Drivers of regional efficiency differentials in Italy: technical inefficiency or allocative distortions?*

Fabrizio Erbetta
University of Piemonte Orientale, Faculty of Economics
HERMES, Higher Education and Research on Mobility and the Economics of Public Services
CERIS-CNR, Institute for Economic Research on Firms and Growth

Carmelo Petraglia[§]
University of Napoli "Federico II", Department of Economics

ABSTRACT: This paper estimates regional economic efficiency differentials at the firm level in the Italian manufacturing sector over the period 1998-2003. We implement an input distance function approach providing measures of both technical inefficiency and allocative distortions in the choice of input mixes. Our results confirm the substantial technical efficiency gap suffered by firms located in Southern regions, thus providing empirical support to the "structural and technological gap" interpretation of the Italian dualism. On the other hand, allocative distortions in the use of inputs show less remarkable regional differences. As for policy implications, our results suggest the need for a re-allocation of public resources for development policies from business incentives measures towards public investments.

KEYWORDS: Technical and allocative efficiency, Input distance function, Development policies
JEL-CODES: C44, D21, D24, O14, O20, R0

[*] An earlier version of this paper was presented at the 10th European Workshop on Efficiency and Productivity Analysis (Lille, 27-30 June 2007). We thank the participants to the parallel session "Exploring Sources of Manufacturing Efficiency and Productivity" for useful comments. We are also very grateful to Graziano Abrate, Giovanni Fraquelli and Adriano Giannola for their helpful comments. The usual disclaimer applies.

[§] *Corresponding author*: Dipartimento di Economia, Università degli Studi di Napoli "Federico II", Complesso Universitario di Monte Sant'Angelo, Via Cinthia, Napoli, 80126, Italy; email: carmelo.petraglia@unina.it

WORKING PAPER CERIS-CNR
Anno 10, N° 2 – 2008
Autorizzazione del Tribunale di Torino
N. 2681 del 28 marzo 1977

Direttore Responsabile
Secondo Rolfo

Direzione e Redazione
Ceris-Cnr
Istituto di Ricerca sull'Impresa e lo Sviluppo
Via Real Collegio, 30
10024 Moncalieri (Torino), Italy
Tel. +39 011 6824.911
Fax +39 011 6824.966
segreteria@ceris.cnr.it
http://www.ceris.cnr.it

Sede di Roma
Via dei Taurini, 19
00185 Roma, Italy
Tel. 06 49937810
Fax 06 49937884

Sede di Milano
Via Bassini, 15
20121 Milano, Italy
tel. 02 23699501
Fax 02 23699530

Segreteria di redazione
Maria Zittino e Silvana Zelli
m.zittino@ceris.cnr.it

Distribuzione
Spedizione gratuita

Fotocomposizione e impaginazione
In proprio

Stampa
In proprio

Finito di stampare nel mese di Dicembre 2008

CONTENTS

INTRODUCTION

The dualistic structure of the Italian economy – on one side, the so-called "Mezzogiorno"[1] and, on the other one, the rest of the Country – might well be regarded as a unique case within the European Union.

Public intervention for the economic and social development of Southern Italian regions dates back to the end of the Second World War. Since then, both demand and supply-oriented policies have been implemented[2]. Nevertheless, the Italian Mezzogiorno is still lagging behind.

After the recognition of the failure of demand-linked regional policies put forward in the 1980s, supply-side interpretations of the Italian dualism have gained credibility, the latter favouring public policies mainly based on incentives to private capital accumulation and public investments. The emphasis put on either incentives to private investment or public investment policies can be thought – with full knowledge of the crudeness of approximation – as reflecting two alternative supply-side explanations of the Italian dualism: the "market oriented" and the "structural and technological gap" views (Destefanis, 2001).

According to "market-oriented" scholars, market forces fail to allocate available productive resources efficiently to a higher extent in the Mezzogiorno as compared to Northern regions. In this view, allocative inefficiency is regarded as the main source of performance differentials between Southern and Northern firms. Hence, well-designed incentives to firms are expected to be effective in driving local resources to their most efficient use, even in the presence of a soft "external" public intervention. On the other hand, scholars within the "structural and technological gap" view emphasize the role played by the structural poverty of the Mezzogiorno economy in terms of a less favourable environment (for instance, as far as transports and communications, education, public order are concerned) which considerably reduces technological possibilities of local firms. Indeed, given the uncertainty of the economic system, many Southern entrepreneurs may be – and actually are – reluctant to undertake investment programmes aimed at improving technology and enhancing the operating scale. On the other side, workers have poor incentives to improve their skill and to benefit from extensive learning opportunities (Cenci and Scarlato, 2002). The combination of the two factors is likely to hamper technical efficiency. Hence, public investments are mostly needed in order to improve environmental conditions and reduce uncertainty.

