Siep Società italiana di economia pubblica

WORKING PAPER
No 624
luglio 2009

ON THE ITALIAN ACE AND ITS IMPACT ON ENTERPRISE PERFORMANCE: A MICROSIMULATION STUDY

SIMONA BALZANO, FILIPPO OROPALLO and VALENTINO PARISI

JEL Classification: H25, H32, C13

Keywords : Allowance for corporate equity, Microsimulation, Enterprise performance, PLS path-modeling, Structural equation model.

ON THE ITALIAN ACE AND ITS IMPACT ON ENTERPRISE PERFORMANCE: A MICROSIMULATION STUDY

Simona Balzano[*], Filippo Oropallo[°], Valentino Parisi[*]

[*]University of Cassino, [°]ISTAT

Abstract

In 1998 Italy introduced a restricted version of an ACE system called the Dual Income Tax system. Using data integrating Italy's Institute for Statistics enterprise survey data and company accounts, we explore the effects of DIT on enterprise performance in 1998-2000. Firms benefiting from DIT are simulated through a microsimulation model. The method to estimate enterprise performance is based on a structural equation model which allows us to compute a composite indicator given specific factors observed from enterprise activity. We find a positive impact of DIT on enterprise performance in that companies benefiting from DIT outperformed non-eligible companies.

Keywords: Allowance for corporate equity, Microsimulation, Enterprise performance, PLS path-modeling, Structural equation model.

JEL classification: H25, H32, C13

Address for correspondence: Valentino Parisi, Department of Economics, University of Cassino; e-mail: valentino.parisi@eco.unicas.it.

A previous version of this paper was presented at the Pre-ICM Convention on Mathematical Sciences (December 2008, Delhi), and at the Second Congress of the International Microsimulation Association (June 2009, Ottawa). We thank Paolo Roberti and participants at both conferences for their constructive comments. The results discussed here rely on micro data from Italy's Institute for Statistics (ISTAT) *SCI* and *PMI* surveys and company accounts data from the Italian Chamber of Commerce, both available at ISTAT within the DIECOFIS project funded by the Information Society Technologies Programme (IST-2000-31125) of the European Commission. ISTAT bears no responsibility for analysis or interpretation of the data. The usual disclaimer applies.

1. Introduction

Economic efficiency, usually identified with neutrality, is by far the most important consideration when designing a corporate tax system. Generally speaking, a tax on firms is efficient when it leaves the firm behaviour unchanged after taxation, that is when decisions undertaken by the firm are unaffected by the presence of the tax. The efficiency features of a corporate tax system can be studied regarding the investment decisions of the firm as well as its financing policy. The latter aspect has received great attention both in the theoretical and empirical literature.

As well known from the theory, in the absence of taxation and imperfections in the capital markets and information, firms are indifferent whether they finance their investments through debt or equity capital. This result changes when taxes are introduced. As the firm has three main financing sources, i.e. debt, retained earnings, and new shares issues, it can be demonstrated that the corporate tax system is neutral over the company financing decisions if the flow of before-tax profits remains unchanged after taxes for marginal investors, whether the return for investors takes the form of interest, dividends or capital gains. The corporate tax changes this picture as interest payments are usually deductible from the tax base while dividends are not; in this sense a corporate tax is not neutral over the company funding sources in that it favours debt over equity financing. The magnitude of these distortions then depends on the features of the corporate tax and personal tax regimes.

Specific systems can be proposed to address this issue. In 1991, the Institute for Fiscal Studies (1991) suggested introducing an allowance for corporate equity (ACE). The basic idea was to provide a deduction of a notional return on company equity from taxable profits so as to address the difference in the tax treatment of debt and equity. In recent years such systems have been in operation in some EU countries (for instance, besides Italy, Croatia, Austria and Belgium), though with differences in their practical application (Klemm, 2007). However, in recent years these countries have scrapped these systems, offering different motivations.

An ACE system has a number of attractive properties. The first obvious feature is that it meets neutrality between debt and equity financing if tax parameters are chosen correctly. The second feature is that as the tax is not levied on the marginal investment, this system is neutral to firm investment decisions. Another property is that the system offsets the distortion originated by the difference between depreciation for tax purposes and economic depreciation (Boadway and Bruce, 1984), as the advantage generated by tax depreciation is fully compensated by the reduction of (future) allowances. In this sense an ACE is again neutral over company investment decisions.

One negative feature of an ACE regime is that as the tax is only levied on extra profits it narrows the tax base and therefore the statutory rate must be greater compared to a standard system to collect the same tax revenue. In a tax competitive environment where governments tend to reduce capital taxation, an ACE regime might deter multinational companies from locating their investments within the country. This motivation probably lay at the heart of policy-makers' decisions to dismantle the

systems in countries where they were implemented.

In 1998 Italy introduced a restricted version of an ACE system, called Dual Income Tax (DIT). This was part of a comprehensive reform that had the primary aim of a selective reduction in the burden of taxation so as to reduce the tax distortion between equity and debt financing. Under the DIT scheme a lower statutory rate is applied to the portion of profits representing the opportunity cost of new equity financing compared with other forms of capital investment. This system structurally reduced the corporate tax burden depending on the amount of the capital increase (new capital subscription and retained earnings) carried out by the company. It remained in place until 2004 when it was definitively abolished, although in July 2001, when a new government took office, some modifications to the original regime were adopted in order to rein in its effects.

Several studies provide an assessment of the ACE systems, both for Italy and other countries (again see Klemm, 2007, for a review). In Italy these studies concentrate on the impact of the DIT system on the company tax rate and the neutrality features of this regime with respect to the pre-existing one as well as the subsequent system.

