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CORPORATE TAXATION IN ITALY: AN ANALYSIS OF THE 1998 REFORM

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Corporate taxation in Italy: an analysis of the 1998 reform*

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Abstract The increasing political concern for fiscal competition across European countries has induced Italy to implement a wide-ranging reform of capital income and business taxation. We describe the reform, discuss its links with other relevant international experiences and reform proposals, and assess its chances of reaching its declared targets. Our results suggest that the reform has been successful in closing the gap between the tax treatment of different assets and different sources of finance. Its effect on the overall cost of capital, and therefore on the demand for capital, is more uncertain however, and largely depends on the financial choices available to companies.

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1.Introduction

Under the new Centre-Left Government which came to power in April 1996, Italy has been introducing a wide-ranging tax reform. It first saw the light of day when Parliament approved the budget law at the end of 1996, and it was defined in more detail during 1997, with the passing of a number of delegated laws; it then finally came into full force in 1998. The reform basically affects all the main aspects of the Italian tax system, including tax administration and tax compliance. Among other things, it innovates the structure of personal income taxation (tax schedules and tax deductions), and significantly alters the balance between central and local taxation, by substituting some national taxes with a new regional tax on business activities (IRAP). A central role in the design of the new fiscal system is played by the reform of capital income and business taxation. This includes the harmonisation of several different tax bases and tax rates for capital income taxation at the personal level, and the introduction of a new system for business income taxation. The latter shares some features with the DIT system introduced in the Nordic Countries at the beginning of the '90s (Sørensen 1994a, 1998) and with the ACE system, proposed in the UK by the Institute for Fiscal Studies (IFS, 1991). However, it also contains several elements of originality, which we illustrate as we go on.

The Italian reform of capital income taxation certainly reflects some specific characteristics of the Italian economy. However, it is also meant to address problems that most countries in Europe are now facing, following the increasing integration of the European economies. For instance, the chief (declared) objectives of the reform include the following: 1) the reduction of the average statutory tax burden on business income; 2) the partial elimination of the advantage of debt-financing over equity-financing; 3) the improvement of real neutrality, by reducing the fiscal wedge between gross and net return for an equity-financed investment. These goals mainly reflect increasing political concern over fiscal competition in the European context . They also aim to encourage the formation of a more competitive capital market, capable of attracting the national savings which improving public financial conditions are currently making available for private investment. The Italian experience may thus be of interest more generally. Accordingly, in this paper we pursue the following aims.

Firstly, we present a comprehensive introduction to the main institutional features of the reform involving corporate income, briefly comparing it with other relevant international experiences and reform proposals.

Secondly, we attempt to assess the chances that the reform has of fulfilling its declared aims. This we do by using a simple model of a firm's maximising behaviour, and by deriving and comparing the optimal real and financial choices available to the firm before and after the reform.

Thirdly, in order to quantify the effects of the reform on the cost of capital and to overcome certain theoretical ambiguities, we also propose a numerical simulation based on details of the Italian tax code.

To put it briefly, our results suggest that the reform achieves its objective of weakening (although not totally eliminating) the fiscal advantage of debt-financing over equity-financing. The reform is also successful in reducing average taxation on corporate income. This is an important result, as there is increasing empirical evidence to show that high average tax rates encourage profit shifting and negatively affect the choice of location made by multinational companies (Bond, 1997, Devereux and Griffith, 1998). The effects of the reform on the demand for capital, however, are more controversial. In particular, the ability of firms to make full use of the advantages offered by the fiscal system turns out to be of vital importance in determining the effect of the reform on the cost of capital. In conditions of full «financial flexibility» (Sinn, 1987), and given that the Italian civil code obliges firms to implement the so-called Uniform Reporting system (Kanniainen and Söderstern, 1995), it actually turns out that the cost of capital is slightly higher under the new system than under the old tax regime. This is due to the introduction of the new regional tax (IRAP), which does not allow for interest payments deduction. On the other hand, if the firm is credit rationed, and cannot use debt to finance its marginal investment, the reform might reduce the cost of capital. Furthermore, as our numerical simulations suggest, it also tends to narrow the tax discrimination on capital assets having different life. Thus the reform seems to be successful in closing the gap in the tax treatment of different assets and different sources of finance. Its effect on the overall cost of capital is more uncertain, however, and largely depends on the financial choices available to the company.

The layout of the paper is as follows. Section 2 provides the reader with some essential background information on the Italian situation both pre- and post-reform. Section 3 introduces the model and discusses its main assumptions. Section 4 looks into the effects of the reform on a company's optimal financial choices, with real investment taken as given. Section 5 introduces further constraints on the financial structure of the firm, and solves the model for the optimal choice of real capital. This section considers both the constraints deriving from legal restrictions imposed on the firm, and a further constraint on the use of debt-financing which is meant to capture all other possible imperfections that may exist in capital markets. Section 6 presents the numerical simulation exercise, and comments upon the results. Section 7 summarises the contents of the analysis, and offers suggestions for further research.

2. The Italian reform of corporate income taxation: objectives and constraints

During the 1980s and the early 1990s, most Western countries introduced important reforms which significantly reduced their tax rates on business corporations. In the EU, the overall (national and local) statutory tax rate on corporate income decreased, on average (excluding Italy), from 46.9% in 1980 to 38.2% in 1997[1]. During the same period, however, Italy moved in the opposite direction. The need to increase revenue induced policy makers into gradually raising the overall tax rate on corporate income, from 36.25% at the beginning of the 1980s to 53.2% in 1995. To do so, the corporate income tax rate (IRPEG) was increased to 37%, and the local income tax (ILOR), levied at a rate of 16.2%, became non-deductible from the corporate tax base. In the second half of the 1980s, less generous depreciation allowances also slightly enlarged the tax base. Finally, in 1992 an «extraordinary» tax on both corporate and non-corporate net business assets (the so-called net worth tax) was also introduced, at a rate of 0.75%, and was maintained during subsequent years.

This evolution in company taxation led to two main criticisms. Firstly, it became increasingly clear that the high statutory rate encouraged tax evasion and avoidance, and discouraged foreign and domestic investment in the country. Secondly, the tax system was seen as an important obstacle to the development of capital markets and to the direct channelling of equity funds into the corporate sector. The high statutory rate, together with the tax on business net worth, gave debt-financing an excessively high advantage over equity-financing. This distortion at the corporate level was not compensated for at the personal level, despite the favourable treatment given to capital gains and the tax credit on dividends (see section 4).

The reform introduced in 1998 aimed to reduce these distortions. To understand the rationale behind the reform, however, one must bear in mind that tight budgetary conditions forced the Government to pursue these goals without significantly reducing tax revenue, at least not in the short term. This constraint was highly influential in initially shaping the reform, and its relaxation in the future will most probably induce further changes, as has been announced, in fact, by the Government itself.

With regard to corporate income taxation, reform measures may be summarised as follows.

1. The reform abolishes local income tax (ILOR), thus reducing the tax burden on corporate profits. The net worth tax, National Health Service social security contributions, and some other national and minor local taxes on business, were also repealed by the reform.

[1] The average tax rate is lower (36.2%) if one also takes into consideration the other countries which joined the EU during this period.

2. To compensate the revenue loss due to these changes, a new regional tax on all types of productive activities was then introduced (IRAP)[2]. The tax rate was set at 4.25% in order to guarantee revenue neutrality in accordance with Government estimates. The tax base of the new tax is basically value-added of the net income type[3], and is calculated using the *deduction* method: that is, total sales, less purchases of intermediate goods and depreciation (including accelerated depreciation)[4]. By looking at the IRAP tax base through the *addition* method, one can see that it includes profits, rents, interest payments and labour costs. IRAP payments are not deductible from the tax base of either IRPEG or IRPEF (personal income tax). As a result of these two changes, the statutory rate on profits fell from 53.2% (IRPEG+ILOR) to 41.25% (IRPEG+IRAP).
3. To stimulate companies' capitalisation and further reduce the relative advantage of debt finance, a «dual» system of profit taxation was also introduced. More precisely, profits are now split into the following two components:
   - an imputed return on new investments financed with equity capital, called the «ordinary return»;
   - the residual taxable profits, that is to say, taxable profits less this «ordinary return».

   The «ordinary return» is calculated by applying a nominal interest rate to new subscriptions and retained earnings from September 1996 onwards. The imputed return is set yearly by the Government with reference to the market interest rate on public and private bonds. However, the law allows Government to raise the imputed return by up to three percentage points over and above the market interest rate, so as «to take into account the higher risk of equity, compared with debt finance»[5]. In 1998, for instance, the ordinary return was set at half a percentage point above the market interest rate. The ordinary return, which is meant to approximate the

[2] IRAP is defined as a «regional» tax, although it is currently levied at the national level, because its tax base is computed at the regional level. Moreover, from the year 2000 onwards, each of the twenty Italian Regions will have the choice of raising its IRAP tax rate by up to 1% above the nationally set rate, and to differentiate this increase across different sectors and categories.

[3] It should be noted however that both the tax base of IRAP and the criteria for its implementation are very different from those of VAT. Incidentally, this is also the reason why the IRAP does not violate the 6 EC Directive. For further discussions on this issue see Gallo (1996).

[4] There are differences among taxpayers, depending on the type of business activity carried out. Specific rules, for example, have been established to define value added for the banking system, financial intermediaries and insurance companies.