Due to the complexity of the issue – both for the number of variables involved into the analysis and its historical persistence – it would be misleading to favour only one of the mentioned views as fully explanatory. However, as policy implications are concerned, it is easy to recognize that providing empirical support to both views can be helpful to the design and the implementation of effective policies to enhance productivity in the Mezzogiorno economy.

With this purpose in mind, we will evaluate the productivity gap between Southern firms and those located in the rest of the Country by estimating sector specific input distance functions. This approach will allow distinguishing regional differentials related to technical inefficiency from those due to allocative distortions in the choice of input mixes. We will interpret the presence of the former as supporting the "structural and technological gap" view; whereas the existence of the latter will be interpreted as supporting the "market-oriented" view.

[1] The Mezzogiorno area includes the following Italian Southern regions: Sicilia, Sardegna, Puglia, Campania, Molise, Calabria, Abruzzo and Basilicata. With the exception of Molise and Abruzzo, in the 2000-2006 Community Support Framework, the Mezzogiorno regions belonged to the Objective 1, all of them having an income per capita below the 75% of European level. On the other hand, the belonging of Southern Italian regions to the objectives of the programming period 2007-2013 is the following: Calabria, Campania, Puglia, Sicilia to "Convergence Objective"; Basilicata to "Statistical phasing-out"; Sardegna to "phasing-in"; Molise and Abruzzo to "Competitiveness and Employment Objective".

[2] For a survey of the different stages of public intervention in the Mezzogiorno see Del Monte and Giannola (1997).

The remainder of the paper unfolds as follows. Section 1 briefly reviews the alternative supply-side views on the Italian dualism and introduces the main features of most recent trends in development policies for the Mezzogiorno of Italy, namely, the intervention lines of the so-called *nuova programmazione*. Section 2 provides some insight on the methodological aspects of the input distance function. Section 3 introduces the dataset and the estimated model, while Section 4 describes the empirical specification. Results are presented in Section 5. Finally, Section 6 concludes.

1. RECENT TRENDS IN REGIONAL DEVELOPMENT POLICIES AND SUPPLY-SIDE INTERPRETATIONS OF THE ITALIAN DUALISM

1.1 Recent trends in development policies for the Italian Mezzogiorno

During the 1980s, Italian regional policies have been based on measures aimed at stimulating the demand side of the economy by means of fiscal subsidizing instruments for firms, households' incomes support – via an enforcement of the welfare state – job creation in the public sector and public works. Such policies were grounded on the idea of "endogenous" development: supporting local demand was expected to create its own local supply, thus giving a boost to local industrial activities. This strategy, however, failed due to the strong economic dependence of the Mezzogiorno on Northern regions. Supporting local demand, far from stimulating local supply, did lead to increasing imports from the North, thus crowding-out local industrial activities (Del Monte and Giannola, 1997).

After the recognition of the failure of demand-linked regional policies, supply-side interpretations of the Italian dualism have gained credibility, suggesting to switch to policies based on incentives to private investment and on public investments.

Since the late 1990s, a new strategy of public intervention has been trying to reconcile the policy maker confidence in the capability of less developed areas to attain endogenous development, and the call for an extensive "external" intervention aimed at improving the social and economic local context. The ultimate declared aim was indeed the creation of the conditions for a self-sustaining development process via an improvement of the socio-economic and institutional context of the area.

A distinguishing feature of this new deal of public intervention is that policies are designed not only in favour of Mezzogiorno regions, but of all the "depressed areas" in the Country. Furthermore, following a "bottom-up" strategy, both planning and implementation processes have been extensively decentralized to regional administrations[3].

Development policies have been targeted at improving: market competition for labour, products and capital; tangible and intangible communication with other areas; training of human resources and opportunities for innovation; social infrastructures; internal relations and externalities of entrepreneurs' agglomeration; accessibility of natural and cultural resources (Barca, 2003 and 2006). As for the instruments employed to achieve such ambitious goals, they can be grouped – as mentioned above – into two main categories: incentives to private investment[4] and the provision of public goods via public investment.

[3] In a former configuration of the supply-based policy (approximately during the period 1950-1992), development strategies typically followed a "top-down" approach which required a full centralization at the national level of any public intervention. The National Agency for Mezzogiorno (*Cassa per il Mezzogiorno*) has been in charge of both planning and funding processes until 1992. The main intervention lines within industrialization policies were: a) public investment in infrastructure, b) public investment in state-owned enterprises and c) the funding of private investment in the form of both capital and interest contributions.

[4] Business incentives are regulated by a number of different laws. They differ for the duration of incentives (from short term to permanent) and targeted variables (employment, innovation, investment). As for the manufacturing sector, they can be grouped into a) interest rates subsidies; b) capital grants and tax credits (Destefanis and Storti, 2006).

