}m^2\end{aligned}$$

where $S = (1 - p_H(m))r_D$ represents the per-unit expected shortfall on the deposit contract, E is the bank own equity capital, and c is the unit monitoring cost for the bank. Solving for the optimal monitoring intensity gives:

$$\max_m \Pi^{bank} \tag{13}$$

$$m^* = \frac{\Delta p}{c}\left(R^b - r_D\frac{D}{I}\right) \tag{14}$$

which is decreasing in D/I because of the moral hazard towards depositors: since the deposit rate is set before monitoring is decided, the bank always has an incentive to increase her profit by increasing the expected shortfall, thus reducing monitoring *ex-post*. The higher the ratio of external capital, $\frac{D}{I}$, the lower the incentive to provide monitoring.

The next step verifies that the main predictions of section 2 hold also in this new setup. With I endogenous, a reduction in A_0 reduces the total investment by firms more than proportionally. Turning to the equilibrium condition (6), the lower monitoring activity affects the term $E(R^b(m))$ that is now equal to $p_H(m)R^b - \frac{c}{2}m^2$. This term is increasing in m since by f.o.c. of (13), $\Delta R^b - cm^* = -\frac{\partial S}{\partial m}D > 0$. Thus a reduction on m, caused by the lower A_0, reduces in turn $E(R^b(m))$ causing an even stronger decrease in $K_b(\beta)$ at equilibrium[23]. The effect described in the previous section is then exacerbated when banks can monitor the firms activity.

4 An estimate of the future capital outflows due to the reform

In order to make predictions on the change in the aggregate credit granted by banks and on the loan rate obtained by SMEs, we have to quantitatively determine two elements exogenous to our theoretical analysis. First, we have

[23] More formally, re-write the aggregated equilibrium condition:

$$\beta K_b(\beta) = E(R_b(m))(K_f + K_b)$$

and differentiate by dK_f. We obtain

$$\begin{aligned}\frac{d\beta}{dK_f}\left(K_b(\beta) + K_b'(\beta)\left(\beta - E(R^b(m))\right)\right) &= E(R^b(m)) + \frac{\partial E(R_b(m))}{\partial m}\frac{\partial m}{\partial K_f}(K_f + K_b) \\ \frac{d\beta}{dK_f} &= \frac{E(R^b(m)) + \frac{\partial E(R^b(m))}{\partial m}\frac{\partial m}{\partial K_f}(K_f + K_b)}{K_b(\beta) + K_b'(\beta)\left(\beta - E(R^b(m))\right)} \\ &> \frac{E(R^b(m))}{K_b(\beta) + K_b'(\beta)\left(\beta - E(R^b(m))\right)}\end{aligned}$$

for any given level of m, since monitor intensity m increases when total investment $K_f + K_b$ is higher (due to the fact that the ratio D/I reduces for higher I) and since $\frac{\partial E(R^b(m))}{\partial m} > 0$.

to predict the outflow of funds from SMEs to pension funds due to the reform. Second, we need to assess the reaction of the bank credit to SMEs following a collateral squeeze. Here we concentrate on the first aspect.

The TFR consists in a fraction[24] of gross earnings set aside by the employers and paid back to workers when their working relationship ends with their previous employer (for any reason, including retirement). The amount set aside every year sums up to the already existing stock which is revalued at a given rate[25].

The severance pay reform, firstly announced and approved in 2004 but modified afterwards within the Budget Law of 2007, does not involve the TFR stock already accumulated within the firms, but only its future flows. More precisely, according to the latest version of the reform just approved by the Parliament, from January 2007 on workers will have to decide whether to invest their current and future TFR flows in pension funds or not. In case they *do not want to join any pension fund*, their ex-TFR will either be accumulated to INPS (if they work in firms with 50+ employees, that is medium and large firms according to the European classification[26]), or it will remain at the firm's disposal (for SMEs with less than 50 employees). If they *do not make an explicit choice*, their ex-TFR flows will be automatically diverted into pre-specified pension funds, according to a mechanism where no choice is equivalent to a tacit consent to pension funds.

The aggregate flows accruing to firms each year are calculated as

$$inFlowTFR_{i,t} = 6,91\% \ * W_{tfr(i,t)}$$

where $W_{tfr(i,t)}$ is the aggregate gross wage received by employees.

