

SESSIONE VII

IMPRESE: TASSAZIONE, CREDITO E OCCUPAZIONE

**Aliquote effettive di imposta per le imprese
in presenza di nonlinearità nella tassazione**

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Corporate effective tax rates in presence of nonlinearities in taxation

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Abstract

Il sistema italiano di tassazione delle società di capitali prevede, a partire dal 2008, una limitazione alla deducibilità delle spese per interessi passivi nella misura del 30% del ROL. Questa misura introduce una non-linearità nel computo della base imponibile che pone problemi di tipo sia teorico che pratico per il calcolo di indicatori forward looking sul carico d'imposta effettivo sopportato dalle imprese. In questo articolo proponiamo un metodo per la soluzione di questi problemi utilizzando l'approccio proposto da Devereux-Griffith. L'analisi degli effetti distorsivi della tassazione sulle scelte dell'impresa è incentrata in particolare sull'interazione tra la limitazione alla deducibilità degli interessi e l'aiuto alla crescita economica introdotto nel 2011.

Parole chiave: Tassazione d'impresa, costo del capitale, aliquote effettive di imposta, deducibilità parziale degli interessi, ACE

Abstract

In 2008 a limitation to interest expenses deductibility entered into force in the Italian corporate tax code. This provision introduced nonlinearities in the Italian corporate taxation that pose theoretical and practical problems in the computation of forward-looking indicators using Devereux-Griffith methodology. In this paper we address those problems, we model the Italian tax system in the framework of Devereux-Griffith scheme and compute the cost of capital and effective tax rates. In this way we investigate the distorting effects of Italian corporate tax reforms since 2008, especially the interaction between the limitation of interest expenses and an allowance for corporate equity introduced in 2011.

Keywords: Corporate taxation, cost of capital, effective tax rates, partial interest deductibility rule, ACE

1 Introduction

The importance of corporate taxation lies not so much in the ability of the government to collect financial resources as in the fact that it can influence the choices of firms, like the level of investments, the sources of finance, the labor demand, the location decisions.

In order to measure the effective tax burden and its distorting effects on the choices of firms, two competing approaches can be applied: computing backward-looking measures on real data using microsimulation models or computing forward-looking indicators for a hypothetical investment project. The former approach is appropriate to analyze the distribution of the tax burden across different types of firms, and it can give a clear picture of the tax position of a particular company and a good grasp on the effects of tax reforms on the total tax revenue. But since it is based on the observation of past data and since tax payments in any

period may depend on the history of the firm, it is the latter approach that can provide a more comprehensive analysis of the effects of tax legislation on *future* investment behaviour, helping in better understanding incentives generated by a particular tax regime.

Both approaches have been used by the Italian National Institute of Statistics (ISTAT) to provide useful insights on the recent Italian corporate tax reforms (see [1, Ch. 2], [3, Sec. 5.2], [2]. See also [5]).

The goal of this paper is to focus on the computation of forward-looking indicators (cost of capital, effective tax rates) for domestic investments, using the methodology developed by Devereux and Griffiths (following King and Fullerton). Their system is based on analyzing a one-period perturbation of the capital stock for a hypothetical company: a one euro additional investment made at time t , and reversed at time $t + 1$, that gives a real pre-tax net return of p (the profitability rate). The company is assumed to be mature, profitable and therefore able to take full advantage of tax benefits.

In particular we concentrate on how to apply D&G methodology in the specific case of Italy and how to model the Italian tax liability function as a result of recent tax reforms. Moreover we develop a technical tool in order to apply D&G methodology also in special cases in which the tax liability is not linear with respect to the profitability of the additional investment.

More specifically, in 2008, a major fiscal reform has introduced in the Italian tax system a limitation to the deductibility of interest expenses based on the Gross Operating Profit (GOP) of the firm. This constraint has been allowing the firm to carry forward undeducted interest expenses or GOP leftovers. This limitation poses two kinds of problems in the framework of the D&G model.

First of all, with this limitation the tax burden on p does not depend only on the way in which the unitary investment has been financed or on the asset purchased, but also on the position of the firm in terms of GOP and interest expenses *prior* to the investment. It seems reasonable to believe that a mature firm will limit the use of debt in order to balance GOP and interest expenses to take full advantage of the partial interest deductibility rule. However, the simultaneous presence of an equity allowance (ACE) introduced in 2011, and the carry-forward provision make this far less obvious. We prove in Section 5.1 that under certain circumstances a value-maximizing firm will indeed try to balance GOP and interest expenses before undertaking new investments (see Proposition 1).