TABLE 1: DEVELOPMENT-RELATED PUBLIC SPENDING IN SOUTHERN AND CENTRE-NORTHERN REGIONS, EUROS PER CAPITA (2000-2003)

Industry	Centre-North				Mezzogiorno			
	2000	2001	2002	2003	2000	2001	2002	2003
Environment	46.2	46.4	53.2	62.5	46.1	53.4	43.6	39.3
Energy	103.9	112	135.7	119.1	80.9	59.0	74.3	85.3
Cultural services	48.6	46.1	46.0	54.1	32.7	36.2	24.0	29.1
Education	86.2	97.5	112.4	120.4	80.2	91.7	102.7	103.3
*Industry and services**	100.1	111.8	159.4	155.9	202.8	299.3	333.2	275.9
Public health	56.3	55.2	56.7	60.2	30.3	41.8	34.1	35.9
Transport networks	243.6	292.6	327.6	374.1	214.7	254.9	221.2	234.9
Public order & law enforcement	18.8	21.6	34.4	33.4	16.5	22.5	27.2	19.4

Source: Our elaborations on "*Conti pubblici territoriali, Dipartimento per le politiche di sviluppo*"
(*) mainly business incentives

In particular, in the view of the policy maker, any business support needs to be temporary, fostering capital accumulation (and thus local employment and income) in less developed areas, until the taking-off of a local endogenous growth process. It is recognized, however, that the latter can be attained only if the support to local private investment is balanced by public investments aimed at making the context of backward regions more favourable (and as attractive as the one of the leading regions) in terms of endowment of public goods (Ministero dello Sviluppo Economico, 2006). However, despite this declared strategy of balanced intervention, data on public spending – shown in Table 1 – seem to reveal that incentive instruments still play a major role, whereas the Mezzogiorno does not benefit from a higher provision of neither material of immaterial infrastructures as compared to the rest of the Country[5]. On the contrary, the item "Industry and services", which mainly concerns business incentives, highlights the greatest differential between the two macro-regions.

1.2 Supply-side interpretations of the Italian dualism

The priority to be given to either well-designed incentives or public investment policies reflects two different supply-side interpretations of the Italian dualism: the "market-oriented" and the "structural and technological gap" views. The key point put forward by "market-oriented" scholars is the higher extent to which Southern firms fail to allocate available productive resources efficiently. Many examples may be mentioned here. The pervasive asymmetric information between the two sides of the labour market, associated with the uncertainty about the true workers' skill on the one hand and the actual opportunities of job advancement offered by the firms on the other, brings about a mismatch between the two groups of agents (Cenci and Scarlato, 2002), thus leading to an inefficient allocation of the workforce.

Furthermore, credit market imperfections can lead to incorrect evaluation of investment projects, thus either causing under-investment or forcing firms to finance investment using their own resources. Hence, performance differences across Italian regions are mainly interpreted as stemming from higher allocative inefficiencies in the South. In this view, well-designed incentives to firms would be expected to be effective in driving resources to their most efficient use, even in the presence of a soft "external" public intervention.

[5] Reported data refer to the period 2000-2003, however, similar evidence is available for the longer time period 1998-2005.