[5] This justification is very likely to be misleading, however. As Bond and Devereux (1995) have shown, even in a world where uncertainty and bankruptcy costs are present, an allowance for an ordinary return on equity equal to the tax free interest rate is enough to make the corporate income tax neutral, *provided* there is a symmetric tax treatment for profits and losses. If profits and losses are treated differently, however, the choice of a greater ordinary return than the market rate of interest can be justified on theoretical grounds (see Panteghini, 1998).

opportunity cost of new equity capital, is taxed at a rate of 19%[6]; residual profits are taxed at the normal corporate tax rate (IRPEG) of 37%. To prevent tax avoidance, and to limit the competitive tax advantage of new companies and revenue losses, a floor was introduced for the average tax rate. The latter cannot be lower than 27%[7], which is the highest rate applied to income from capital.

4. Finally, the taxation of dividends and capital gains was also modified by the reform. Previous legislation provided for the exemption from taxation of most types of capital gains and net proceeds of derivative products. In the case of capital gains on shares, full exemption was granted if the company was listed on the Stock Exchange. Capital gains on other shares were taxed at realisation, and at preferential rates. Under the new tax regime, dividends and capital gains are taxed at the standard rate of 12.5%. Furthermore, in most cases capital gains (losses) are taxed (deducted) at accrual, rather than at realisation[8]. As most interest income is also taxed at the 12,5% rate, the attempt of the policy maker to harmonise the taxation of all sources of capital income is very clear. There are exceptions, however. A higher tax rate of 27% is applied to interest income from short-term bank deposits (and similar assets) and capital gains on «qualified» sales[9]. Dividends received by a «qualified» shareholder are not eligible to the 12.5% rate, but must be included in the personal tax base, where they benefit from a tax credit. The latter was also reformed so as to better compensate for corporation tax payments, and in order to pass some explicitly listed companies' tax preferences on to the shareholders[10].

Overall, the Italian reform appears to be highly innovative, and does not reproduce any of the tax reform schemes most recently discussed or implemented in other countries. On closer inspection, however, one may note several similarities with both the Dual Income Tax system introduced in the Nordic countries at the beginning of the 1990s and the ACE system proposed by

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[6] This is equal to the lower rate for the personal progressive income tax (IRPEF). Any excess between the «ordinary return» and taxable profits can be carried forward for five years. This is the period over which tax losses can be carried forward in Italy.

[7] If this constraint is binding, however, the share of the «ordinary return» that does not benefit from the lower rate of 19% may be carried forward (again within a five-year limit).

[8] Broadly speaking, there are three different regimes. The most interesting one concerns the taxation of managed portfolios through approved intermediaries. In this case the 12.5% rate is applied to the net return on managed portfolios, which is defined as the difference between the market value of the managed portfolio at the end and at the beginning of the period. All capital income and net gains accruing to the portfolio are included in the tax base, unless they already paid the final withholding tax of 27%. When financial assets are held directly by the saver, or simply deposited in a bank or with other authorised intermediaries, the tax rates are those applied in the case of managed portfolios, but each type of income is separately taxed. In these cases capital gains are taxed at realisation. To correct the disadvantage that this would give to portfolios managed through intermediaries, the government introduced a specific adjustment mechanism to (approximately) balance out the tax treatment of realised and accrued capital gains.

[9] A higher rate was applied to both items before the reform as well.

[10] Examples include the previously-described preferential treatment of «ordinary income» and the partial exemption of foreign dividends.

the IFS in the UK[11]. Like the Nordic reform, the Italian tax system is based on the idea of taxing capital income at a flat rate, and again like the Nordic DIT, the Italian reform divides profits into two components. However, this division, which according to the Nordic system should only be applied when labour and capital incomes accrue jointly, in Italy has been extended to cover all types of business activity (except those activities where simplified accounts are kept). On these grounds, the Italian DIT[12] looks more like the ACE system, which proposes the taxation of extra-profits at a higher rate than that applied to normal profits, regardless of the organisational form involved[13]. One may also note similarities between the IRAP and the CBIT proposed by the US Treasury (1992), in so far as the IRAP tax base, like the CBIT proposal, includes interest payments[14].

The hybrid solution adopted in Italy seems to have been implemented in order to trade off various conflicting aims. To reduce the distortion of financial choices, lower the cost of capital and the overall tax rate on profits (including both the tax rate on ordinary return and that on the residual profits), while limiting short-term revenue losses. How successful has the reform been in reaching these targets?

3. The model

In this section we introduce a simple model of a company's behaviour, which will allow us to derive and compare the company's optimal financial and real choices before and after the 1998 tax reform. The model is a standard neo-classical one, with a price-taking representative firm, perfect capital markets and no uncertainty. It embodies the so-called «new view» of the firm: the pay-out ratio is endogenously determined by the company as a result of its optimal investment policy (King, 1974, Auerbach, 1979).

The flow of cash dividends to the shareholders (net of corporate taxation) is given by :

$$(3.1)\quad D=F(K)-iB+S+Q-I-\delta K-T$$

where $F(K)$ is the production function, with the price of output normalised to one, and K is the stock of physical capital. It is assumed that $F'>0$ and $F''<0$, and that $F(\cdot)$ satisfies the usual Inada

[11] It should be remembered, however, that under the Italian reform, the share of profit subject to taxation at a preferential rate (ordinary income) has been calculated with reference to new equity and retained earnings since September 1996. According to the Nordic DIT or the ACE proposal, this imputed return (called «capital income» and «allowance for corporate equity» respectively) is, however, calculated with reference to the entire sum of equity capital invested in the company.

[12] The acronym DIT is officially used for this reform.

[13] A form of ACE allowance has also been adopted in Croatia in 1994, under the name of Interest Adjusted Income Tax (IAIT). Under the IAIT companies that kept proper accounts are permitted to deduct an imputed «normal» return on their equity (equal to rate of growth of manufacturing prices plus 3 % points) from their taxable profits. For further details, see Rose and Wiswesser (1998).

conditions. B is the stock of outstanding debt, i is the rate of interest, S is the debt flow, Q is the new issue of shares, I is net investment, δ is the «true» depreciation rate for capital and T is the flow of corporate tax payments. In what follows, we consider two alternative corporate tax systems: the «old», pre-reform, regime and the «new», post-reform, regime. T is of course different in the two cases; below, where necessary, we distinguish between them by adding the suffix «O» or «N» , respectively, to the relevant parameters. Debt and capital dynamics are driven by:

$$(3.2) \quad dB/dt = S$$

$$(3.3) \quad dK/dt = I$$

where t indicates units of time. Under the «old» regime, total taxation on the company could be written as the summation of two elements, the taxation of profits and the net worth tax:

$$(3.4) \quad T^O = \tau^O [F(K) - aA - iB] + \tau_k [E^O]$$

where τ^O is the overall corporate tax rate under the «old» regime, and is equal to the sum of the IRPEG and ILOR rates (see section 2). The tax base for both ILOR and IRPEG, the first term in square brackets to the RHS of (3.4), is fiscal profits, i.e. total revenue less interest payments (iB) and fiscal depreciation allowances (aA)[15]. Accounting capital A accumulates according to the equation:

$$(3.5) \quad dA/dt = I - aA + \delta K$$

where the fiscal depreciation coefficient (a) is assumed to be higher than the economic one (δ), because Italian legislation allows companies to anticipate depreciation allowances during the first three years[16]. The second element in the RHS of (3.4) is the tax on the company's net worth, with τ_k indicating the relative tax rate. The tax base of the property tax, E^O, evolves according to the formula:

$$(3.6) \quad d E^O/dt = F(K) - iB - aA - D - T^O$$

[14] For a more detailed comparison see Giannini, 1997.
[15] Though there were differences between the IRPEG and ILOR tax bases, they are not relevant for our purposes here.

Thus, E^O is equal to the sum, over time, of retained net taxable profits, i.e. fiscal profits net of dividends and taxes paid by the corporation. Note that in (3.6), the net worth of the company does not include the funds generated by the issue of new shares. This is because in 1995 Italian legislation purposely excluded new subscriptions from the tax base of the net worth tax.

As we said, the reform significantly changed the structure of corporate taxation. In our notation, the post-reform overall tax burden of the company can be written as:

$$(3.7) \quad T^N = \tau_r[F(K) - aA] + \tau_l^N [i_E E^N] + \tau_h^N [F(K) - aA - iB - i_E E^N]$$

Corporation taxation is now constituted by the summing up of three different elements. The first is the newly introduced local tax, IRAP, the tax rate of which we indicate with τ_r. Note that in the tax base of IRAP, debt interests are not deductible, whereas fiscal depreciation is. Corporate taxation also changes. As explained in section 2, there are now two different tax rates. The lower tax rate, τ_l^N, is applied to the «ordinary » return, i_E, on the equity invested in the company, E^N. Profits exceeding this ordinary return are taxed at a higher rate τ_h^N (which coincides with the old regime IRPEG tax rate). In turn, the company's equity capital accumulates according to the formula:

$$(3.8) \quad dE^N/dt = F(K) - iB - aA - D - T^N + Q$$

so that E^N is defined as the summing up, in time, of retained net «fiscal» profits (see also equation 3.6) plus the new equity resulting from the issue of new shares.