Secondly, even when GOP and interest expenses are balanced, the additional unitary investment is still subject to the GOP rule: this means that taxation is not linear in p . As we will see (see Section 5.2), this implies that the computation of forward-looking indicators is more difficult. That is why we have developed a script in Excel/VBA that can numerically avoid the obstacle; moreover since the script can manage any form of tax liability functions and of depreciation schemes, then it can be applied to any year and any country, without analytically solving the equations for the cost of capital and other forward-looking indicators.

Finally, as an application, we present a short analysis of the evolution of the cost of capital and effective tax rates for Italy from 2007 to 2016, taking into account all the relevant tax reforms in the period 2008–2014. In [9], Zangari provides an analysis of the effects of the introduction of the GOP rule on the cost of capital, using a partial economic equilibrium model. However the author introduces a simplification assuming an average interest deductibility parameter α . In this way he avoids referring to the GOP in order to determine the amount of interest expenses that can be deducted, and at the same time he is not taking into consideration the carry-forward possibility.

The paper is organized as follows. In Section 2 we briefly review the definition of the main forward-looking indicators: the cost of capital, the Effective Marginal Tax Rate (EMTR) and the Effective Average Tax Rates (EATRs). In Section 3 we present the general Devereux–Griffith model for domestic investments. In Section 4 we sketch the two most important Italian tax reforms since 2008. In Section 5 we explain the methodology that we have adopted to model these tax reforms within the D&G framework, and how we computed the cost of capital and the EATRs. Finally, in Section 6, we present summary charts for the cost of capital and EATRs in Italy from 2007 to 2016 and a geometric description of the interaction between GOP rule and ACE allowance in 2014.

2 The cost of capital and effective tax rates

Traditionally, the measurement of the effects of tax rules on investment choices is based on the idea of the *cost of capital*, i.e., the minimum pre-tax real rate of return required to undertake an investment. Let us denote by R_t the post-tax economic rent at time t generated by an investment. Then R_t depends on the investment profitability rate p (net of depreciation) and the cost of capital is just the rate $\tilde{p}$ for which R_t equals zero. The percentage difference between the cost of capital and h , the post-tax real rate of return to the shareholder, is called *effective marginal tax rate*:

$$\text{EMTR} = \frac{\tilde{p} - h}{\tilde{p}}.$$

As the name suggests, the EMTR (and the cost of capital) focuses on the impact of taxation on the marginal investment, i.e., an investment that yields a financial return barely sufficient to cover all the costs. Hence the EMTR can give a clear picture on the possible distortions introduced by the tax system (for different assets and sources of finance) but it might not be indicative if a firm faces a choice between different exclusive investment projects from which it expects to earn more than the minimum required rate of return, for example when a firm needs to decide the international location of its investments. In these cases the choice will be made on the basis of the highest post-tax economic rent (with respect to the expected profitability).

This is why Devereux and Griffiths in 1998 (see [6]) proposed a new synthetic forward-looking indicator of the effective rate of taxation: the *effective average tax rate* (EATR). The EATR is the difference between pre-tax and post-tax economic rent scaled down by the present value of the pre-tax income stream (net of depreciation). Denoting by R_t^* the pre-tax economic rent at time t , then

$$\text{EATR} = \frac{R_t^* - R_t}{\frac{p}{(1+r)}},$$

where p is, again, the profitability rate and r is the real interest rate. Thus EATR ponders the proportion of the pre-tax economic rent that goes to the government as corporate tax. Since EATR depends on p , it gives also an idea of the progressivity of the corporate tax system. Note that EATR coincides with EMTR when the profitability p is set equal to the cost of capital $\tilde{p}$.