Given that the primary policy objective of the DIT allowance was to reduce the tax discrimination against equity financing and strengthen the financial structure of Italian companies, this regime might have had a positive impact on their performance. We expect three factors to work in this direction. First, the reduction in the cost of equity-funded investment capital has an impact on firms (usually small) with constraints on debt financing or in general on firms for which access to the credit market is more difficult. Secondly, as over-reliance on debt financing can be viewed as a potential threat to the financial stability of the corporate sector[1], the increase in firms' capitalization improves the competitive position of companies benefiting from the allowance. Lastly, the reduction in the effective tax rate obviously increases firm profitability.

In this paper we study the impact of DIT on enterprise performance. Our empirical analysis is restricted to the period 1998-2000 when the system was in "full" operation and is based on a specific dataset combining ISTAT (Italy's Institute for Statistics) survey data on firms and company accounts. Data do not include companies of the agricultural and financial sectors.

To this end we estimate a Structural Equation Model (herein SEM, Jöreskog and Sörbom, 1979) which allows us to compute a composite indicator (Nardo et al., 2005) of enterprise performance given specific factors that can be observed from their activity. The model is estimated using the partial least squares (PLS) approach to SEM (Tenenhaus et al., 2005), also called PLS Path Modeling (PLS-PM). Companies eligible for the DIT allowance are simulated by means of the DIECOFIS microsimulation model[2], reproducing in detail the corporate tax system existing in 1998-2000 (Oropallo, Parisi, 2007;

[1] Indeed, at the beginning of the 1990s this was weak also by international standards (De Bondt, 1998) as the debt-equity ratio of non-financial firms was the highest among the main European countries.

[2] The model was developed within the EU-funded project DIECOFIS which was coordinated by ISTAT (scientific coordinator Paolo Roberti) and involved several European research centres: the Board of Inland Revenue (UK), the Joint Research Centre of the European Commission (Applied Statistics Sector), Informer

Roberti, 2004).

The paper is organized as follows. Section 2 describes the main features of the DIT system and how this evolved when it was in operation. Section 3 illustrates the dataset used in the analysis, while section 4 is devoted to the methodology used to estimate enterprise performance. The empirical results are discussed in section 5 and section 6 offers some concluding remarks.

2. The DIT allowance

Unlike the standard ACE model where a full deduction on the return on equity capital is provided, in the Italian regime the notional return was taxed at a lower rate than the statutory one. Therefore the Italian ACE can be classified as a restricted version of the standard model.

DIT basically works as a dual-rate schedule in which overall profits are divided into two components. The first approximates normal profits (ordinary income), i.e. the opportunity cost of new financing with equity capital (in the form of new capital subscriptions and retained earnings) compared with other forms of capital investments, and is taxed at the rate of 19%. Ordinary income is calculated by applying an assigned nominal rate of return to equity capital injected after 1996 (when the reform was actually presented) net of the increases (again after 1996) in loans to subsidiaries, loans to parent companies, or other investments held as fixed assets by the firm.

The second component of overall profits is computed residually from total profits after ordinary income and represents business extra-profits. It was taxed at the prevailing statutory rate of 37% up to 2000, cut to 36% in 2001. In order to limit revenue losses resulting from the introduction of the dual-rate schedule, the law fixed a floor of 27% for the average effective corporate tax rate. Furthermore, it permitted firms to bring allowable DIT profits forward up to five years whenever they could not benefit from the reduced rate, i.e. when they incurred losses and when ordinary profits exceeded total taxable income.

In the first years of application, the dual-rate system mainly benefited new and less-well capitalised enterprises rather than strongly capitalised companies (Bordignon et al., 2001). In order to accelerate the impact of this system, in 2000 some adjustments were made to the original mechanism[3]. Specifically, when computing ordinary income, capital increases were to be multiplied (up to the enterprise net wealth threshold) by a conventional parameter set first at 20% in 2000 and then at 40% in 2001. Obviously, the idea the policy maker had in mind was to make the system a regime in which

S.A., the London School of Economics, the University of Cambridge, the University of Wien, the University of Rome Tor Vergata, the University of Florence, and the Centre of Economic and Social Research (CERES, Italy).

[3] In addition, in the years 1999-2001 a temporary measure was introduced for both corporations and unincorporated firms that worked basically as an incentive scheme for investments. This allowance could be cumulated with the DIT system, strengthening its effects and its general purposes. The share of profits corresponding to the amount of investments in new producer goods financed out of the company's own capital was taxed at a reduced rate of 19% rather than the statutory tax rate. In this way, profits corresponding to the amount of new investments were taxed at a lower rate when investments were made, while ordinary income resulting from the same capital increases could benefit from the reduced rate in the following periods.

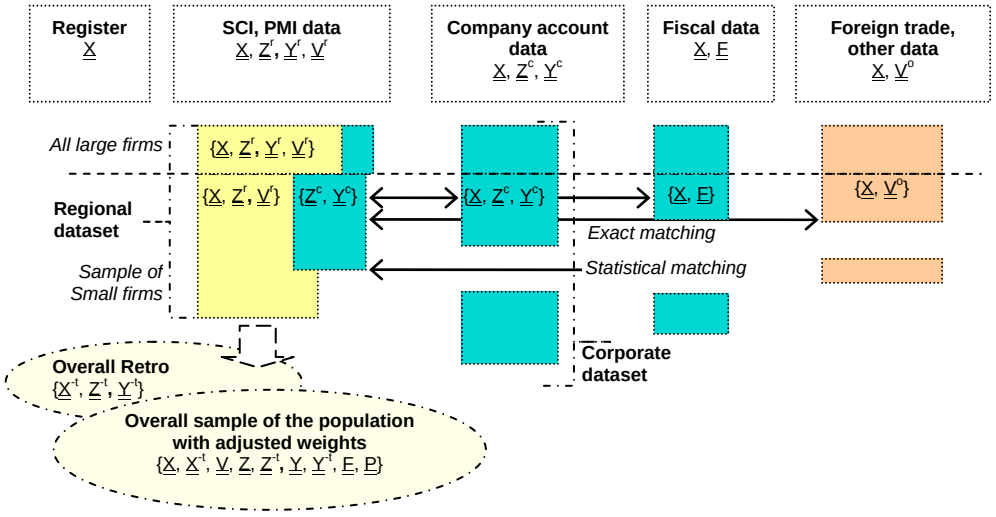
normal profits would be computed on the enterprise's entire capital stock rather than on capital increases. Moreover, in 2001 the constraint under which the average statutory rate resulting from the application of the DIT could not fall below 27% was removed.