Before going on, it is important to underline the fact that equation (3.7) does not represent the situation at the beginning of the reform, but rather at its conclusion. As explained in the previous section, the fear of losing tax revenue persuaded the Government to introduce the reform in a very cautious manner. Thus, E^N is only calculated with reference to the «new» equity capital used by the company (new retention or issue of new shares) starting from September 1996. This implies that E^N is zero at the beginning, and will represent the entire equity capital of shareholders only in the long run, when the «new» equity will have entirely replaced the «old» equity. Note, however, that this does not affect the tax burden on the new investments the company makes, so

[16] Moreover, the linear depreciation coefficients set down by the tax code are in most cases higher than the corresponding «true economic» depreciation rates. This assumption is embodied in the empirical simulation presented in section 6.

that (3.7) and (3.8) are perfectly suitable for studying the effect of the reform on the cost of capital[17].

In comparing (3.7) with (3.4), two interesting features emerge. Firstly, the replacement of the local tax on profits and the net worth tax with the new regional tax , which takes into consideration a totally different tax base[18]. Secondly, the introduction of a «dual» system for corporate income taxation, which taxes «normal» and «extra-profits» at different rates. In what follows, we will see how these two elements interact in modifying the company's optimal choices.

4. Financial choices

In a deterministic world, a shareholder would hold equity shares only up to the point where their net return equalled the net return from selling the company and investing the asset into the best alternative investment available (say, Treasury Bonds). Thus the arbitrage condition in the capital market can be expressed as:

$$(4.1) \quad (1-\tau_i)\, iV(t) = (1-\tau_p^j)\, D + (1-\tau_c^j)\, [dV/dt - Q]$$

The LHS of (4.1) is the return to the consumer from selling off the company at its current value $V(t)$ and holding risk-free bonds instead, net of the tax on interest income, τ_i. In equilibrium, this must be equal to the net return from holding shares: i.e. the gross dividends, net of effective personal taxation at the marginal tax rate, of the representative shareholder (τ_p)[19], plus the capital gains on the owned shares $[dV/dt - Q]$, net of capital gains tax, τ_c. The suffix j in (τ_p, τ_c), $j=O,N$, is to remind the reader that the reform also changed personal taxation of dividends and capital gains (see section 2), thus affecting the relative convenience of holding shares[20]. By integrating (4.1), we can then express the value of the firm at time t under regime j as:

$$(4.2) \quad V^j(t) = \int_t^{\infty} \left[\frac{(1-\tau_p^j)}{(1-\tau_c^j)} D(s) - Q(s) \right] e^{-\int_t^r \rho^j(u)\,du}\, ds$$

[17] In (3.7) we have also avoided taking account of the further complication of a lower boundary to the average profit tax rate (see section 2).

[18] We do not consider labour here, but it is worth recalling that another important difference between the ILOR tax base (profits) and the IRAP tax base (value added) is that the latter includes labour costs.

[19] τ_p must be interpreted as net of any tax credits offered by the State for the tax paid by corporations (see below). To avoid confusion, we will subsequently indicate the marginal tax rate of the taxpayer *before* the credit with t_p.

[20] The tax rate on interest income was not changed by the reform, remaining as it did at 12.5%.

The value of the company at time t is then the discounted sum of all future net dividends, minus the new share issues, where $\rho^j \equiv i(1-\tau_i)/(1-\tau^j_c)$ is the shareholder's discount factor. Note that the latter differs from the market rate of interest if there is a difference between the tax rates on interest income and that on accrued capital gains.

Given the above assumptions, the problem of the company at time t is that of maximising $V^j(t)$, by choice of the real variable I and of the financial variables (S, Q and retained profits), subject to the motion equations (3.2), (3.3), (3.5) and alternatively, either [(3.4), (3.6),] or [(3.7), (3.8)], according to the existing tax regime. Clearly, given the linearity of the (assumed) tax functions, the solution to problem (4.2) can only entail a corner solution, with the firm using the cheapest source of funds to finance its real investment. We will look more closely at this problem in the following section, where we shall be discussing the constraints that legal restrictions and market imperfections impose on the company's financial choices. In this section we are only concerned with studying the effect the reform has on the relative convenience of using the different sources of funding, without taking into consideration any such constraints.

The simplest way of calculating the financial preferences of the firm under the two tax regimes is to keep real investment fixed, and at the margin, to investigate the effect of substituting one source of finance with another on the value of the company. We proceed as follows. We firstly form the (present value) Hamiltonian:

$$(4.3)\quad H^J = \left[\frac{(1-\tau_p^j)}{(1-\tau_c^j)}D - Q\right] + \mu^j{}_s\, dB/dt + \mu^j{}_K\, dK/dt + \mu^j{}_A\, dA/dt + \mu^j{}_E\, dE_j/dt \qquad j=O,N$$

where the $\mu^j{}_i$ $(i = S, K, A, E)$ indicate the respective costate variables for debt, capital, fiscal capital and equity. Secondly, we use equation (3.1) to write retained «true» net profits as simply I -S-Q. We can then calculate the company's financial preferences by alternatively partially differentiating (4.3) with respect to the financial variables, S and Q, and by keeping I fixed[21].

Table 1 summarises the results we obtain by performing this exercise. In the table «DB», «RP» and «NI» stand for new debt, retained profits and new issue of shares, respectively; and the

[21] For instance, by partially differentiating H^J with respect to S (res. Q), this reduces retained net profits by the same amount; thus, $\partial H^j/\partial S$ (res. $\partial H^j/\partial Q$) directly gives us the effect of replacing one lira of retained profits with a lira of a new loan (res., new equity). Similarly, by partially differentiating (4.3) with respect to S and Q and imposing $dS = - dQ$, we get the net effect on the firm's value of substituting at the margin new equity with debt. Also note that both $\partial H^j/\partial S \geq 0$ and $\partial H^j/\partial S - \partial H^j/\partial Q \geq 0$, with $j=O,N$, are required in order for a solution to problem (4.3) to exist. Otherwise, no distribution of dividends would ever occur and the market value of shares would be null or negative (see Sinn, 1987, 82 and 86). As we show below, these two conditions always hold in our model.

sign «>» means «preferred to». The two final columns give the condition whereby the financial preference, given in the first column, holds.

Table 1. The company's financial preferences before and after the reform

Financial preferences	*Old Regime*	*New Regime*
DB>RP if	$(1-\tau_i) > (1-\tau^O_c)\,(1-\tau^O-\tau_k/i)$	$(1-\tau_i) > (1-\tau^N_c)\,[(1-\tau^N_h)+(\tau^N_h-\tau^N_l)i_E/i]$
DB>NI if	$(1-\tau_i) > (1-\tau^O_p)\,(1-\tau^O)$	$(1-\tau_i) > (1-\tau^N_p)\,[(1-\tau^N_h)+(\tau^N_h-\tau^N_l)i_E/i]$
NI>RP if	$(1-\tau^O_p)\,(1+\tau_k/\rho^O) > (1-\tau^O_c)$	$\tau^N_p < \tau^N_c$

A close inspection of the table reveals a number of interesting results.

First of all, debt is the preferred source of funding under both tax regimes. This is clear for instance from the first row, where the financial preference between retained profits and debt is indicated. Although under the old regime, capital gains on shares of companies listed on the Stock Exchange were exempt from taxation (i.e. $\tau^O_c = 0$), debt financing was certainly preferred to retention on purely fiscal grounds, since $(\tau^O + \tau_k/i) > \tau_i$. And under the new regime $\tau_i = \tau^N_c$, so that the inequality given in the last column certainly holds if $\tau^N_h > (\tau^N_h - \tau^N_l)\,i_E/i$. As explained in section 2 above, $\tau^N_h = 37\%$ and $\tau^N_l = 19\%$, so that debt is clearly preferred to retained profits unless Government sets i_E at more than twice the level of i[22]. This seems very unlikely, and may actually turn out to be impossible (in spite of declining interest rates) given the legal constraints on the maximum difference allowed between i_E and i (see section 2) [23]. Similar arguments show that debt is also preferred to new share issues under both regimes (see the second row in table 1)[24].

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[22] For future reference, it should also be noted from the table that at $i_E \approx i$ and $\tau_i \approx \tau^N_c$, indifference between debt and retained earnings would require $\tau^N_l = 0$. Indeed, this is the essence of the ACE proposal, which computes an ordinary return on the equity invested in the company which is equal to the market rate of interest, and then entirely exempts this ordinary return from taxation.

[23] Indeed, as we have already mentioned above, when the law was first introduced, Government set i_E just above the market rate of interest, and it is quite likely that position will be maintained in the future; see section 7.