3 Devereux–Griffith model in a domestic setting

The Devereux–Griffith approach to compute the post-tax economic rent of an investment (R_t), the cost of capital and EATR is now well-established. It is rooted in the model developed by King and Fullerton ([7]) and it computes R_t as the difference between the value of the firm when a new unitary investment has been undertaken and the value of the firm in the absence of this investment. Practically, it is based on simulating a one-period perturbation of the capital stock of a hypothetical, mature company that is not tax exhausted and that can take full advantage of the benefits of tax legislation. More precisely, it is assumed that at time t a shock takes place which increases investment, and hence capital stock, by one unit. This can be achieved by the firm in three different ways (or a mixture of them): retaining some earnings, issuing new equity or increasing the debt. At time $t + 1$ the firm goes back to its original condition, selling the piece of physical capital purchased at time t and contextually repaying the debt or buying back the equity at the original price. Any net return is distributed as dividends. Since this shock produces changes in dividends and taxes during period t and subsequent periods, all these changes must be considered to calculate the value of the company.

The value of the firm can be derived by three equations: the capital market equilibrium condition, the equality of sources and uses of funds and, of course, the tax liability T_{t+s} of the firm at time $t + s$, for each $s \geq 0$. If we set V_t as the value of the firm at time t then, after some algebraic manipulations, we see that

$$(1 + \rho)V_t = \sum_{s=0}^{+\infty} \frac{\gamma D_{t+s} - N_{t+s}}{(1 + \rho)^s}. \quad (1)$$

where ρ is the shareholders' nominal discount rate, γ is the measure of the tax discrimination between new equity and distribution, D_t is the dividend paid in period t and N_t is the new equity issued in period t .

Dividends D_t are the residuals of the model and are defined as

$$D_t = Q_t(K_{t-1}) + N_t - I_t + B_t - (1 + i)B_{t-1} - T_t, \quad (2)$$

where Q_t is the value (at time t) of the revenue at t (it depends on the capital stock K_{t-1} at time $t - 1$), I_t is the investment at time t , B_t is one-period debt issued at time t , T_t is the tax liability at time t and i is the nominal interest rate (risk is ignored).

We would like to evaluate the post-tax economic rent $R_t := (1 + \rho)(V_t^S - V_t)$ generated by the new unitary investment, where the superscript S means “in presence of the shock”. For simplicity, for any time t and for any variable X_t , we will set $\Delta X_t := X_t^S - X_t$. Please, be aware that Δ indicates, for every time t , a difference between two situations (with shock and without shock) and not a difference between consecutive time periods.

By Equation (1) it is clear that

$$R_t := (1 + \rho)\Delta V_t = \sum_{s=0}^{+\infty} \frac{\gamma \Delta D_{t+s} - \Delta N_{t+s}}{(1 + \rho)^s}. \quad (3)$$

4 Interest deductibility and ACE in the Italian tax system

Since 2008 two main corporate tax reforms have been introduced with the aim of making the tax levy more neutral with respect to financing decisions.

The first reform, in 2008, cut both the main statutory corporate tax rate from 33% to 27.5% and the IRAP tax rate from 4.25% to 3.9%. The revenue neutrality was almost ensured by a broaden tax base, obtained mainly through the abolishment of accelerated and anticipated capital depreciation allowances and the introduction of a restriction to interest deductibility. By the latter provision, corporations can still fully deduct interest expenses and similar charges in an amount equal to interest income and similar revenues, but the excess may be deducted up to the 30% of the Gross Operating Profit (GOP). Since 2010, any leftovers (either interest expenses or GOP) are carried forward to subsequent tax years.

Later, at the end of 2011, the ‘Salva-Italia’ introduced in the Italian tax system the so called ‘Aiuto alla Crescita Economica’ (ACE, Aid to Economic Growth). Under the new ACE regime, a notional return on equity is deductible against corporate profits. The Italian ACE is applied on an incremental basis in order to minimize the reduction of the tax return: the notional return is computed on new equity issued from 2011 onwards and on earnings retained since 2011. The notional return is set equal to 3% for the first three years (2011, 2012, 2013) and then 4%, 4.5% and 4.75% for the three subsequent years (‘legge di stabilità’ 2014).

5 Methodology for forward-looking indicators in the case of Italy

In order to properly compute R_t and the cost of capital for Italy we have made some straightforward assumptions on the real interest rate ($r = 2.5\%$), on the Italian HICP ($\pi = 2\%$), and on economic depreciation rates of five possible types of investments: machinery, buildings, intangibles, inventories, financial assets (see [4, Section 4] and [8]).

Then we have modeled the tax function T_t with respect to the Italian tax legislation.