In July 2001, when a new government took office, some changes were made to the DIT scheme in order to curb its effects. These changes anticipated the intention of the policy maker to repeal the dual-rate allowance (it was in fact repealed at the beginning of 2004 when a new tax reform came into effect). The measures in question froze the capital increases to be taken into account when computing ordinary income at those carried out until July 2001, lowered the imputed nominal rate and abolished the 'multiplier'.[4]

3. Data description

The analysis developed in this paper is based on a specific dataset obtained by integrating survey data on firms with company accounts data[5]. Figure 1 illustrates the features of the data sources and the steps followed in order to obtain the integrated final dataset for the year 2000. A similar procedure is also used for 1998 and 1999.

Figure 1. Integration scheme: sources, units and variables. Year 2000



Legend:
↔ Exact matching (one to one)
← Statistical matching (similar to similar)
$\underline{X}$ = Matrix **Register** (around 4 million firms)
$\underline{Z}^r$ = Matrix Profit & Loss of SCI and PMI surveys (62,900 firms)
$\underline{Y}^r$ = Matrix Assets & Liabilities of the SCI survey (roughly 9,300 large firms)
$\underline{V}^r$ = Matrix Employment and other variables (SCI and PMI surveys)

[4] An optional regime contemplating the application of the multiplier could be used but under the constraint of a minimum average rate of 30%. In July 2001 a temporary (for the second half of 2001 and for 2002) new investment tax incentive replaced the previous one (see note 2).

[5] This section draws on Oropallo, Parisi (2007).

$\underline{\underline{Z}}^c$ = Matrix Profit & Loss of **Corporate** dataset (around 489,000 corporate firms)
$\underline{\underline{Y}}^c$ = Matrix Assets & Liabilities of Corporate dataset (around 489,000 corporate firms)
$\underline{\underline{F}}$ = Matrix of the sections RF RN RJ RU RS of **Fiscal** returns
$\underline{\underline{V}}^o$ = Matrix of other datasets
$\{\underline{\underline{X}}^{-t}, \underline{\underline{Z}}^{-t}, \underline{\underline{Y}}^{-t}\}$ = Matrices with retrospective information (t= 1996, 1997, 1998, 1999)

The sources involved in the integration process are: the Statistical Register (ASIA); Business Structural Surveys (SCI and PMI); administrative data (company accounts and fiscal data); other statistical sources (foreign trade survey etc.).

The information used as a basis for the integration process is represented by the statistical register (matrix $\underline{X}$) of Italian active enterprises (acronym ASIA), which covers all economic activities except agricultural, public and non-profit sectors. The register includes basic information on the firm as well as variables (geographical reference, activity sector, legal status, size, turnover) that can be used as auxiliary variables in the imputation process when integrating the various data sources.

The main statistical sources are two surveys conducted annually by ISTAT on both incorporated and unincorporated firms: the survey of small and medium-sized enterprises (acronym PMI) regarding firms with fewer than 100 workers, and the survey of large enterprises (acronym SCI) with 100 or more workers. The SCI survey is exhaustive, embracing the universe of large firms (comprising 8,000 corporations), whereas the PMI survey is carried out on a sample of 18,000 SMEs.

The integrated dataset compounds two main administrative sources, the company accounts database containing information about assets and economic accounts of about 489,000 firms, and tax returns data containing information about differences between the balance sheets profits and the corporate tax base. Fiscal data are available for all large corporations and for a sample of SMEs (PMI survey sample).

As shown in Figure 1, surveys contain variables of the company accounts (matrices $\underline{\underline{Z}}^s$ and $\underline{\underline{Y}}^s$) and variables pertaining to the firm's employees, investments and other information on the firm's activity (matrix $\underline{\underline{V}}^s$). As the PMI survey includes only the profit and loss account and because both for PMI and SCI surveys specific items in the administrative archive (the Company Accounts box in the chart) are reported at a more disaggregated level, survey data are matched against the administrative data. The integration process[6] allows us to reconstruct the balance sheet of firms covered by the PMI survey, as well as to impute specific variables that are needed for tax modelling purposes for companies of both the PMI and SCI surveys. Furthermore, for tax modelling purposes, the final database also includes

[6] In the data reconstruction process two main issues were faced: (i) inconsistent values across survey and administrative sources; (ii) mismatches between survey and administrative data. To overcome the first problem, we calculate a discrepancy variable in order to identify the inconsistent units that must be deleted. For the second problem, a statistical matching procedure is used in order to impute data of similar units. Imputation of missing information uses the deck imputation technique based on nearest neighbour search (Little and Rubin, 1987), in which similar units are found by means of a mixed distance function (Abbate, 1998). At the end of the process the sample weights are recalculated to comply with the corporate sector population.

data from previous years (1996-1999) for specific variables[7], as shown in Figure 1 (*Overall-retro* data).