[24] For shareholders declaring dividends in their personal tax base, τ^j_p (j=O,N) depends on the marginal tax rate of the shareholder (t^j_p) and on the entity of the tax credit, c^j; or, to put it more precisely, $\tau^j_p = t^j_p - c^j\,(1-t^j_p)$. Under the old regime $c^O = 56.25\%$ and debt was preferred to new share issues even if the shareholder was subject to the lowest marginal personal income tax rate ($t^O_p = 10\%$). The value of τ^N_p is not as easy to compute as it was before the reform, because of an upper constraint imposed on credit. This is given by the average tax rate of the shareholder. If the latter is equal or greater than the corporation tax (37%), τ^N_p may be computed as it was before the reform. Its value is then given by $t^N_p - c^N\,(1-t^N_p)$, where t^N_p is the marginal tax rate of the shareholder according to the new tax brackets introduced with the reform, and c^N is the new tax credit as a percentage of dividends (58.73%). When the average tax rate of the shareholder is less than the corporate tax rate, the value of τ^N_p becomes: $\tau^N_p = t^N_p - c^N\,(1-t^N_p) + \varepsilon\,(1+c^N)/(1-\tau^N_l)*((\tau^N_h - \tau^N_l)/\tau^N_h - \tau_r\,(1-\tau^N_h)/(1-\tau_r-\tau^N_h))$, where ε is the difference between the corporate tax rate (τ^N_h) and the shareholders' average tax rate (t^N_m) (for further details, see Bontempi et al., 1998). It turns out that even after the reform was implemented, debt was, and still is, preferred to new share issue, except in the unlikely case where the shareholder has the lowest marginal and average tax rate (19%).

Secondly, the fiscal advantage of debt over equity has been greatly reduced by the reform, however. Simple calculations show, for example, that under the old regime the fiscal gap between debt and retained profits was very large: for a 5% interest rate, overall taxation on retained earnings was 68.2%, whereas the tax rate on interest was as low as 12.5%. Under the new regime, the latter tax rate remains unchanged, while the overall tax rate on retained profits is reduced from 68.2% to 29.1%[25].

Thirdly, it is generally impossible to sign unambiguously the preference between new issue of shares and retained profits under both regimes, as it depends on the marginal personal tax rate of the shareholder and on the extent of the tax credit given on the corporate tax paid by the company. It should be pointed out, however, that under the new regime, unless the shareholder is a qualified one or decides to opt for the tax credit regime, the term in the last row and last column reduces to equality, in so far as both dividends and accrued capital gains are now taxed at the common 12.5% rate (see section 2). In this important case, therefore, the tax system no longer discriminates between the two sources of equity.

Summing up, we have shown in this section that even after the reform, debt is still the preferred source of funding, although to a much lesser degree than was the case under the previous regime. Furthermore, under the reformed tax system, the two different sources of equity, retention and the issuing of new shares, are not fiscally discriminated in the important case where the shareholder is not a «qualified» one. The reduction in fiscal distortions is due to the three following factors: 1) the reduction in average taxation on corporate profits, resulting from the elimination of ILOR; 2) the abolition of the net worth tax, and 3) the introduction of the DIT fiscal allowance on the «normal» return from the equity invested in the company. Finally, note should be taken of the fact that the IRAP tax rate never appears in the equations determining the optimal financial choices of the company; this tax is completely neutral with respect to such choices.

5. Real choices

5.1 The constraints on the financial structure of the company

The simple model discussed in the previous section is of use as a first approximation to the effects of the reform. Without any further constraints on financial choices, however, each company would simply choose the cheapest source of financing in order to pay for all its investment, which is debt under both regimes. As we do not observe real-world firms that are completely debt-financed, it is clear that the above model lacks something essential[26]. A very large literature has developed

[25] Assuming that $i_E \approx i$.

[26] Indeed, as debt interests are fully deductible from the corporate tax base, this also means that corporate taxation would have no effect on investment in physical capital, as we have known since the seminal work by Sitglitz (1973),.

trying to explain why the «optimal financial structure» of a company should not involve only debt funding, in spite of the clear advantage that corporate taxation offers to this form of financing. Recently, considerable progress has been made by seriously considering the constraints that the civil legislation of a country produces on the financial structure of companies. This line of research, originated with King (1974), Boadway and Bruce (1979) and Sinn (1987), took an important step forward with the work by Kanniainen and Södersten (1995). They note that in the majority of OECD countries outside the Anglo-Saxon world, there is no difference between the balance sheet that a company produces for *fiscal* purposes and the commercial one drawn up for *civil* purposes. This legal restriction, called Uniform Reporting, implies that *the dividends distributed by a company cannot be any greater that its fiscally defined profits.* On the contrary, under the system of Separate Reporting, which envisages the drafting of two clearly distinguished balance sheets, dividends are only constrained by after-tax *economic* profits. This distinction is particularly important when fiscal and economic profits differ, generally as a result of generous depreciation allowances.

The Italian Civil Code does not allow for Separate Reporting. Thus the fiscal allowances for capital depreciation, which, as we mentioned above, are more generous than those for «true» economic depreciation, reduce the amount of profits available for distribution[27]. Analytically, this constraint on dividends can be represented as follows:

(5.1') $D_j \leq F(K) - iB - aA - T_j$ j=O,N

which, by invoking (3.1), can be more simply rewritten for *both* tax regimes as:

The UR constraint:

(5.1) $I - S - Q \geq aA - \delta K > 0$

The RHS of (5.1) equals the increase in reserves due to the difference between «fiscal» and «true» depreciation allowances. As explained above, equation (5.1) then implies that retained «true» net fiscal profits cannot fall below a given threshold, $(aA - \delta K)$: clearly, the more generous fiscally allowed depreciation is with respect to «true» depreciation, then the greater this threshold is.

[27] To be more precise, under Italian law a company may also advance the deduction of depreciation allowances without reducing the profits shown in the accounts, but the excess part must be allocated to a special reserve and cannot be distributed as dividends.

As in many other countries, Italian legislation also imposes various constraints on share repurchasing by companies, which cannot exceed 10% of the outstanding stock of shares. We can represent this legal restriction as follows:

The Share repurchasing constraint:

(5.2) $Q \geq \underline{Q}$

where $\underline{Q} \leq 0$. In what follows, we will often simplify the problem by making $\underline{Q}=0$, so that (5.2) becomes a non-negative constraint on the issue of new shares.

Constraints (5.1) and (5.2) derive from purely legal considerations. However, they are unlikely to provide us with a full picture. For instance, it could certainly be argued that even in the absence of the UR constraints, a company could not possibly be 100% debt-financed. One can easily image several reasons (bankruptcy costs, liquidity constraints, monitoring advantages, signalling, credit rationing, and so on) why this could not be the case in the real world. It would be difficult to explicitly introduce these arguments into our model, as they make reference to market imperfections (such as uncertainty and asymmetric information) which are beyond the scope of the present model. Following Sinn (1987), we therefore prefer to include all these considerations as an *ad hoc* constraint on debt financing. To be more precise, we assume that:

The Credit Market constraint:

(5.3) $S \leq \sigma I$

where σ, $0 \leq \sigma \leq 1$, is a given parameter. Equation (5.3) implies that only a share of net investment by the firm can be financed through new debt raised into the credit market, and that the lower σ[28] is, the lower this share is. By combining (5.3) with (5.1), we can also see that for $\sigma^* = S/(S+Q+(aA-\delta K))$, the UR constraint and the credit market constraint on debt financing coincide. Hence, for $\sigma \geq \sigma^*$ constraint (5.3) is not binding at the optimum. In what follows, again following Sinn (1987), we will refer to this latter case as the case where the firm enjoys full «financial flexibility», meaning that the constraint on the use of new loans by companies only derives from legal restrictions such as the UR constraint, and not from any form of rationing dictated by the credit market.

5.2 The cost of capital under the two tax regimes

Under our assumptions, the problem of the managers is that of maximising the value of the company, as given by equation (4.2), through the choice of financial variables and net investments, and subject to the motion equations described in section 3, to the relevant tax parameters (according to the tax regime), and to legal and market constraints 5.1 to 5.3. By solving this maximising exercise under the two different tax regimes, we can derive *the cost of capital* for the company in the two cases, and thus enquiry on the effects of the reform on demand for capital.

By invoking (4.3), the problem of the company can be formally stated as follows:

$$(5.4)\quad \underset{(I,\,S,Q)}{\text{Max}}\ L^J = H^J + \lambda^j_Q\,(Q-\underline{Q}) + \lambda^j_D(I - S - Q - (aA-\delta K)) + \lambda^j_S\,(\sigma I - S) \qquad j=O,N$$

where H^J is the constrained Hamiltonian of equation (4.3), and λ^j_Q, λ^j_D, λ^j_S are the Lagrangean multipliers on share repurchasing constraint (5.2), dividend constraint (5.1) and credit market constraint (5.3), respectively. In what follows, we assume that the relevant transversality conditions on the state variables of this problem are always satisfied.

5.2.1 The old tax regime

We begin with the «old» tax regime, by substituting the respective equations in (5.4), and carrying out the resulting maximising exercise. By manipulating the first order conditions (see the Appendix), we can then derive the equation for the cost of capital. Under the old regime, debt is always the most convenient source of finance, and three different cases can be obtained.