In particular

$$T_t = \text{IRES}_t + \text{IRAP}_t + \text{IMU}_t,$$

where IRES is the corporate tax on corporate profits, IRAP is the local (regional) tax on business activities and IMU is the real estate property tax. More precisely, $\text{IMU}_t = \tau_e K_t^{\text{BUILD}}$, $\text{IRAP}_t = \tau_r(Q_t - L_t)$, $\text{IRES}_t = \tau_h(Q_t - L_t - G_t - i_E E_{t-1} - 0.1 \cdot \text{IRAP}_t)$, where K_t^{BUILD} is the real estate capital subject to IMU, τ_e is the IMU rate (net of IMU deduction from IRES tax base), τ_r is the nominal IRAP rate, τ_h is the IRES rate, i_E is the ACE notional return rate, E_{t-1} is the stock of capital financed by new equity or retained earnings (since 2011), L_t is the depreciation expense and G_t is the ‘GOP rule’ introduced in 2008 (and modified in 2010). That is, G_t

is the allowed deduction for interest expenses. In its simplest form we could say that $G_t = \min\{iB_{t-1}, 0.3Q_t\}$, but since either GOP or interest expenses that cannot be compensated could be carried forward, then we need to consider also leftovers at time $t-1$. Thus $G_t = \min\{iB_{t-1} + [M_t]^-, 0.3Q_t + [M_t]^+\}$, where M_t is the GOP excess at time $t-1$ (if positive) or the excess of interest expenses (if negative). As usual, $[\cdot]^+$ indicates the positive part, and $[\cdot]^-$ the negative part, i.e., $[a]^+ := \max\{0, a\}$, $[a]^- := -\min\{0, a\}$. Therefore from 2011 onwards the Italian tax function could be represented by

$$T_t = \tau Q_t + \tau_e K_t^{\text{BUILD}} - \tau_h i_E E_{t-1} - \tau_h G_t - \tau L_t, \quad (4)$$

where τ is the overall statutory tax rate (IRES and IRAP, net of IRAP deduction from IRES tax base).

5.1 Balancing debt and GOP

Unfortunately the tax liability on the unitary investment strongly depends on the ratio between debt and GOP before the investment is undertaken. Moreover, since excess of either GOP or interest expenses can be carried forward to subsequent years, we cannot restrict our attention just on the instant before the investment. Anyway, it is reasonable to suppose that a mature company would try to benefit from the interest deductibility regulation by adjusting its debt to its GOP, so that debt and GOP are balanced before embarking on the new investment. Because of the simultaneous presence of the ACE deduction, this assumption is actually not obvious and must be verified, at least under certain simplifying conditions.

In this regard we consider a mature company that needs to maintain its capital $K_t = K_0$ stable along time (inflation is not considered): each year the company must invest $I_t = \delta K_0$ in order to counterbalance the economic depreciation δ . Since the production Q_t depends on the capital stock at time $t-1$, then $Q_t = Q_0$ for each t . At time $t=0$ the company becomes aware that starting from time $t=1$ ACE and GOP rule will be fully in force. In this respect, at time $t=0$ the company chooses how much of the new investment δK_0 will be financed by debt, and how much by retained earnings. Hence at time $t=0$ the company borrows an amount equal to B_0 , that might be different from the debt B_{-1} undertaken the previous year. As a simplification, we assume that retained earnings are the only source of internal finance and that, for every $t \geq 0$, B_t is constantly equal to B_0 .

We start again from Equation (1), setting $t=0$. We want to see which is the optimal amount B_0 for which the value of the firm (at $t=0$) is maximal. Dividends are computed by Equation (2). Since $\epsilon := \sum_{s=0}^{+\infty} \frac{1}{(1+\rho)^s} = \frac{\rho+1}{\rho}$, we have that

$$(1+\rho)V_0 = \epsilon\gamma Q_0 - \epsilon\gamma\delta K_0 + \gamma B_0 - \frac{\gamma i}{\rho} B_0 - \gamma i B_{-1} - \gamma B_{-1} - \sum_{s=0}^{+\infty} \frac{\gamma T_s}{(1+\rho)^s}.$$

In order to use Equation (4) we need to calculate E_s and G_s , i.e., the ACE base and the GOP rule.

$$E_s = \left[I_0 - B_0 + B_{-1} + \sum_{n=1}^s (I_n - (B_n - B_{n-1})) \right]^+.$$

By the assumption that the debt is constant over time we have that, for every $s \geq 0$, $E_s = (s+1)\delta K_0 - B_0 + B_{-1}$. As for G_s , notice that the equation of motion of M_s is $M_{s+1} = 0.3Q_s - iB_{s-1} + M_s$, with $M_0 = M_1 = 0$, hence $M_s = (s-1)(0.3Q_0 - iB_0)$ for each $s \geq 2$.