As explained, the same method is used to obtain both the 1999 dataset for firms of SCI and PMI surveys, and the 1998 dataset for SCI firms. As a result, our analysis covers the universe of large firms in the years 1998-1999-2000, and a sample of small and medium-sized enterprises for 1999-2000. Table 1 displays the total number of companies present in the final dataset by business sector; in 2000 this comprised 18,187 small and medium-sized companies, about 8000 large corporations, and a total of 26,196 companies out of a population of about 556,000.

Table 1. Number of companies present in the database by sector of activity; years 1998, 1999, 2000

	1998		**1999**			**2000**	
Sector	**LE**	**LE**	**SME**	***Total***	**LE**	**SME**	***Total***
Mining and quarrying	17	13	168	*181*	13	218	*231*
Manufacturing	4762	4752	5399	*10151*	4443	6978	*11421*
Electrical, energy, gas, steam and water	102	99	256	*355*	74	245	*319*
Construction	322	328	430	*758*	299	705	*1004*
Wholesale and retail trade	703	744	2704	*3448*	711	3243	*3954*
Hotel and restaurant services	191	210	299	*509*	197	326	*523*
Transport, storage and commercial services	635	694	1099	*1793*	673	1248	*1921*
Real estate, renting and business services	988	1093	2343	*3436*	1037	3634	*4671*
Education services	10	6	229	*235*	11	250	*261*
Health and social work services	363	384	345	*729*	387	373	*760*
Other social and personal services	184	188	779	*967*	164	967	*1131*
Total	**8277**	**8511**	**14051**	***22562***	**8009**	**18187**	***26196***

Source: ISTAT

4. The model to estimate enterprise performance

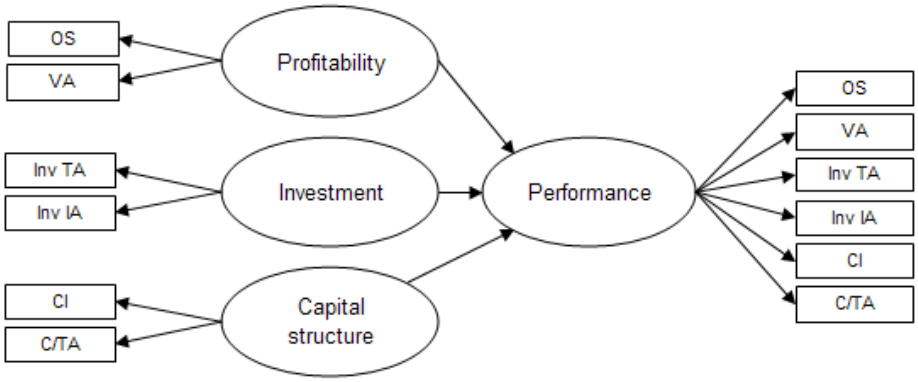
The theoretical model is based on the hypothesis that global performance can be viewed as being dependent on factors (or dimensions) that cannot be measured directly but can only be observed as a "reflection" of a set of observable indicators. From a statistical standpoint, such a data structure can be handled by a Structural Equation Model (SEM) (Jöreskog, Sörbom, 1979), where the performance

[7]Integration between survey data and company accounts is also applied to 1999 data and, for the SCI survey alone, to the year 1998. Therefore the model simulates the corporate tax for the year 1998 (large companies) and for 1999 and 2000 (both large and small and medium-sized firms).

factors and performance itself play the role of *latent variables* while the observed indicators are *manifest variables*. This model supplies the "score" for the latent variables (performance factors) and the value of the performance index for each enterprise. There is extensive literature on the use of this methodology to measure an unobservable (latent) factor, actually covering several fields, ranging from customer satisfaction to sensory analysis and social analysis.

Below we briefly describe the method used to estimate the performance indicator and refer to Tenenhaus et al. (2005) and Tenenhaus & Esposito Vinzi (2005) for more technical details. The estimated model is shown in figure 2 by a typical SEM representation. Ellipses represent the latent variables and rectangles the manifest variables, while arrows identify the relationships between them[8].

Figure 2. The causal model for performance estimation



Legend:

OS = operating surplus
VA = value added
Inv. TA = investments (tangible assets)
Inv. IA = investments (intangible assets)
CI = capital increase
C/TA = capital/total assets

Several specifications with different combinations of manifest and latent variables were considered and estimated. The final one (figure 2) actually includes basic information on performance factors so that the model structure is simple so as to maintain its validity in terms of both statistical significance of coefficient estimates and the relative impact of factors on performance over the three years of analysis, both for large and small and medium-sized enterprises.

In a nutshell, we assume enterprise performance depends on three factors (dimensions): profitability, investments and capital structure that can be observed through the following manifest variables:

[8] The model is characterized by a two-level relationship system: (i) between latent and manifest variables, and (ii) between latent variables.

operating surplus and value added, investments in tangible/intangible assets, capital increase (evaluated with reference to 1996 as prescribed by the DIT regime) and the capital-assets ratio. Global performance plays the role of the fourth latent variable and is explained by the three performance factors.

We estimate the model using the partial least squares (PLS) approach to SEM (Wold, 1982), also called PLS path modeling (PLS-PM). PLS-PM is based on an iterative algorithm consisting of a system of multiple and simple regressions, alternated for an inner and outer estimation of the latent variables.

Formally, given the generic latent variable ξ_q, the PLS-PM algorithm iteratively determines:

1) the outer estimation of the latent variable ($\mathbf{v}_q$), obtained as a linear combination of its own manifest variables $\mathbf{x}_{pq}$, that is:

[2] $$\mathbf{v}_q \propto \pm \left(\sum_{p=1}^{P_q} w_{pq} \mathbf{x}_{pq} \right)$$

where P_q is the number of manifest variables associated to the q-th latent variable and w_{pq} represents the outer weights, i.e. the weight associated to each manifest variable to obtain the latent variable estimate.