Case 1

The simplest case is where the firm is not rationed in the credit market (i.e. $\sigma \geq \sigma^*$). In this case, regardless of the relative fiscal convenience of retained earnings over new share issues, the solution is the same. As a result of the UR constraint, which is binding at the optimum, the company only retains an amount of profits equal to the difference between fiscal and economic depreciation (i.e. $RP^* = aA^* - \delta K^*$), and does not issue new shares (i.e. $Q^* = \underline{Q}$). The remaining investment is financed through debt (i.e. $S^* = I^* - \underline{Q} - (aA^* - \delta K^*)$), where an asterisk indicates the

[28] There is some empirical evidence (e.g. Rondi et al., 1998) which suggests that in Italy, companies, especially small ones, are credit rationed. Not surprisingly, this constraint seems to become more severe in periods of monetary tightening.

optimal solutions and where, as in Table 1, *RP* stands for retained profits. In turn, K^* (and thus, implicitly, I^*, A^* etc.) is determined by the following equation:

$$(5.5)\quad F'(K^*) = i[1 - \frac{(a-\delta)(\tau_i - \tau^o{}_c)}{(\rho^o + a)(1-\tau^o{}_c)}] + \delta \equiv C_K^o$$

On the LHS of (5.5) we have the marginal productivity of capital, expressed in money terms as the price of output is normalised to one; the apostrophe here indicates the derivative of the production function with respect to the stock of capital. The LHS then measures the *marginal benefit* of capital for the company. The expression to the RHS of (5.5), C_K^o , is the marginal (and average, being a constant) *cost of capital* for the firm in case 1. Given that the company's desired stock of capital is determined by the equality between marginal benefit and marginal cost, the latter shows how personal and corporate taxation interact to affect the demand for capital.

C_K^o reproduces the formula for the cost of capital drawn up by Kanniainen and Södersten (1995, 426) and by Sørensen (1994b, 443). What might seem surprising is that neither the corporate rate of tax nor the net worth tax rate appears in C_K^o . The intuition is, however, quite simple. In case 1, the only source of equity finance comes from the greater depreciation allowances given for fiscal purposes. This means that the company's equity financed investment is immediately written off for tax purposes, thus making the corporation tax neutral, like a cash flow tax (see Sørensen, 1994b,1995). Explaining why net worth tax does not appear in the formula is even simpler. «Fiscal» retained profits are zero, and so the tax base of the net worth tax does not change as a result of the investment (see equation 3.6).

Saying that corporate and property taxes do not affect the cost of capital does not mean, however, that the cost of capital in (5.5) is unaffected by taxation. On the contrary, it is affected by both distortions in personal taxation and accelerated depreciation. Indeed, it is easy to see from (5.5) that if either $\tau^\rho{}_i = \tau^\rho{}_c$ or $a=\delta$, C_K^o narrows down to $i + \delta$, which in turn corresponds to the benchmark case with no taxation or pure debt financing. These results are highly intuitive. Forced retention of profits induces the market revaluation of shares, and the resulting capital gains are taxed at the rate $\tau^\rho{}_c$. Debt interests , on the other hand, are taxed at the rate $\tau^\rho{}_i$. Therefore, if $\tau^\rho{}_i = \tau^\rho{}_c$ the shareholder is indifferent to the choice between debt financing and retention. The cost of capital in (5.5) is therefore unaffected by the tax system, even when $a \neq \delta$. Similarly, if $a=\delta$, the UR constraint does not imply any forced retention on the part of the firm. New net investment is then

entirely financed by debt, and the corporation tax does not produce any distortions in the demand for capital.

For the above-mentioned reasons, under the old regime the $\tau^{\rho}_{i} > \tau^{\rho}_{c}$ case was the most likely to occur. Since $a > \delta$, this meant a distortion in capital demand even when the firm was not constrained in the credit market. Interestingly enough, this distortion tended to provide an *incentive* to capital formation. We will come back to this in section 6.

Case 1 assumes that only the UR constraint is binding, and that the company is not rationed in the credit market. However, this is only possible if both σ and $(aA-\delta K)$ are «large». When the firm is credit-rationed, we must distinguish between the two possible different cases, depending on which of the two sources of equity (new share issue or profit retention) is favoured by the company. As we saw in section 4, both cases are possible under the old regime, though the net worth tax generally tended to discriminate against retention.

Case 2

In case 2, the inequality in the third row of table 1 holds, and new share issues are preferred to retention. Thus the company only retains profits because of the UR constraint ($RP^* = aA^* - \delta K^*$); it uses debt as far as it can ($S^* = \sigma I^*$); and it finances the remaining part, if any ($Q^* = I^*(1-\sigma) - (aA^* - \delta K^*)$), with the new issue of shares. The resulting cost of capital is given by :

$$(5.6)\quad F'(K^*) = C_k^o + i\left[\frac{(1-\tau_i)}{(1-\tau_p^o)(1-\tau^o)} - 1\right](\theta^o - \sigma)$$

where $\theta^o = [(\rho^o + \delta)/(\rho^o + a)]$. By comparing (5.6) with (5.5), we see that there is now an extra term on the RHS of the equation, which captures the effect on the cost of capital of the use of a dominated source of finance. This extra term is positive, thus making the cost of capital in case 2 greater than it is in case 1. The expression in square brackets to the RHS of (5.6) represents the extra cost of using one lira of new shares, instead of debt, in order to finance the investment. It is positive because in the old regime, the tax burden on interest income is lower than the overall taxation on dividend income (see section 3). The term $(\theta^o - \sigma)$ measures the extent to which this

dominated source of finance is employed, and it must also be non-negative for case 2 is to be feasible[29].

To get a clearer understanding of the formula, it should be pointed out that for $a=\delta$ (which implies $\theta^o=1$ and $RP^*=0$), the RHS of (5.6) comes down to $\delta + \sigma i + (1-\sigma)\, i\ (1-\tau_i) / [(1-\tau^o)(1-\tau^o_{p})]$. The cost of capital in this case is then simply a weighted average of the cost of capital under debt and under a new issue of shares, with σ as the weighting factor. When $\sigma=1$, the company is not rationed in the credit market, all investment is debt-financed, and we return to the *laissez-faire* condition $F'(K^*)= \delta + i$.

Finally, note that in 5.6 the net worth tax rate does not appear in the formula. This is as expected, since «fiscal» retained profits are zero, and the new share issue does not affect the tax base of the net worth tax (see equation 3.6).

Case 3

In case 3, the overall tax burden on dividends is higher than the one on retained profits. Therefore the company never issues any new shares ($Q^* = \underline{Q}$), it uses debt as far as possible ($S^*=\sigma I^*$), and it finances the remaining part of the investment through retention ($RP^*=(1-\sigma) I^*$). Note, however, that only a part of these retained profits are «fiscally» retained profits, i.e. that part (if any) which exceeds «forced» retention ($aA^*-\delta K^*$). The cost of capital in this case is given by:

$$(5.7)\quad F'(K^*) = C_k^o + i\left[\frac{(1-\tau_i)+\left(1-\tau_c^o\right)\frac{\tau_k}{i}}{(1-\tau_c^o)(1-\tau^o)} - 1\right]\left(\theta^o - \sigma\right)$$

Equation (5.7) is very similar to equation (5.6) and can be interpreted in the same way. With regard to the case where only the UR constraint is binding (equation 5.5), there is now an extra term which represents the additional cost for the firm of being forced by the market credit constraint to use a dominated source of finance, «fiscally» retained profits. The expression in square brackets to the RHS of (5.7) measures the extra cost for the shareholder of using one lira of (fiscally) retained profits rather than debt. As shown in section 3, this expression is certainly positive, in spite of the fact that capital gains were in general exempt from taxation under the old regime. Note again that for $a=\delta$, (5.7) simplifies to:

[29] Indeed, by working on the first order conditions of the problem, it can be shown that $\sigma^* = \theta^o$, so that for $\sigma \geq \sigma^*$ we return to case 1. A formal proof is available from the authors on request. In the new regime's case, of course, $\sigma^* = \theta^N$.

$$(5.7') \quad F'(K^*) = \delta + i\sigma + i\left[\frac{(1-\tau_i)+\left(1-\tau_c^o\right)\frac{\tau_k}{i}}{(1-\tau_c^o)(1-\tau^o)}\right](1-\sigma)$$

so that the cost of capital is just the weighted sum of the cost of debt and retained profits. Again, for σ=1, no constraint is binding and we return to the *laissez-faire* condition $F'(K^*) = \delta + i$.

It should also be noted that in (5.7) both the corporate tax rate and the (present value) property tax rate appear. The reason for this is simple. In case 3, the company is forced to use retained profits beyond the amount of the difference between fiscal and true depreciation. Thus corporate taxation bites and increases the cost of capital. Furthermore, as net fiscal retained profits are now positive, the tax base of the net worth tax rises, and this tax affects the cost of capital too.

5.2.2 The new tax regime

Let us now turn to the analysis of the «new» tax regime. As in the previous case, we proceed by substituting for the relevant equations in (5.4), by carrying out the maximising exercise of the firm, and by manipulating the first order conditions in order to derive the formulas for the cost of capital (see the Appendix). As debt is always the preferred source of funding, and as the ranking of the two sources of equity depends on the parameters (see section 3), once again we obtain the same three possible cases discussed in the previous sub-section. We can therefore avoid repeating most of the comments we have already made, and focus instead on the formulas for calculating the cost of capital under the new tax regime, and on a discussion of the differences between the «new» and the old regimes.