Therefore $G_0 = 0$ and, for each $s \geq 1$, $G_s = \min\{0.3Q_0, iB_0\}$.

We have that

$$T_0 = \tau Q_0 + \tau_e K_0^{\text{BUILD}} - \tau L_0,$$

while, for $s \geq 1$,

$$T_s = \tau Q_0 + \tau_e K_0^{\text{BUILD}} - \tau_h i_E (s\delta K_0 - B_0 + B_{-1}) - \tau_h \min\{0.3Q_0, iB_0\} - \tau L_s.$$

Since the net present value of fiscal allowances due to fiscal depreciation $\sum_{s=0}^{+\infty} \frac{\gamma \tau L_s}{(1+\rho)^s}$ is finite, then

$$(1+\rho)V_0 = \gamma B_0 - \frac{\gamma i}{\rho} B_0 - \frac{\gamma \tau_h i_E}{\rho} B_0 + \frac{\gamma \tau_h}{\rho} \min\{0.3Q_0, iB_0\} + C,$$

where C is a constant that does not depend on B_0 . Therefore we see that if we do not consider personal taxation (i.e., $\rho = i$) then, as long as $i \geq i_E$, V_0 is maximal when iB_0 is equal to $0.3Q_0$. Under the simplifying assumptions stated above, in the Devereux–Griffith framework, we have proved the following

Proposition 1. *If both ACE regime and GOP rule are in force, and the ACE ordinary return rate i_E is less than, or equal to, the nominal interest rate i , then a value-maximizing firm will balance interest expenses with the 30% of its Gross Operating Profit.*

In the case of Italy, given the assumed values of i and i_E , the hypothesis that $i \geq i_E$ is satisfied until 2015.

5.2 Nonlinearities in taxation

Starting from a company with balanced GOP and interest expenses, we can now compute the post-tax economic rent R_t of the new unitary investment and obtain the cost of capital, EATRs and the EMTR. Because of the interest partial deductibility rule, R_t is not linear in p anymore, but it is rather a broken line, and the point at which R_t breaks may very well depend on the debt ratio and the economic and fiscal depreciation rates of the assets purchased.

This entails to more sophisticated computations to deduce the cost of capital: in particular, to compute the cost of capital for a mix of assets and sources of finance it is not possible to separately compute $\tilde{p}$ for each asset/source of finance and then just take a weighted mean. Also computing the cost of capital is a bit more complicated, since R_t cannot be predicted on the basis of just two points.

In order to overcome these difficulties, we have developed a script in Excel/VBA that can handle any form of the tax liability function T_t . The script simulates the new unitary investment at time t and, given the fiscal and economical parameters, it computes $R_t(p)$ for any p ; the cost of capital is then obtained applying the secant method, a well-known root-finding algorithm. Since the script can also manage any structure of fiscal depreciation scheme, then it can be applied to reproduce different tax systems, once the tax function has been set.

6 The cost of capital and EATRs in Italy from 2007 to 2016

In this section we analyze forward-looking indicators for Italian companies from 2007 to 2016. Personal taxation is not included in these calculations to allow comparisons with previous analyses for Italy (see, for example, [4]). During 2008–2014 other reforms have been implemented in addition to those described in Section 4. In order to correctly interpret all the graphs below, in Table 1 we sum up all the fiscal reforms that have an impact on the cost of capital (under D&G model). Both EATRs and the cost of capital have been computed for an equal mix of five kinds of assets that a firm can purchase: machinery, buildings, intangibles, inventories, financial assets.