2) the inner estimation of each latent variable, computed by using its outer estimate of the previous step and considering its relations with the other latent variables. In other words, the inner estimate $\mathbf{z}_q$ of each latent variable ξ_q is obtained as:

[3] $$\mathbf{z}_q \propto \sum_{q'} e_{qq'} \mathbf{v}_{q'}$$

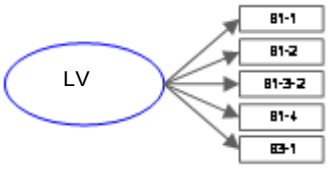
where, $\mathbf{v}_{q'}$ is a generic latent variable connected to the q-th latent variable, and $e_{qq'}$ is an inner weight, usually obtained as the sign of the correlation between the outer estimates of the q-th latent variable and of the q'-th latent variable. The symbol $\propto$ means that each estimate of the latent variable has to be standardized, both in the outer and inner estimates.

3) the outer weights w_{pq} measuring the strength of the relationship between each manifest variable and its own latent, to be reused in the next iteration for the outer estimate of the latent variables.

In PLS PM analysis it is also possible to define the direction of the relationship between each manifest variable and the latent variables within each block. We assume a *reflective scheme*, i.e. the latent variable is considered as a predictor of the manifest variable. Thus, each relation in the block is a

simple linear regression model[9], i.e. as:

[4] $$\mathbf{x}_{pq} = \lambda_{pq}\xi_q + \varepsilon_{pq}$$



where λ_{pq} is the generic loading (i.e. the correlation coefficient) associated to the *p*-th manifest variable linked to the *q*-th latent variable, and ε_{pq} is a residual term;

After updating the outer weights they are used to obtain a new outer estimate of the latent variables. These three steps are repeated until convergence between inner and outer estimates. The final estimates of the latent variables are then computed and the structural relations among the latent variable are quantified by standard multiple/simple linear regression models.

For a generic endogenous latent variable $\xi_q^{(endo)}$ in the model, the structural model can be written as:

[5] $$\xi_q^{(endo)} = \sum_{m=1}^{M} b_{qm}\xi_m^{(eso)} + \zeta_q$$

where $\xi_m^{(eso)}$ is the generic exogenous latent variable impacting on $\xi_q^{(endo)}$, b_{qm} is the OLS regression coefficient (*path-coefficient*) linking the m-th exogenous latent variable to the q-th endogenous latent variable, ζ_q is a residual term, and *M* is the total number of exogenous latent variables impacting on $\xi_q^{(endo)}$.

To sum up, for each year considered in the analysis we estimated two models, one for large enterprises and one for small and medium-sized firms. The results show the enterprise performance standardized index in each year and for each group. As already explained, the model also allows us to estimate the weights of the relationships between variables (latent with manifest and latent with latent), that can be interpreted as regression coefficients.

5. Effects of the DIT system on enterprise performance

In order to analyse the impact of the DIT allowance we first explore its effects on the company tax burden[10]. To this end we compute ex-post corporate tax rates using the DIECOFIS microsimulation

[9] By contrast, in the *formative scheme* the latent variable is a function of its own indicators. In this case each block is a multiple linear regression model:

[10] As explained in section 2 the DIT allowance was subject to frequent changes before July 2001, when it was practically abolished. To fully estimate the benefits of the DIT scheme, ideally, we should use data (balance sheets) as of July 2001 when the constrained on the minimum average rate was removed and the multiplier was increased to 1.4. The other possibility could be to use balance sheet variables of year 2001. However we recall that after July 2001 the DIT mechanism was strongly reduced and a temporary investment allowance was

model[11]. The model simulates the corporate tax system existing in 1998 for large firms, and in 1999 and 2000 both for large and small and medium-sized firms. Implicit tax rates can be computed using different denominators generally reflecting some "income" concept of the firm, hence a company balance sheet item such as enterprise operating surplus, profits before taxation, turnover. Obviously, the magnitude of the figures tends to vary according to the basis of the tax rates. While the most immediate item is operating surplus, basically a measure of profits before extraordinary activities and taxes, tax rates computed using this denominator tend to be extremely variable and the means by sectors or other firm categories highly affected by the number of firms present in each group. Turnover offers a more stable denominator. However, in this case tax ratios are very small and usually figures can be less instructive when comparing the effective rate of corporate taxation across countries. By contrast, they can be useful indicators when studying changes of corporate taxation over time, which indeed is the purpose of the analysis developed here.

Ex-post corporate tax rates are computed as ratios of tax paid on companies' turn-over in the years 1998, 1999, 2000 and reported in table 2. The DIT system lowered the average effective corporate tax rate on large firms by 0.32 percentage points in 1998-2000, and on small and medium-sized companies by 0.06 points in 1999-2000. We also note that in 2000 the tax rates reduction is greater for large firms (0.12) than small firms. The figures also show that the allowance lowered the effective rate of taxation in all sectors and for the various classes of employees considered in the analysis.

Looking at large companies we see that the benefits of the DIT scheme are greater in the wholesale (1.72) and construction (1.17) sectors, and, to a lesser extent, in the electricity sector (0.9). By contrast, they tend to be rather small in manufacturing and mining where the implicit tax rate declines slightly (0.09). If we then consider firm size, we note that corporate tax rate reductions are smaller in very large firms (with >999 workers).

We now turn to small and medium-sized firms. Here, in 1999 and 2000, drops in the effective corporate tax rate due to the DIT system are greater in the hotel, transport (0.95), electricity (0.56), and construction (0.52) sectors, while benefits of this system in the remaining sectors are less appreciable.