Case 1

In this case the firm is not constrained by the credit market constraint, but only by the UR constraint. Thus, it finances its investment totally with debt with the exception of that part which results from forced retention (i.e. $RP^* = aA^* - \delta K^*$; $Q^* = \underline{Q}$; $S^* = I^* - \underline{Q}$ $(aA^* - \delta K^*)$). The cost of capital under the new tax regime is given as follows :

$$(5.8) \quad F'(K^*) = i[1 - \frac{(a-\delta)(\tau_i - \tau^N{}_c)}{(\rho^N + a)(1-\tau^N{}_c)}] + \delta + i\theta^N \frac{\tau_r}{1-\tau_h^N - \tau_r} \equiv C_K^N$$

where $\theta^N = [(\rho^N + \delta)/(\rho^N + a)]$. Comparing (5.8) with (5.5), we can see that the two formulas are very similar, except for the additional element $i\theta^N \frac{\tau_r}{1-\tau_h^N - \tau_r}$, which appears with a positive

sign on the RHS of (5.8). This element represents the additional distortion to the cost of capital caused by the new regional tax (IRAP). This is due to the fact that debt interests are not deductible from the tax base of IRAP (see section 2). This makes debt financing more costly than under the old regime, and this cost depends directly on the IRAP tax rate. Indeed, it is easy to see that (5.8) would be exactly the same as (5.5) if we let τ_r fall to zero. It should also be noted that the allowance for the normal return on the equity invested in the company does not appear in (5.8). This is for the same reason that net worth tax did not appear in equation (5.5). In case 1, the firm neither retains fiscal profits nor issues new shares. No accumulation of equity thus takes place, and the company is not eligible for the new equity allowance[30].

As was mentioned in section 2, the case $\tau_i = \tau^N{}_c$ is a highly likely one for a majority of shareholders under the new regime. Substituting in (5.8), we then see that the second term in the square brackets on the RHS of (5.8) disappears. It thus follows that in case 1, even where $a \neq \delta$, the company's real demand for capital under the new regime would not be affected by taxation if it were not for the extra term $i\theta^N \frac{\tau_r}{1-\tau_h^N-\tau_r}$. It must be noted, however, that this term is quantitatively very small, given the current values of the IRAP and IRPEG tax rates. We will come back to this in section 6.

Summing up, then, we can say that under the new tax regime, in the case where only the UR constraint is binding, the main tax induced distortion results from the introduction of the new local tax, IRAP. On the contrary, under the old regime, it resulted both from the allowance for accelerated depreciation and from the lack of capital gains taxation. Interestingly enough, the distortions in the two regimes work in opposite directions: stimulating demand for capital under the old regime, and slightly reducing it under the new regime.

Case 2

If the company is constrained in the credit market, it has to use equity capital to finance part of its investment. In case 2, new issues of shares are preferred to retained earnings, so that retention is limited to satisfying the UR constraint: i.e. $S^*=\sigma I^*$; $Q^* = I^*(1-\sigma) - (aA^*-\delta K^*)$; $RP^*= (aA^*-\delta K^*)$. The cost of capital under the new regime can be written as:

[30] It would indeed become eligible for this allowance if it did not deduct anticipated depreciation to define accounting profits. In such a case the corresponding increase in reserves would contribute towards enlarging the base for the calculation of the equity allowance.

$$(5.9)\quad F'(K^*) = C_K^N + \frac{i}{1-\tau_h^N-\tau_r}\left[\frac{1-\tau_i}{1-\tau_p^N} - 1 + \tau_h^N - \frac{i_E}{i}\left(\tau_h^N - \tau_l^N\right)\right]\left(\theta^N - \sigma\right)$$

In comparing (5.9) with (5.8), we can see that a new term appears on the RHS, representing the company's forced use of a more expensive source of financing. Provided that i_E is not much greater than i, this extra term will be positive (see the discussion in section 3). Equation (5.9) may look different from the corresponding equation under the old regime (5.6), but it is easy to check that by eliminating the two new features of the reform, IRAP and DIT (i.e. by setting $i_E = \tau_r = 0$ in (5.9)) the two equations become exactly the same. The terms i_E and τ^N_l appear in equation (5.9) because in this case the firm is forced by the credit market constraint to finance part of its investment with a new share issue. It therefore accumulates equity (see equation 3.8) and enjoys the allowance on its «ordinary» return.

It is of course difficult to compare equations (5.9) and (5.6), as so many parameters have been changed by the reform. This is why we use numerical examples in the next section. However, we should point out that, as was seen in section 3, for a large number of taxpayers the reform implies $\tau_i = \tau^N_p$. Furthermore, $i_E \approx i$ is very likely, given the current attitude of Government. Substituting in (5.9), the expression in the square brackets on the RHS simplifies dramatically in this case, leaving only the term τ^N_l. And indeed, if we let $\tau^N_l = 0$, as suggested in the ACE proposal, (5.9) would become identical to (5.8), implying a total indifference of the company between new share issue and debt-financing. Given the low value of τ^N_l, however, it is also clear that the reform in case 2 provides the credit constrained company with an advantage with respect to the situation under the old tax regime.

Case 3

Finally, let us look at the case where retained profits constitute the second choice of funding, so that under the credit market constraint, the company would finance its remaining investment requirements through retention only (i.e. $S^* = \sigma I^*$; $Q^* = Q$; $RP^* = (1-\sigma) I^*$). The formula for the cost of capital in this case is:

$$(5.10)\quad F'(K^*) = C_K^N + \frac{i}{1-\tau_h^N-\tau_r}\left[\frac{1-\tau_i}{1-\tau_c^N} - 1 + \tau_h^N - \frac{i_E}{i}\left(\tau_h^N - \tau_l^N\right)\right]\left(\theta^N - \sigma\right)$$

Equation (5.10) is very similar to equation (5.9); the only difference is that the rate of capital gains tax replaces that of dividend taxation. As a result, very much the same comments could be

made here, and so we will not bother repeating them again. We would just like to point out that for those shareholders where $\tau_c^N = \tau^N{}_p$ holds, equation (5.10) is exactly identical to equation (5.9), as it should be since in such a case the company is indifferent when it comes to choosing between the two sources of equity.

We can therefore conclude this section by saying that the effect of the reform on the demand for capital is generally ambiguous, as it depends on two countervailing factors. Retained profits, and to a lesser extent the new issue of shares, are taxed less under the new regime as a result of the elimination of ILOR and of net worth tax on the one hand, and the offer of the DIT allowance on the other. It remains to be seen, however, whether this can compensate for the higher taxation on the debt-financed part of the marginal investment. Intuition suggests that the more restrictive the credit market constraint is (i.e. the lower the σ), the more favourable the new regime will be for companies. However, the change in ρ also induced by the reform further complicates the picture, and does not enable us to come to general conclusions, since a number of different cases must be taken into consideration. To gain further insights, we then recur to numerical simulations

6. Numerical simulations

Table 2 illustrates the cost of capital, net of economic depreciation, under the pre- and post-reform regimes, calculated using the formulas derived in the previous section, together with details of the tax code. Calculations have been made on the assumption that the market interest rate stands at 5%[31].

[31] We assume, moreover, that the imputed interest rate used to calculate the ordinary return under the new regime is equal to the market interest rate. Depreciation allowances are computed on the assumption that the linear fiscal coefficient is 15.23% for machinery and equipment, and 3.58% for buildings (see Bontempi, Giannini, and Golinelli, 1995). True exponential depreciation rates are set at 12.25% and 3.6% respectively for machinery and buildings.. In the absence of adequate estimates for the Italian economy, we utilised the depreciation rates used by the OECD to make international comparisons (see OECD, 1991). It is worth noting that given these assumptions, and considering the effect of anticipated depreciation too, fiscal depreciation turns out to be significantly higher than real economic depreciation.

Table 2. Cost of capital under the pre and post reform tax regime

Source of finance	Machinery		Buildings		Non-depreciable assets or a=δ	
	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform
Case 1: Full financial flexibility equations (5.5) and (5.8)	4.6%	5.1%	4.8%	5.3%	5%	5.4%
Case 2: Debt, new share issues and retained earnings eq. (5.6) and (5.9) [32]						
• σ = 0	6.4%	5.5%	8.4%	6.0%	10.1%	6.4%
• σ = 0.2	5.3%	5.3%	7.3%	5.7%	9.1%	6.1%
• σ = 0.4	4.6% (1)	5.1% (1)	6.3%	5.5%	8.1%	5.9%
• σ = 0.6	4.6% (1)	5.1% (1)	5.3%	5.4%	7.1%	5.7%
• σ = 0.8	4.6% (1)	5.1% (1)	4.8% (1)	5.3% (1)	6.0%	5.5%
• σ = 1.0	4.6% (1)	5.1% (1)	4.8% (1)	5.3% (1)	5.0%	5.4%
Case 3: Debt and retained earnings eq. (5.7) and (5.10)						
• σ = 0	6.6%	5.7%	8.9%	6.4%	10.9%	7.0%
• σ = 0.2	5.4%	5.4%	7.7%	6.1%	9.8%	6.7%
• σ = 0.4	4.6% (1)	5.1% (1)	6.5%	5.8%	8.6%	6.3%
• σ = 0.6	4.6% (1)	5.1% (1)	5.4%	5.4%	7.4%	6.0%
• σ = 0.8	4.6% (1)	5.1% (1)	4.8% (1)	5.3% (1)	6.2%	5.7%
• σ = 1.0	4.6% (1)	5.1% (1)	4.8% (1)	5.3% (1)	5.0%	5.4%

(1) The cost of capital cannot be lower than in case 1, because the Uniform Reporting system constraints the use of debt financing.