We focus on the forecasts of the future yearly inflows to the TFR stock, which represent the (maximum) total amount of money the workers will be able to divert into pension funds due to the reform. In doing this, we assume that the reform is not affecting the labor market conditions, i.e. is not going to provoke a change in the structure of employment (between SMEs and big firms) nor is going to affect the duration of employment[27]. Also, we do not try to estimate the outflows of TFR due to workers leaving the labor market, or simply changing their employer, which in reality affect the availability of funds for each firm

[24] Every year, the employer must set aside in the TFR of each employee a quota equal to 1/13,5 of the gross annual salary, that is 7.41%. Out of the legal amount of 7,41%, 0,5% is directly paid by the firm to INPS, the public institute paying pensions, as a guarantee premium.

[25] The TFR stock at the end of each year is equal to:

$$TFR_{i,t} = (1 + r_t)(TFR_{i,t-1} - TFRLIQ_{i,t}) + flowTFR_{i,t}$$

where $TFRLIQ_{i,t}$ is the amount of TFR liquidated in year t due to the exit of the employee from the firm, and r_t is the rate at which TFR is capitalized annually, that is 1.5% plus 3/4 of the inflation rate measured in the last year by ISTAT.

[26] The European Commission defined a classification of SMEs based on number of employees and turnover. Micro-enterprises include those that employ fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed € 2 million. A small enterprise is defined as an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed € 10 million. A medium firm employs fewer than 250 persons and has an annual turnover not exceeding € 50 million, and/or an annual balance sheet total not exceeding € 43 million (EC, 2003).

[27] However, Garibaldi and Pacelli (2004) argue that larger severance payments increase individual job duration. They observe an increase in the probability of separation for workers who withdraw part of their accumulated stock of unpaid wages, at any given tenure.

(Fugazza and Teppa, 2005). Our approach to the labor market conditions is admittedly strong, since it reduces to an estimate of future inflows to the TFR based only on the total employment level and the average remuneration.

To assess the magnitude of TFR flows (*accantonamento*) and perform forecasts, we have used data about the number of employees and gross earnings in the whole of Italian firms from Istat (2006). This dataset contains information on main balance sheet entries for Italian firms in 2004, disaggregated by economic activity and firm size, measured by the number of employees. At this point two remarks need to be made. First, since the 2004-2007 reforms involve the private sector only, we have excluded from the analysis the public administration. Second, by employees we will mean throughout the simulations *dependent* employees, as they are the only ones entitled to TFR, excluding independent workers and the so-called 'atypical' contracts for which no TFR is accumulated.
Table 1 shows TFR inflows as they were in 2004. The vast majority of Italian firms (94,9%) is concentrated in the 1-9 dimensional class, occupying about one quarter of total employees. Earnings are increasing with firms' size and total TFR inflow amounts to about 15 bl euro, with 44% in the 1-50 class.
In order to obtain the aggregate gross wages in the reform years we have assumed a constant growth – the same across sectors and size – of employment and earnings of 3.9% jointly, in line with the 2000-2003 experience (Istat, 2005; Istat, 2006a). However, a sensitivity analysis has been performed by adopting a 2.5% and a 5.5% growth rates as well.

Assuming that the participation to the reform is the same across firms' size, we calculate the total TFR flows in absence of reforms and the TFR capital which will be invested into pension funds or collected by INPS, or remain with the firms.

In Table 2 we show the destination of total TFR flows under various hypotheses about workers' response to the reform and macroeconomic scenarios. In particular, the 'reform participation' hypothesis includes both the explicit and implicit ("tacit consent") choice in favour of pension funds[28]. Given a constant distribution of firms and employees within size groups, there is a slightly higher share of TFR going to INPS (about 55.5%) rather than to firms (about 44.5%), for any participation and macroeconomic scenario. Of course, for higher rates of growth of employment and wages, TFR flows are higher.

It should be noted that the assumption of constant participation of workers to pension funds regardless of firm size might not be fulfilled. Participation may be lower in smaller firms (*per se*) because employers could exert higher pressure on the workers in these firms against a withdrawal of TFR, and (possibly) because of weaker links with large sectorial occupational funds. On the other hand, the implicit "choice" given to workers of medium-large firms between pension funds and INPS might result in opposite behavioral responses. Participation to supplementary funds may be relatively higher in big firms in case workers consider the transfer of their TFR to INPS an option more subject to political control, even though they will receive it back at the end of their

[28] The reform does not state what should be the destination of the funds accumulated during the six months when workers can make a decision about their TFR. We have assumed that starting from January 1st 2007 the funds will be divided among INPS, pension funds and firms according to the decisions taken as of June 1st, as if funds were allocated at the beginning of the year.

career in any case. On the contrary, participation to pension funds may turn out to be relatively low if workers decide not to join pension funds for one year and then see how the legislative framework evolves, since the norm diverting funds to INPS is due to be checked in 2008.
However, as our projections only want to point out lower and upper bounds of the phenomenon, we keep the participation rate constant across categories.