Results also show that reductions in the implicit rate of taxation are greater in very small firms, that is for companies employing fewer than 20 workers.

---

introduced (practically) in substitution of this system. Therefore using data of 2001 would inevitably present strong biases and this is the reason why we restrict the analysis to the period 1998-2000.

[11] The model allows precise computation of effective rates of corporate taxation (known as implicit rates or backward-looking indicators) by taking into account the interaction of the various elements (definition of profits for tax purposes, carry-forward loss provisions, allowances, tax credits and so on) of the tax system. Such rates, as compared to ex-ante or forward-looking measures, are especially appropriate if the objective is to study the effects of the tax system on enterprise cash flows and to focus on distributional burdens (for instance, at sectoral level or on firms of different size).

Table 2. Effective corporate tax rates (simulated tax paid on company turnover); breakdown by business sector, firm size. 1998, 1999, 2000.

(a) Large firms

Business sector	1998	1999	2000	Absolute diff. 2000-1998
Mining, manufacturing	2.10	2.08	2.01	-0.09
Electricity	3.17	2.75	2.27	-0.90
Construction	2.85	2.94	1.68	-1.17
Wholesale and retail	2.98	1.10	1.26	-1.72
Hotels, transport, real estate	2.31	2.05	1.95	-0.36
Education, health, social services	2.63	2.50	2.22	-0.41
Firm size (number of employees)				
100-249	2.14	2.19	1.91	-0.23
250-499	2.72	2.57	2.00	-0.72
500-999	2.34	1.63	1.96	-0.38
more than 999	1.96	1.95	1.81	-0.15
Total	**2.25**	**2.05**	**1.93**	**-0.32**

(b) Small and medium-sized firms

Business sector	1999	2000	Absolute diff. 2000-1999
Mining, manufacturing	2.13	2.01	-0.12
Electricity	3.28	2.72	-0.56
Construction	2.20	1.68	-0.52
Wholesale and retail	1.71	1.52	-0.19
Hotels, transport, real estate	3.24	2.29	-0.95
Education, health, social services	2.22	2.18	-0.04
Firm size (number of employees)			
1-9	2.42	2.12	-0.31
10-19	1.83	1.54	-0.29
20-49	1.64	1.57	-0.07
50-99	1.52	1.51	-0.01
Total	**1.98**	**1.92**	**-0.06**

Source: Authors' computations

We now turn to the impact of the DIT regime on enterprise performance. As explained in section 4, given the specific performance factors the model evaluates both the relationship between these factors and the performance index. As the performance scores are standardized within the model estimation,

only year by year comparisons make sense (i.e. within the results of the same model). This means that the method allows us to explore whether the DIT system had an impact on enterprise performance when it was in operation, but sheds no light on how this changed over time.

Table 3 displays the weights of the manifest variables on the composite performance indicator[12].

Table 3. Weight of performance factors; 1998-2000

		Large firms			Small and medium sized firms	
		1998	1999	2000	1999	2000
PERFORMANCE	operating surplus	0.296	0.238	0.303	0.319	0.317
	value added	0.308	0.312	0.293	0.302	0.292
	investments (tangible assets)	0.321	0.270	0.317	0.376	0.367
	investments (intangible assets)	0.109	0.293	0.225	0.383	0.401
	capital increase*	0.248	0.143	0.183	0.191	0.357
	capital/total assets	0.044	0.112	0.052	0.327	0.163

Source: Authors' computations

*evaluated with reference to 1996 according to eligibility for the DIT allowance

Some results for large enterprises are somehow largely in line with what may be predicted. Indeed, we expect the factors linked to firm productive capacity (profitability) or its investment behaviour to have a greater impact on firm performance as compared to the capital factors. This result holds basically for all the manifest variables grouped in the profitability and investment dimensions, with the exception of the year 1998 when the weight of capital increase is greater than that estimated for investments in intangible assets.

Results in table 3 also provide some interesting result as regards the feature of the DIT scheme. In each year the impact on enterprise performance of capital increase is greater as compared to the capital/assets ratio. This means that the "incremental" design of the DIT system as it was implemented in Italy, where the allowance was computed on the capital increase undertaken by the company rather than on capital stock as prescribed by the classical ACE system, might have had a greater impact on (large) firm performance.

The figures show a different picture for small and medium-sized companies: while in 1999 the weight of capital increase on enterprise performance is greater than the capital/assets ratio, in 2000 the opposite result holds. In other words, capital increase appears to be relevant in stimulating small and medium-sized enterprise performance precisely when changes in the computation of the DIT allowance were enacted in order to speed up its effects (see section 2). This also confirms the finding discussed in the empirical literature according to which in its first years of application the DIT scheme

[12] The model assessment results are not reported here. However, it must be emphasized that all latent variables considered in the model are statistically significant.

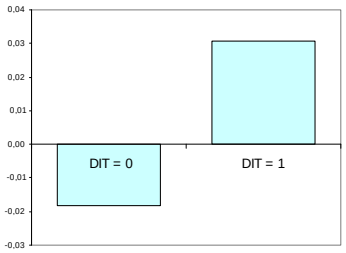
benefited large companies to a greater extent (Bordignon et al., 2001).

To delve into the study of the impact of the DIT regime on enterprise performance, we consider the differences in the average performance of companies eligible/non-eligible for the allowance, both for large and small-medium firms. The results must be interpreted differently for the two groups as data refer to the population of large enterprises and to a sample of small and medium-sized firms. To study the significance of estimates for the second group we perform regression analysis using a dummy variable identifying eligible (DIT=1) and non-eligible (DIT=0) companies; coefficients represent the average performance for eligible and non-eligible enterprises. Results are reported in tables 4 and 5.