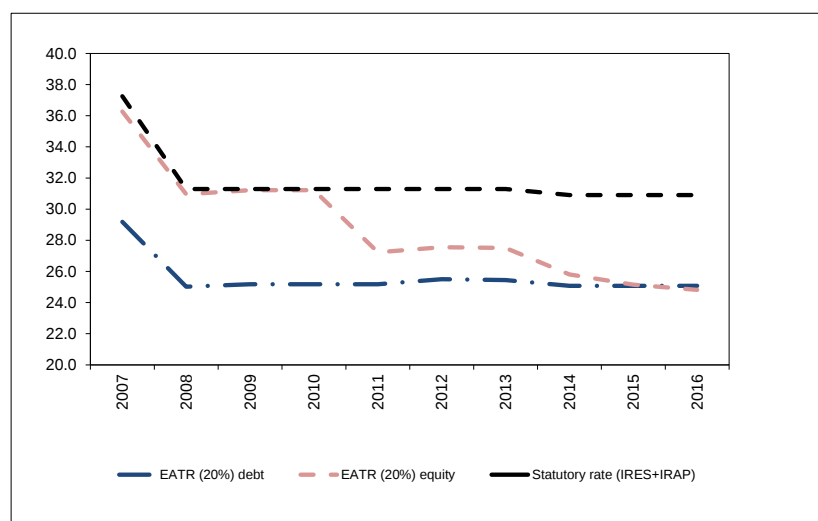
Figure 1 shows the statutory tax rate and the EATR, according to the source of finance. We assume a profitability level of 20%. As expected, both EATRs show a significant decrease in 2008, due to the tax rate cut of the 2008 tax reform. The GOP rule cannot be appreciated in this graph, since the chosen level of profitability is too high and the GOP is never binding. In 2008, the EATR in case of debt is 25.02%, while in case of new equity is 30.96%. From 2008, the EATR for debt financing remains almost constant along time, reaching its maximum (25.50%) in 2012 when the new tax on buildings (IMU) replaced the old one (ICI) with higher rates, and its minimum (25.08%) in 2014–2016, because of the IRAP rate cut. Conversely the EATR for equity financing drops by almost 4 percentage points in 2011, due to the ACE reform, and it drops by another 2.7 percentage points between 2013 and 2016 because of the reinforcement of the ACE deduction. In 2016, for the first time, EATR based on equity becomes smaller (24.81%) than EATR based on debt (25.08%).

Figure 2 shows the evolution of the cost of capital with respect to equity and debt. Contrary to EATRs (for large values of profitability), the cost of capital is more affected by changes in the definition criteria of the tax base than by the variations of the statutory tax rate. The tax wedge between the cost of equity and the cost of debt gives a measure of the distorting effects of tax rules on corporate financing choices. It is seen

Table 1: Tax reforms with an impact on the cost of capital

Tax year	Tax changes
2008	Cutting IRES statutory rate from 33% to 27.5%
	Cutting IRAP ordinary statutory rate from 4.25% to 3.9%
	Introduction of a partial lump-sum IRAP deduction from IRES
	Elimination of tax on buildings (ICI) deduction from IRAP
	Introduction of a 30%-GOP ceiling to interest deductibility
	Abolishment of anticipated depreciation allowances (except for the first period)
2009	Complete abolishment of anticipated depreciation allowances
2011	Introduction of an allowance for corporate equity (ACE) with rate set at 3%
2012	Replacement of ICI with another tax on buildings (IMU), with higher rates
2013	Introduction of a 30%-IMU deduction from IRES
2014	Cutting IMU deduction from 30% to 20%
	Increase of ACE rate from 3% to 4%
	Cutting IRAP ordinary statutory rate from 3.9% to 3.5%
2015	Increase of ACE rate from 4% to 4.5%
2016	Increase of ACE rate from 4.5% to 4.75%

Figure 1: Tax rates (EATR and STR) in Italy



that in 2011, with the contemporaneous application of the GOP rule and ACE regime, the tax levy becomes almost neutral with respect to companies' financing choices: the equity-financing cost of capital drops by 1.16 percentage points, from 3.62% to 2.46%. In 2014 the ACE ordinary rate was raised from 3% to 4%, and equity financing became more convenient than debt financing. But this is true only if the GOP rule is in force, otherwise a completely deductible debt is still preferable to new equity (in fact $i > i_E$). By raising the notional return for ACE to 4.75%, in 2016 the Italian historical advantage of debt over equity has been actually inverted, even if interest expenses were fully deductible (in fact, in 2016, i_E becomes greater than i).