Anyway, should the participation to pension funds turn out to be very high, the funds remaining to firms and those paid to INPS will result rather low. In this case, the 2006 additions to the reform diverting part of the funds to INPS would result rather ineffective.

Table 3 shows the amount of TFR 'leaving' the firms under the 3.9% growth scenario, irrespective of its destination (INPS or pension funds). This is substantially higher for medium and large firms (above 50 employees) with respect to smaller ones, due to the mechanism maintaining ex-TFR funds not directed at supplementary pension funds at the firms' disposal only for enterprises employing less than 50 workers. However, among firms with less than 50 employees the aggregate loss is higher for micro enterprises (less than 10 employees) with respect to the 10-49 category, due to the huge number of very small firms.

4.1 An assessment of the main quantitative effects of the reform on loan rates and firms investment

We derive here some indications on how the outflows of TFR are likely to impact the loan rate paid by firms and how the reduced access to credit impact their investments.

The main theoretical predictions of the model are contained in equations (10) and (11): in this section we estimate the necessary parameters on current data. A very important caveat has to be made for a correct interpretation of our predictions. The theoretical model we present is based on the assumption that firms which do not have enough liquid capital cannot attract external finance, hence they simply can not invest. In order to verify this assumption, and calibrate the parameters on real data, we would need to verify whether, in the past, small firms with less liquidity were refused the access to credit. In other words, we need to observe how the credit policy of banks reacted to a negative shock on (liquid) assets of small Italian firms. Unfortunately, up to now we could not obtain credit lending data sufficiently detailed to make such an estimate. We then leave this estimate to further research, and for the moment we simply verify which predictions we can make based on (10) and (11).

The bank's (binding) individual rationality constraint reads as: $I^b = \frac{E(R^b)I}{\beta}$, that is $E(R^b) = \frac{\beta I^b}{I}$. We measure $\frac{I^b}{I}$ with the ratio between financial debt over total capital observed on the capital structure of firms. The reason for our choice is that if we assume that the optimal capital structure is quite stable in time, the ratio we observe should correspond to the optimal ratio between the flow of external finance and the total capital flow. Guiso (2003) measures this ratio for Italian manufacturing firms from a survey of over 4.000 firms (mostly small and medium-sized) conducted in 1999 by Mediocredito Centrale, obtaining a median value of 23,1% and an average value of 32,2%. We use these two statistics as an

estimate of $\frac{I^b}{I}$.

Furthermore, we obtain a measure of the total bank credit to firms from Bollettino Statistico of the Bank of Italy: in this report, we can observe the total credit granted from banks (and other financial institutions) to all clients, classified by loan size. We obtain from this document, for each class, both the number of credits and the total amount lent by all banks and financial institutions in Italy. We use this information to estimate the total capital K_b^* banks lend to firms at equilibrium before the reform. Reasonably, small firms obtain on average credits of relatively small amounts, hence we refer to the credit classes with less than 250.000 euros. Since moreover SMEs are probably not the only clients obtaining such a loan (households mortgages for investments in real estate represent for sure an important quota of these loans), we consider the numbers reported by Bank of Italy as an upper bound of the credits granted to SMEs.

To compute the impact of the reform on the loan rate paid by SMEs who have access to bank credit, we still need the equilibrium loan rate pre-reform, and the elasticity of the banks supply of capital to the loan rate. We obtain information about the average loan rate currently paid by SMEs from the survey by Capitalia (2005), indicating an average rate of 7.4% for the period 2001-2003 across all size classes. We use the lower bound (5.4%) and the upper bound (8.2%) in this same survey as two limit scenarios.

Finally, to estimate the elasticity of the loan supply with respect to the loan rate we rely on Huelsewig, Mayer and Wollmershaeuser (2005) who use aggregate data to estimate the response of bank loans to a monetary policy shock. As a robustness check, we also use the estimates in King (1986), and we notice that the sensitivity of the change in the loan rate to this elasticity parameter is extremely low. Finally, the impact of the reform on the future investment is independent of this parameter (see equation (11)).