Table 4. Average performance of large companies eligible and non-eligible for the DIT allowance; 1998, 1999, 2000

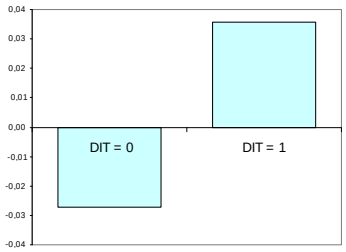
(a) 1998

Statistics	Performance (overall)	Performance of eligible firms	Performance of non-eligible firms
Min	-1.790	-0.235	-1.790
Max	59.036	59.036	47.944
1° Quartile	-0.104	-0.091	-0.110
Median	-0.071	-0.056	-0.079
3° Quartile	-0.019	-0.001	-0.030
Average	0.000	**0.031**	**-0.018**



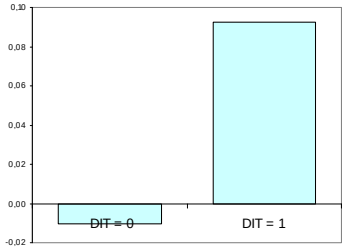
(b) 1999

Statistics	Performance (overall)	Performance of eligible firms	Performance of non-eligible firms
Min	-6.022	-0.224	-6.022
Max	63.444	63.444	45.398
1° Quartile	-0.118	-0.096	-0.131
Median	-0.068	-0.045	-0.085
3° Quartile	0.003	0.027	-0.017
Average	0.000	**0.036**	**-0.027**



(c) 2000

Statistics	Performance (overall)	Performance of eligible firms	Performance of non-eligible firms
Min	-4.825	-0.122	-4.825
Max	50.762	6.342	50.762
1° Quartile	-0.094	-0.068	-0.095
Median	-0.077	-0.028	-0.079
3° Quartile	-0.041	0.068	-0.050
Average	0.000	**0.092**	**-0.010**

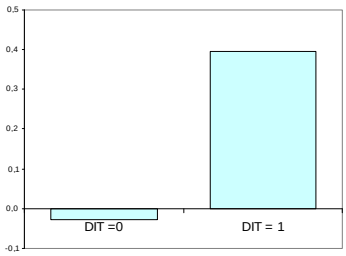


Source: Authors' computations

5. Regression analysis: average performance of small and medium-sized companies eligible and non-eligible for the DIT allowance; 1999, 2000

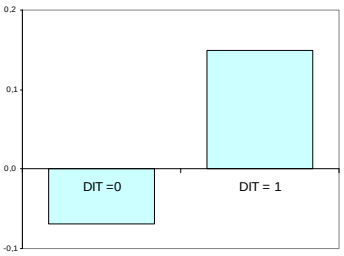
(a) 1999

Source	Coefficients	Standard Deviation	t	Pr > |t|
Intercept	0.000			
DIT= 0	-0.069	0.002	-34.589	< 0.0001
DIT= 1	0.149	0.003	50.593	< 0.0001



(b) 2000

Source	Coefficients	Standard Deviation	t	Pr > |t|
Intercept	0.000			
DIT= 0	-0.028	0.001	-18.633	< 0.0001
DIT= 1	0.396	0.006	70.712	< 0.0001



Source: Authors' computations

The figures lead to a clear-cut result: performance of companies qualifying for the DIT allowance is greater than that companies not qualifying for this regime.

We finally explore the empirical results by business sector. Table 6 compares the estimated performance indicator respectively for firms which are eligible (EEs) and non-eligible (NEEs) for the DIT allowance, by business sector. Recalling that the performance scores are standardized (i.e. the mean score is 0 for each estimated model), the results must be interpreted with due consideration that positive/negative values are respectively higher/lower than the mean performance.

Table 6. Performance of firms eligible (EEs) and non-eligible (NEEs) for the DIT allowance by business sector; 1998-2000

Large enterprises						
	1998		1999		2000	
Sector	EEs	NEEs	EEs	NEEs	EEs	NEEs
Mining, manufacturing	0.006	-0.023	0.006	-0.030	0.113	-0.026
Electricity	0.501	1.090	0.721	0.945	0.273	0.169
Construction	-0.065	-0.087	-0.064	-0.102	0.157	-0.077
Wholesale and retail	-0.012	-0.041	-0.017	-0.049	0.040	-0.032
Hotels, transport, real estate	0.100	-0.036	0.171	-0.046	0.026	0.045
Education, health, social services	0.054	0.001	0.026	-0.037	-0.029	-0.050
Small and medium-sized enterprises						
Mining, manufacturing			0.391	0.067	0.736	0.160
Electricity			2.490	0.677	0.648	0.563
Construction			-0.092	-0.178	0.035	-0.123
Wholesale and retail			0.014	-0.116	0.338	-0.062
Hotels, transport, real estate			0.122	-0.056	0.259	-0.066
Education, health, social services			0.400	-0.179	0.346	-0.097

Source: Authors' computations

Our figures show that in 1999-2000 the DIT regime had an impact on performance of manufacturing companies as EEs exhibit a value of the composite index above the mean value, as compared to NEEs. As for firms in the electricity sector, the picture is less clear-cut. Indeed, while the DIT system improved performance of small and medium-sized firms both in 1999 and 2000, for large enterprises this result applies only to the year 2000. In other words, in the electricity sector the DIT system appears to support performance of large companies only when operation of this system is more generous due to the introduction of the multiplier (see section 2).

Both EEs and NEEs of the construction sector exhibit a negative performance record in 1998 and 1999. However, EEs perform a little better than NEEs as (negative) differences for the first group are lower compared to the second group. The DIT scheme definitely provided a positive incentive for EEs in year 2000. Indeed, while performance of firms qualifying for the allowance was above average, non-eligible companies still showed a negative performance record. A similar result also applies to large wholesale and retail companies.