In the benchmark case 1, where the company is totally flexible over its financing strategies, the reform results in a slight increase in the cost of capital (about half a percentage point). More precisely, whereas under the old regime the cost of capital for machinery and buildings was moderately lower than the market interest rate, after the reform it is somewhat higher. As explained in the previous section, under full financial flexibility, both regimes create tax distortions, but they operate in opposite directions. The old regime provided an incentive to capital formation, because of the preferential treatment of capital gains with respect to interest income[33], and because of accelerated depreciation allowances[34]. Under the new regime, the tax distortion penalises capital formation, mainly because of the new regional tax (IRAP). Without this tax, the post reform regime

[32] To calculate τ^O_p and τ^N_p we assumed that c^O =56.25%, t^O_p=41%, c^N =58.73%, t^N_p=40%, t^N_m=34.89%. The latter is the highest average tax rate for the income bracket taxed at the 40% marginal tax rate.

[33] To compute the cost of capital under the old regime we assumed that τ^O_c =0 and that τ_i =0.125.

[34] If the asset did not depreciate, or if fiscal depreciation followed the same time path as economic depreciation, then the incentive would disappear and the system would be neutral (see table 2).

would be perfectly neutral with respect to the cost of capital, irrespective of the presence of accelerated depreciation[35].

The numerical simulations illustrated in Table 2 show, however, that in both cases the distortions are quantitatively very small. It should also be noted that under the old regime the tax system got closer to neutrality (i.e. the cost of capital got closer to the 5% market interest rate), the longer the life of an asset. The opposite is now true after the introduction of the reform.

Because of the presence of accelerated depreciation allowances, the Uniform Reporting convention constrains the maximum fraction of debt financing (σ^*) allowed to a company[36]. Given the depreciation coefficients used in our numerical simulations, σ^* turns out to be around 35% for machinery and 70% for buildings under *both* tax regimes[37]. For values of σ greater than σ^*, the credit market constraint does not bite and as shown in the table, the cost of capital is always equal to that in Case 1. This is the lowest possible level of the cost of capital under either tax regime, given the relative fiscal advantage of debt financing, and is lower under the old regime. However, for values of σ smaller than σ^*, the company is rationed on the credit market, and has to use equity finance instead, either through issuing new shares (case 2) or through retaining profits (case 3). As shown in table 2 [38], in such cases the reform tends to reduce the cost of capital. The reduction is of course greater, the lower the fraction of investment financed through debt is, and the longer the life of the asset. For example, in the extreme case of an investment entirely financed through internal funds (Case 3), the cost of capital decreases by around 14% for machinery, 28% for buildings and 36% for non-depreciable assets, thus also levelling out the field of play for assets having different life spans. Under both tax regimes, the cost of capital tends to decrease with an increase in the debt/equity ratio, and is lower for those shorter-life capital assets. However, these distortions are much lower under the new tax regime than they were under the old regime.

In order to get a clearer picture of the effect of the reform, the following three graphs show the pattern of the cost of capital before and after the tax reform, in the cases of machinery, buildings

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[35] In table 2 we assume the «normal» case $\tau^N_c = \tau_i = 0.125$. As explained in section 5, in case 1 this makes the system neutral regardless of the time path followed by fiscal and economic depreciation.

[36] That is, in the equations in section 5, $\sigma \leq \theta^j$, $j=N,O$.

[37] More precisely, σ^* equals 34.4% and 69.2% respectively, for machinery and buildings under the old regime, and 35.4% and 71.4% for the two assets under the new regime. Obviously, for a non-depreciable asset (or if fiscal depreciation follows economic depreciation) the proportion of debt financing might be, in the absence of other constraints, as high as 100%.

[38] To calculate the cost of capital in case 2 we have assumed that the personal tax rates of marginal shareholders were the highest ones at which new share issues continued nevertheless to be preferred to retention. These rates are 41% under the old regime and 40% under the new one. In the pre-reform situation, and for a market interest rate of 5%, new share issues were preferred to retained earnings even when the shareholder could opt for the final 12.5% rate. In such a case, the values for the cost of capital would be slightly higher than those illustrated in table 2 (case 2), but lower than those illustrated in case 3. After the reform, which extended the 12.5% final tax rate to most capital income, the shareholder became indifferent to the choice between new share issues and retained earnings. The respective cost of capital is that illustrated in case 3.

and non-depreciable assets (or assets for which fiscal and true depreciation rates coincide) respectively. The cost of capital is shown for case 3 (case 2 does not differ much), and for different debt/equity ratios, up to the highest value allowed by the UR constraint.

Fig. 1
Cost of capital for machinery (case 3; market interest rate =5%)

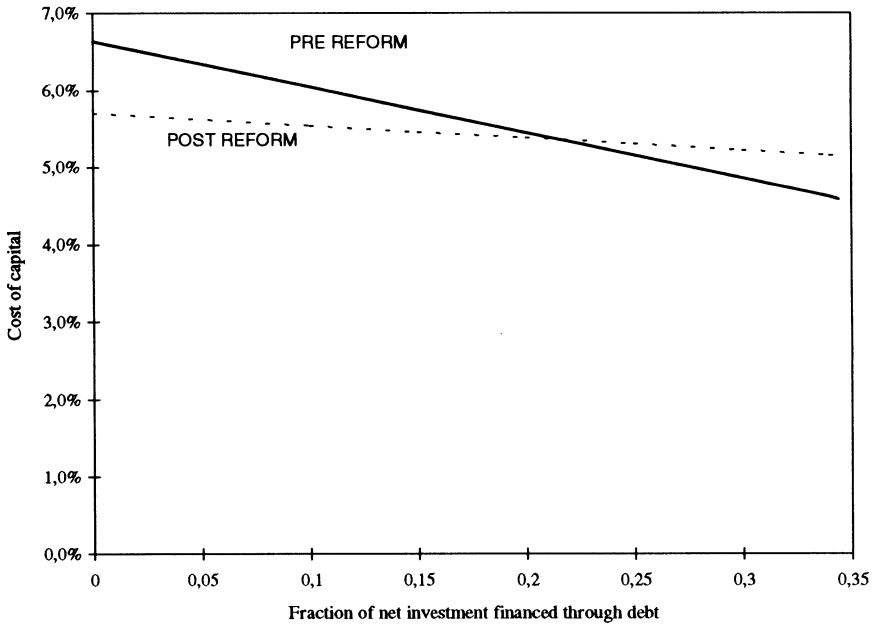


Fig. 2
Cost of capital for buidings (case 3; market interest rate =5%)

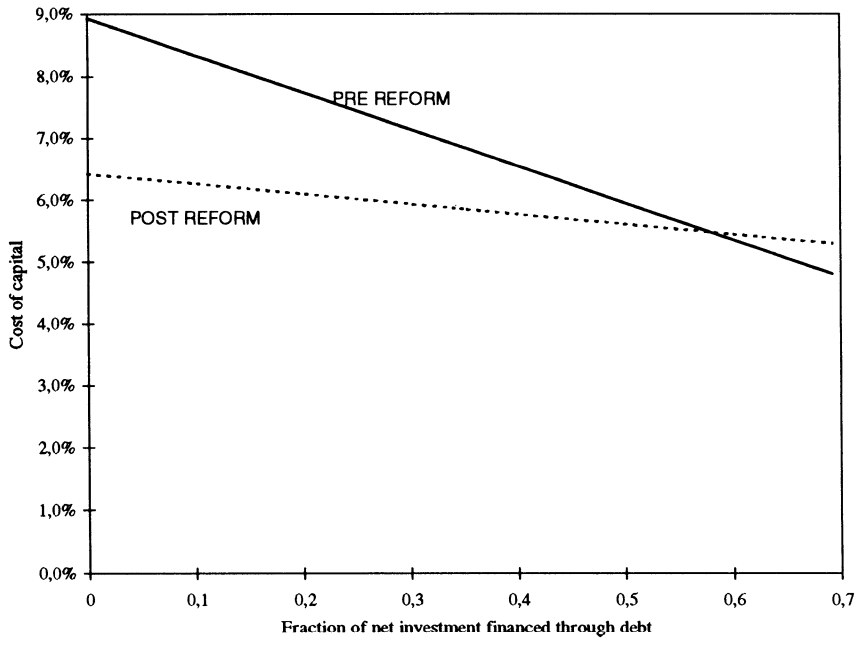
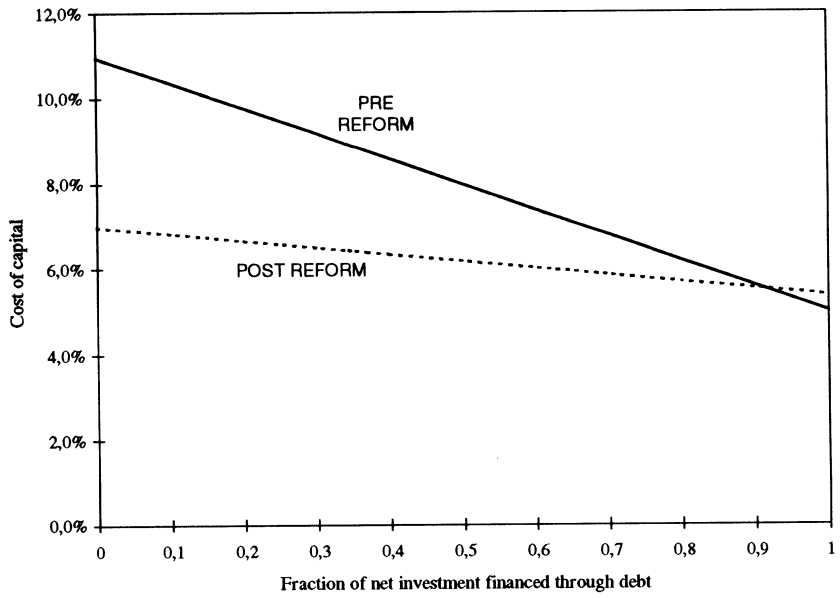


Fig. 3
Cost of capital when a=δ (case 3; market interest rate =5%)



As the figures clearly show, the reform mainly benefits those companies that are strongly constrained on the credit market or that, for different reasons, prefer to use equity capital. Note further, that for longer-life capital assets or for those for which there is less discrepancy between fiscal and economic depreciation, the cost of capital is reduced by the reform, even where a relatively high proportion is debt-financed.