Our main conclusions are collected in Table 4. The impact of the outflow of TFR from the balance sheet of SMEs on the loan rate is, in any of the scenarios, negligible (a maximum reduction of far less than one basis point in any possible scenario). Indeed, the model forecasts that the reduced amount of assets forces some firms to lose their access to credit, reducing the aggregate demand of loans that banks can accept. The impact on the loan rate is proportional to the outflow of TFR, but in any case we see that this amount is too low to produce any important macroeconomic effect on β. The effect is higher (in absolute terms), the higher the current leverage of firms.

However, according to (11), the reform will produce an important reduction of SMEs investment. In particular, the forecasted reduction is more than proportional to the outflow of the TFR, and it is larger the larger the quota of investment actually financed by the banks (i.e. the higher the leverage ratio of SMEs, according to our assumptions). We assess that this reduction can be about 130%-147% of the future outflow of TFR, as an effect of the "multiplier" $\frac{1}{1-\frac{I^b}{I}}$. The intuition of this result is that, since one euro of liquid assets ends up allowing an investment higher than one euro, the loss of this same amount due to the reform reduces the investment capacity of the firm by more than one euro.

We conclude then that if the reform will have a negative impact on the

SMEs, this will be due to their reduced access to bank credit, and not to more expensive loans: simply some of the SMEs will be forced to ask more financing, and due to the risk of a moral hazard, banks will reject their requests, so that the aggregate investment decreases.

5 Conclusions

The lack of external capital is often quoted as one of the main impediments for SMEs to grow. In the presence of a moral hazard problem between the borrowing firm and external financiers, the debt capacity of the former depends on the amount of collateral SMEs can pledge to the lender (Berger and Udell (1995), Holmstrom and Tirole (1997)), and the amount of liquid assets they invest in the new projects. In our paper, we study the effects of the government reform of the system of severance indemnities currently in use for Italian employees on the cost and the access to credit for Italian SMEs. The most direct consequence of the reform will be to reduce the amount of liquid assets of Italian firms, with respect to the situation pre-reform, both due to the possibility for employees to invest part of their severance payments outside the firm and to the mechanism diverting larger firms' funds to INPS. Some empirical literature (Guiso (2003), Bianco (1997), Sapienza (1997)) provides evidence that Italian firms are credit constrained if they operate below a certain assets threshold, suggesting that the liquid net worth is one of the main determinants for their debt capacity. We use then the model of Holmstrom and Tirole (1997) to make predictions about the effects of such a reform on the aggregate investments of SMEs, their access to credit, and the loan rate. We first perform an estimate of the future outflows from the severance indemnities fund, and then provide some estimates of the theoretical effects based on real data. We then show that the proposed reform will reduce in the long run the aggregate investment by SMEs at a rate that is more than proportional to the outflows of TFR funds: this reduction is higher the higher the current leverage ratio of firms. Moreover, the effect in the long run on the cost of intermediated finance is likely to be negligible, and, if any, will turn in a reduction of loan rates paid by SMEs. In the very short run, however, when the investment level can be considered as exogenous, SMEs will probably increase their demand of credit instead of cutting the investment level. This will increase the interest rate on loans, as well as the total amount of lending, but it will tighten the credit constraint for some of the (smallest) firms.

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Table 1: Distribution of firms, employees earnings and TFR flows across sectors and firms' size in 2004

Sector	Size	Firms	Dependent employees	Gross earnings per dependent employee *(Th Euro)*	Total TFR flow *(th Euro)*
Manufacturing	1-9	439,045	578,110	15.4	614,298
	10-19	53,924	625,868	18.0	776,307
	20-49	25,630	721,839	21.1	1,054,818
	50-249	10,474	989,901	25.0	1,707,221
	250+	1,490	1,131,558	29.8	2,332,667
	Total	530,563	4,047,276	23.2	6,485,311
Construction	1-9	533,845	461,741	14.7	467,974
	10-19	21,593	237,495	16.8	276,290
	20-49	6,231	171,066	21.3	251,725
	50-249	1,375	115,569	23.4	187,031
	250+	85	51,445	29.3	104,028
	Total	563,129	1,037,316	18.0	1,287,049
Services	1-9	3,018,446	1,575,182	14.9	1,618,189
	10-19	60,926	688,045	18.5	877,407
	20-49	22,063	610,737	20.7	874,901
	50-249	9,111	861,650	22.1	1,316,863
	250+	1,624	1,735,986	23.7	2,848,110
	Total	3,112,170	5,471,600	19.9	7,535,469
Total	1-9	3,991,336	2,615,033	14.9	2,700,461
	10-19	136,443	1,551,408	18.0	1,930,004
	20-49	53,924	1,503,642	21.0	2,181,443
	50-249	20,960	1,967,120	23.6	3,211,115
	250+	3,199	2,918,989	26.2	5,284,805
	Total	4,205,862	10,556,192	21.0	15,307,828