Figure 2: The cost of capital in Italy according to the source of finance

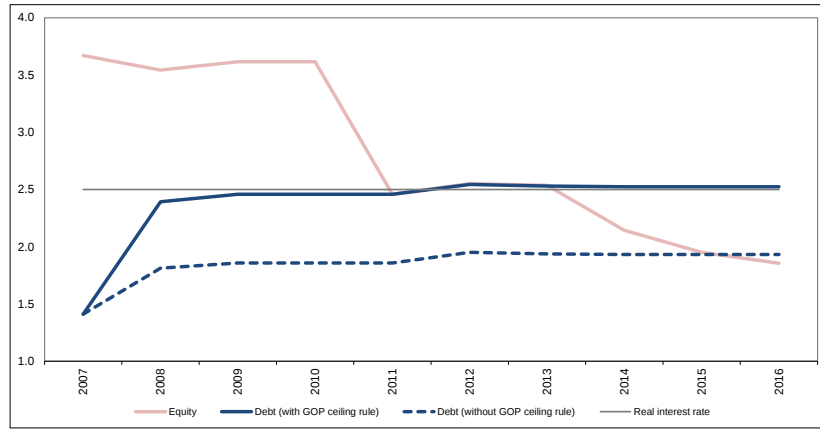
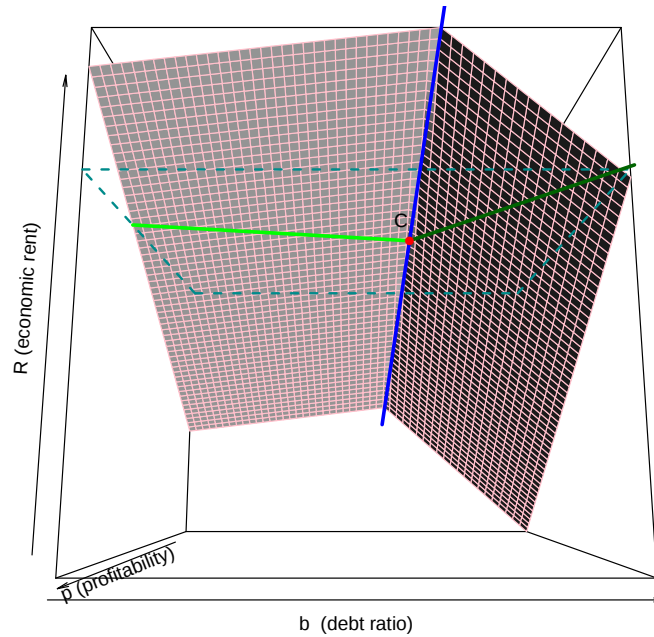


Figure 3 gives, for 2014, a geometric description of the GOP rule and its interaction with the ACE deduction. It represents the value of the post-tax economic rent (R) generated by the unitary investment with respect to

Figure 3: Economic rent in 2014, by debt and profitability



the debt ratio b and the profitability rate p . Only the range $1.4\% \leq p \leq 2.5\%$ is shown, while $0 \leq b \leq 100\%$. The figure is a surface that consists of two semi-planes; the break actually depends on the GOP rule. The two semi-planes are joined together along the equilibrium line (where the 30% of GOP is equal to interest expenses). This line is a watershed between the deduction of interest expenses and ACE deduction: in fact for

each fixed level of profitability p , R increases with the level of debt b but only until this level is balanced by the 30% of the GOP. Then increasing b makes R smaller. This depends on the fact that in 2014 the ordinary ACE rate $i = 4\%$ is less than the interest rate $i = 4.55\%$. The horizontal plane (just sketched with four dashed lines) is the level of null economic rent: below that plane the economic rent is negative therefore it is not convenient to undertake the investment. All the profitability values of the intersection points between the horizontal plane and the surface represent the cost of capital for certain values of b . These intersection points draw two semi-lines that intersect in a point C ; this point is also on the watershed line. Among all the points on the two semi-lines, C is the one with the lowest p -coordinate p_C . This amounts to say that, independently on the level of the debt, if $p < p_C$ then the post tax economic rent is always negative. In our case the coordinates of C are $p_C = 2.01\%$, $b_C = 62.72\%$; this means that in 2014, mixing equity and debt, a company can reduce its cost of capital up to 2.01%; this can be achieved resorting to 62.72% of debt, and 37.28% of new equity or retained earnings. If the GOP rule was not in force in 2014, then the minimum for the cost of capital would have been 1.93% (see Figure 2) and it would have been achieved with an investment fully financed by debt.

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