7. Concluding remarks

The 1998 Italian corporate tax reform was introduced in order to achieve two main objectives: to reduce the statutory rate on profits, and to increase the neutrality of the system with respect to real and financial choices.

The ability of the reform to achieve the first objective can easily be assessed: by replacing ILOR with IRAP, the legal tax rate on profits fell from 53.2% to 41.25%. Considering the DIT allowance as well, and the minimum average corporate tax rate of 27%, the statutory rate will progressively decrease (as «ordinary income» increases) to 31.25%.

To analyse the potential impact of the reform on investment and financing decisions, we used a simple model of firms' maximising behaviour and derived formulas for the cost of capital under different financing plans. We purposely took account of the legal constraint on dividend distribution due to the Uniform Reporting accounting system, and of the possibility that the company be constrained on the credit market. The numerical examples given in the last section

clarify the theoretical results and provide some empirical evidence of the potential effects of the reform.

The present paper's main conclusions may be summarised as follows.

a) The reform is successful in increasing the neutrality of the system with respect to the alternative sources of finance and to capital goods with differing life-spans. The reform does not reach a situation of perfect neutrality with respect to capital formation because of the new regional tax (IRAP). Debt continues to be the most favoured source of finance, because of the taxation of ordinary income at the corporate level. However, the huge distortions observed under the old tax regime have been drastically reduced by the reform.

b) The increased neutrality concerning debt and equity financing derives from a significant reduction in the cost of capital for investment financed through new share issues or retained earnings, and from a moderate increase in the cost of capital in the case of debt financing. In particular, the reform is going to benefit those companies that tend to be constrained in the credit market or that make more use of equity financing (both internal funds and new subscriptions). For those companies that are fully flexible in their financing strategies, there will be a moderate increase in the cost of capital.

c) The effects of the reform on the cost of capital also depend on the life-span of the capital asset and on the ability of the company to make full use of the advantages offered by the fiscal system. For assets of relatively short life-span, the reform results in a (moderate) reduction in the cost of capital only if the proportion of debt financing is very low On the contrary, for longer-life capital assets, or for those cases where fiscal and economic depreciation do not greatly diverge, the cost of capital is reduced by the reform, even if debt/equity ratios are relatively high (up to nearly 60% for buildings, and up to 92% if fiscal and economic depreciation are the same).

In brief, the reform may be considered as an important step towards a greater degree of uniformity in the taxation of capital and business income and towards the removal of fiscal obstacles to the development of capital markets. To fully understand the impact of the reform on capital formation, further research would be necessary in order to assess the importance of credit rationing and other imperfections in capital markets, and to investigate the extent to which companies make full use of anticipated depreciation allowances. However, the magnitude of the variations in the cost of capital suggests that in most cases one should not expect the reform to have a significant impact on capital formation.

A more interesting suggestion for further research is that of analysing the future of the newly introduced system. As we have emphasised in section 2, the reform was implemented under a tight budgetary constraint, and further adjustments, which will depend on the relaxation of this constraint, are expected to be made in the future.

Appendix

In this appendix we derive the first order conditions of the problem. Start with the relevant Hamiltonian (4.3).

$$(4.3)\quad H^j = \left[\frac{(1-\tau_p^j)}{(1-\tau_c^j)}D - Q\right] + \mu^j_B\, dB/dt + \mu^j_K\, dK/dt + \mu^j_A\, dA/dt + \mu^j_E\, dE_j/dt \qquad j=O,N$$

Under the old regime, the first-order conditions are

(A1) $dH^O/dI = -((1-\tau^O_p)/(1-\tau^O_c))+\mu^O_K + \mu^O_A + \mu^O_E = 0$

(A2) $dH^O/dS = ((1-\tau^O_p)/(1-\tau^O_c))+\mu^O_B - \mu^O_E$

(A3) $dH^O/dQ = ((1-\tau^O_p)/(1-\tau^O_c))-1-\mu^O_E$

(A4) $\mu^O_B/dt - \rho^O \mu^O_B = ((1-\tau^O_p)/(1-\tau_c))(1-\tau_O)i$

(A5) $d\mu^O_K/dt - \rho^O \mu^O_K = -((1-\tau^O_p)/(1-\tau^O_c))((1-\tau_O)F_K - \delta) - (\mu^O_A+\mu^O_E)\,\delta$

(A6) $d\mu^{jO}_A/dt - \rho^O \mu^O_A = -((1-\tau^O_p)/(1-\tau^O_c))\,\tau_O a + (\mu^O_A+\mu^O_E)a$

(A7) $d\mu^O_E/dt - \rho^O \mu^O_E = ((1-\tau^O_p)/(1-\tau^O_c))\tau_K$

and the transversality conditions

(A8) $\lim_{t\to\infty} \mu^O_K K\, exp(-\rho^O t)=0$

(A9) $\lim_{t\to\infty} \mu^O_B B\, exp(-\rho^O t)=0$

Under the new regime, the first-order conditions are

(B1) $dH^N/dI = -((1-\tau^N_p)/(1-\tau^N_c))+\mu^N_K + \mu^N_A + \mu^N_E = 0$

(B2) $dH^N/dS = ((1-\tau^N_p)/(1-\tau^N_c))+\mu^N_B - \mu^N_E$

(B3) $dH^N/dQ = ((1-\tau^N_p)/(1-\tau^N_c))-1$

(B4) $d\mu^N_B/dt - \rho^N \mu^N_B = ((1-\tau^N_p)/(1-\tau^N_c))(1-\tau^N_h)i$

(B5) $d\mu^N_K/dt - \rho^N \mu^N_K = -((1-\tau^N_p)/(1-\tau^N_c))((1-\tau^N_h-\tau_r)F_K - \delta) - (\mu^N_A+\mu^N_E)\,\delta$

(B6) $d\mu^N_A/dt - \rho^N \mu^N_A = -((1-\tau^N_p)/(1-\tau^N_c))(\tau_r+\tau^N_h)a + (\mu^N_A+\mu^N_E)a$

(B7) $d\mu^N_E/dt-\rho^N\mu^N_E = -((1-\tau^N_p)/(1-\tau^N_c))(\tau^N_h-\tau^N_l)i_E$

and the following transversality conditions

(B8) $\lim_{t\to\infty} \mu^N_K K\, exp(-\rho^N t)=0$

(B9) $\lim_{t\to\infty} \mu^N_B B\, exp(-\rho^N t)=0$

Under legal and market constraints, the maximisation procedure involves the following Lagrangean

(5.4) $\underset{(I,S,Q)}{\text{Max}}\ L^J = H^J + \lambda^j_Q(Q-\bar{Q}) + \lambda^j_D(I - S - Q - (aA-\delta K)) + \lambda^j_S(\sigma I - S)$ j=O,N

Under the above regimes, the first three conditions can be written as

(C1) $dL^j/dI = dH^j/dI + \lambda^j_D+\lambda^j_S\,\sigma=0$

(C2) $dL^j/dS = dH^j/dS-\lambda^j_D-\lambda^j_S=0$

(C3) $dL^j/dQ = dH^j/dQ+\lambda^j_Q-\lambda^j_D=0$

with $j=O, N$ respectively.

Under the *old regime* conditions (A5) and (A6) are

(C4) $d\mu^O_K/dt-\rho^O\mu^O_K = -((1-\tau^O_p)/(1-\tau^O_c))((1-\tau_O)F_K-\delta)-(\mu^O_A+\mu^O_E+\lambda^O_D)\delta$

(C5) $d\mu^O_A/dt-\rho^O\mu^O_A = -((1-\tau^O_p)/(1-\tau^O_c))\tau_O a+(\mu^O_A+\mu^O_E+\lambda^O_D)a$

while conditions (A4), (A7), (A8) and (A9) still hold.

Turn now to the *new regime*, where the following conditions hold

(C6) $d\mu^N_K/dt-\rho^N\mu^N_K = -((1-\tau^N_p)/(1-\tau^N_c))((1-\tau^N_h-\tau_r)F_K-\delta)-(\mu^N_A+\mu^N_E+\lambda^N_D)\delta$

(C7) $d\mu^N_A/dt-\rho^N\mu^N_A = -((1-\tau^N_p)/(1-\tau^N_c))(\tau_r+\tau^h_N)a+(\mu^N_A+\mu^N_E+\lambda^N_D)a$

while conditions (B4), (B7), (B8) and (B9) are unchanged.

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