Note: manufacturing includes: actual manufacturing, mining and utilities industries.
Source: own elaboration from Istat (2006).

Table 2: TFR flow projections for 2007, by destination, thousand euro

	Firm	INPS	Pension Funds	Total
	Base scenario (3.9% growth)			
Participation 20%	6,112,311	7,623,371	3,433,920	17,169,602
Participation 40%	4,584,233	5,717,528	6,867,841	17,169,602
Participation 60%	3,056,155	3,811,685	10,301,761	17,169,602
Participation 80%	1,528,078	1,905,843	13,735,681	17,169,602
	2.5% growth			
Participation 20%	5,868,544	7,319,341	3,296,971	16,484,857
Participation 40%	4,401,408	5,489,506	6,593,943	16,484,857
Participation 60%	2,934,272	3,659,671	9,890,914	16,484,857
Participation 80%	1,467,136	1,829,835	13,187,885	16,484,857
	5.5% growth			
Participation 20%	6,399,060	7,981,008	3,595,017	17,975,085
Participation 40%	4,799,295	5,985,756	7,190,034	17,975,085
Participation 60%	3,199,530	3,990,504	10,785,051	17,975,085
Participation 80%	1,599,765	1,995,252	14,380,068	17,975,085

Source: own elaboration from Istat (2006).

Note: participation hypotheses include both explicit and implicit consent

Table 3: Projections of TFR flow lost by firms each year, million euro

Participation hypothesis	Year	1-9	10-19	20-49	50-249	250 +	Total
20%	2007	606	433	489	3,602	5,928	11,057
	2008	629	450	508	3,742	6,159	11,489
	2009	654	467	528	3,888	6,399	11,937
	2010	679	486	549	4,040	6,648	12,402
40%	2007	1,212	866	979	3,602	5,928	12,585
	2008	1,259	900	1,017	3,742	6,159	13,076
	2009	1,308	935	1,057	3,888	6,399	13,586
	2010	1,359	971	1,098	4,040	6,648	14,116
60%	2007	1,817	1,299	1,468	3,602	5,928	14,113
	2008	1,888	1,349	1,525	3,742	6,159	14,664
	2009	1,962	1,402	1,585	3,888	6,399	15,236
	2010	2,038	1,457	1,647	4,040	6,648	15,830
80%	2007	2,423	1,732	1,957	3,602	5,928	15,642
	2008	2,518	1,799	2,034	3,742	6,159	16,252
	2009	2,616	1,870	2,113	3,888	6,399	16,885
	2010	2,718	1,942	2,195	4,040	6,648	17,544

Source: own elaboration from Istat (2006).

Note: participation hypotheses include both explicit and implicit consent

Table 4: Decrease in the loan rate (percentage points) due to the reform

Bank financing[a]	*Interest rate*[b]	*Loans supply elasticity*[c]	**Part. 20%**	**Part. 40%**	**Part. 60%**	**Part. 80%**
23.1	5.4	0.14	0.000076	0.000152	0.000227	0.000303
		0.65	0.000056	0.000112	0.000168	0.000224
	8.2	0.14	0.000115	0.000230	0.000345	0.000460
		0.65	0.000085	0.000170	0.000255	0.000340
32.2	5.4	0.14	0.000107	0.000214	0.000321	0.000427
		0.65	0.000081	0.000162	0.000244	0.000325
	8.2	0.14	0.000162	0.000325	0.000487	0.000649
		0.65	0.000123	0.000247	0.000370	0.000493

Sources:

[a] Guiso (2003)

[b] Lower and upper bounds from Capitalia (2003)

[c] Huelsewig, Mayer and Wollmershaeuser (2005); King (1986)

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