For large companies in the hotel and transport sector there emerges a discontinuous trend: NEEs show a negative performance record in 1998-99 and a positive record in 2000, while EEs exhibit a positive record throughout the period. However, in each year EEs perform better than NEEs. In education and other social services, firms show a negative record in 1999 for NEEs, in 2000 both for both NEEs and EEs. In all cases, again, EEs outperformed firms not benefiting from the DIT allowance.

Lastly, as for small and medium-sized companies in wholesale and retail services, hotels and transport,

education and other social services, the empirical results show clearly that the DIT scheme provides a positive incentive on enterprise performance of small companies. Indeed, while in 1999 and 2000 and in each sector NEEs show a negative performance score, EEs show a positive score.

6. Conclusions

In the period 1998-2001 Italy introduced a restricted version of an ACE system, called Dual Income Tax. This allowance was part of a wider reform aimed at reducing the corporate tax burden as well as the tax discrimination between equity and debt financing implicit in the previous system. ACE regimes have been in operation in several countries with differences in their practical application (Klemm, 2007). While the empirical literature has mainly focused on the impact of these regimes on the effective rate of taxation and the distortion between debt and equity funding, there is little evidence of the effects of an ACE system on enterprise performance.

Indeed we expect three factors to work in the direction of increasing performance of companies benefiting from an ACE. First of all, the most immediate effect is given by the reduction in the cost of capital of equity-funded investments which has an impact on companies for which access to the credit market is more difficult. Furthermore, increase in a firm's capitalization improves its financial stability and this may have a positive effect on its competitive position. Lastly, the reduction in the effective tax rate obviously operates to increase firm profitability.

Using an integrated dataset combining company balance sheets with Italy's Institute for Statistics (ISTAT) enterprise survey data, in this paper we analysed the effects of the DIT system on enterprise performance in the years 1998-2000 when this regime was in full operation. Companies eligible for the DIT allowance are simulated by means of the DIECOFIS (Oropallo, Parisi, 2007; Roberti, 2004) microsimulation model which reproduces the details of the Italian corporate tax system. Companies in the banking and agricultural sectors are excluded from the analysis.

Enterprise performance is a complex concept where performance can be viewed as being dependent on factors or dimensions that cannot be measured directly but can be observed as a reflection of a set of observable indicators of enterprise activity. We assume company performance is explained through three dimensions, namely profitability, investments and capital structure, that can be observed through the following manifest variables: operating surplus and value added, investments in tangible/intangible assets, capital increase and the capital-assets ratio.

In order to compute a composite performance indicator we estimated a SEM where the performance factors and performance itself played the role of latent variables while the observed indicators were manifest variables. The model was estimated using the PLSPM approach to SEM (Wold, 1982). Our results show that companies qualifying for the DIT allowance performed better than non-eligible firms. This result holds both on average (performance of firms of the first group is higher as compared to firms of the second group) as well as for the various business sectors.

Using the same model we estimated the weights of the various performance factors, i.e. the strength of the relationships between the estimated indicator and the performance dimensions. Finally, while some results were quite straightforward, they also provided some interesting insights into the feature of the DIT mechanism: the impact of capital increase upon enterprise performance is greater than that of the capital/assets ratio. This means that the “incremental” design of the DIT system as it was implemented in Italy, where the allowance was computed on the capital increase undertaken by the company rather than on capital stock as prescribed by the classical ACE system, might have had a greater impact on firm performance.

References

Abbate C. (1997), "Completeness of Information and Imputation from Donor with Minimum Mixed Distance", Quaderni di Ricerca ISTAT, no. 4.

Boadway, R., Bruce, N. (1984), "A General Proposition on the Design of Neutral Business Tax", Journal of Public Economics, 24, 231-39

Bordignon, M., Giannini, S., Panteghini, P. (2001), "Reforming Business Taxation: Lessons from Italy?", *International Tax and Public Finance*, vol. 8, no. 2.

De Bondt, G.J. (1998), "Financial Structure: Theories and stylized facts for six EU Countries", *De Economist*, no. 2, 146.

Institute for Fiscal Studies (1991), Equity for Companies: A Corporation Tax for the 1990s, London.

Jöreskog K.G, Sörbom D. (1979) *Advances in Factor Analysis and Structural Equation Models*, Cambridge, Massachusetts, Abstract Books.

Little R. J. A, Rubin D. B. (1987), *Statistical Analysis with Missing Data*, Wiley & Sons, New York.

Klemm, A. (2007), "Allowances for Corporate Equity in Practice", CESifo Economic Studies, June 12.

Nardo M., Saisana M, Saltelli A., Tarantola S., Hoffman A. Giovannini E. (2005) Handbook on constructing composite indicators: methodology and user guide, OECD Statistics Working Paper.

Oropallo, F., Parisi, V. (2007), "Will Italy's Tax Reform Reduce the Corporate Tax Burden? A Microsimulation Analysis", *Rivista di Statistica Ufficiale*, no.1.

Roberti, P. (2004), International Research into Developing Integrated and Systematized Information Systems (EISIS) for EU Business Policy Impact Analysis, *Austrian Journal of Statistics*, Volume 33, N. 1&2.

Tenenhaus M., Esposito Vinzi V., Chatelin Y.M., Lauro N.C. (2005) PLS Path Modeling, *Computational Statistics and Data Analysis*, 48.

Tenenhaus M., Esposito Vinzi V., (2005) PLS regression, PLS path modeling and generalized Procrustean analysis: a combined approach for multi-block analysis, *Journal of Chemometrics*, 19.