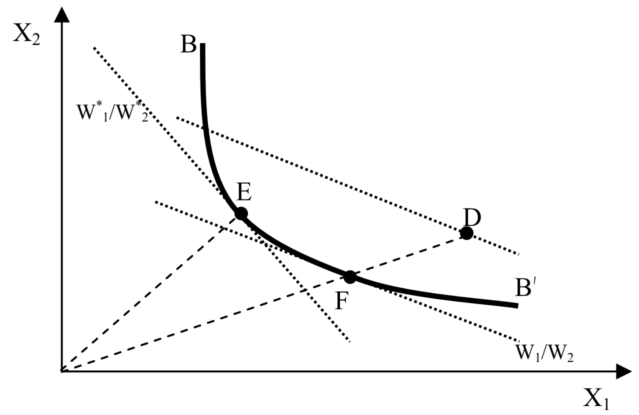

FIGURE 1: TECHNICAL AND ALLOCATIVE INEFFICIENCY

Figure 1 illustrates this point. Assuming a simple technology using two inputs (x_1 and x_2, whose prices are W_1 and W_2 respectively) to produce one output, the units on the boundary of the input requirement set, BB', are technically efficient since it is not possible to further reduce simultaneously the use of all inputs. However, the units lying on the boundary are not equivalent in terms of allocative inefficiency. According to the definition used by Schmidt and Lovell (1979), a producer is allocatively efficient if it succeeds to allocate inputs in such a way to equate the marginal rates of technical substitution to the ratio of the respective input prices. The optimal input boundle is given by point F, i.e. the tangency point between the boundary BB' and the isocost line, whose slope is given by W_1/W_2. On the contrary, unit E – though technically efficient – uses too much of input 2 and too little of input 1 with respect to the input price ratio W_1/W_2. Such a distortion disappear in correspondence to the input price ratio W^*_1/W^*_2, wherein prices W^*_1 and W^*_2 are the so-called *shadow prices* (i.e. the input prices that make an allocative inefficient firm efficient). The allocatively inefficient input combination corresponding to unit E is due to a perceived (and not directly observed) shadow price ratio which is different from the market (and observed) price ratio, thus leading to over-utilization of input 2 and under-utilization of input 1[6]. Therefore, the discrepancy between market and shadow price ratios (graphically represented by the different slopes of the two dotted isocost lines tangent to BB' at the points F and E) may be regarded as a proper measure of allocative distortion. In order to eliminate this form of inefficiency, firm E should be given well-designed incentives to change its input mix given the input market prices it faces.

On the other hand, scholars within the "structural and technological gap" view – see, for instance, Costabile (1996) – emphasize the role played by the structural poverty of the Mezzogiorno economy in terms of less favourable environmental conditions. In other words, the main source of regional differentials in performance is technical inefficiency. Turning to figure 1, point D is allocatively but not technically efficient. The main problem affecting unit D's performance lies in an excessive use of both inputs. In this view, development policies should put more emphasis on the improvement of the environmental conditions, the latter being the fundamental pre-requisite for (technical as well as human) capital accumulation in less developed areas. Hence, an "external" intervention is mostly needed in the form of public investments in both material and immaterial public capital. Improving communi-cations and transportation infrastructures, enhancing law enforcement, enforcing public order, establishing high-quality educational institutions just represent a few possible interventions able to create the conditions to make more productive private investments in less developed areas.

[6] It is worth noting that such failure to efficiently allocate inputs are not necessarily due to a mistake, but rather to environmental factors that may affect producers' behaviour.

2. MODELLING TECHNICAL INEFFICIENCIES AND ALLOCATIVE DISTORTIONS

Economic efficiency can be decomposed into two components: technical efficiency and allocative efficiency (Farrell, 1957). In general terms, technical efficiency reflects managers' capacity to minimise input utilization and reduce wastes, whereas – given input prices – allocative efficiency is associated with the ability to set a cost-minimising input mix. In order to derive measures of technical and allocative efficiency, we have estimated a set of by sector input distance functions[7], which entail many advantages with respect to the estimation of traditional cost functions (see, for more details, Färe and Grosskopf, 1990; Färe and Primont, 1995; Grosskopf *et al.*, 2001; Coelli and Perelman, 2000 among others)[8]. Indeed, given observed input prices, the estimation of a traditional cost function implies the assumption that all firms are equally able to express input requirements consistent with cost minimisation. As a consequence, any discrepancy between actual and fitted cost is solely due to random noise. Using a cost frontier specification allows removing such assumption of full efficiency – even in a context of assumed cost-minimising behaviour – as actual cost can differ from fitted cost by both random noise and a composite technical and allocative inefficiency term. Unfortunately, separate measures of technical and allocative inefficiency are difficult to obtain. This difficulty to separate the two effects has been denoted by Bauer (1990) as the "Greene problem" (Kumbhakar and Tsionas, 2005 and Kumbhakar and Wang, 2006, developed new approaches to solve this problem using a flexible cost and primal system). In this sense, the distance function approach used here has many convenient properties. First, it does not impose the restrictive assumption of cost-minimising behaviour[9], since each firm is allowed to select the input mix consistently with its own shadow input prices rather than its market input prices. Secondly, it provides a pure measure of technical inefficiency, whereas traditional cost frontier functions solely allow measuring excess cost without distinguishing between technical and allocative components. Thirdly, the input distance function accommodates multi-input multi-output bundles without requiring information on input prices, the latter being difficult to obtain. Finally, the input distance function is dual to the shadow cost function (Färe and Primont, 1995) and such relationship can be used for the identification of shadow price ratios, which enables to provide evidence on the presence of input misallocation.

Formally, the input distance function is defined as follows:

$$D_I(y,x) = \max_{\delta}\{\delta \geq 1 : x/\delta \in L(y)\} \qquad (1)$$

where x denotes the N×1 input vector, y denotes the M×1 output vector and L(y) denotes the production possibility set, given the level of y, modelling the transformation of inputs x into outputs y. For $x \in L(y)$ the distance parameter δ is ≥ 1, being equal to 1 if and only if x is technically efficient[10]. Therefore, the greater $D_I(y,x)$ the lower the technical efficiency associated with each producer.

As argued by Färe and Primont (1995), $D_I(y,x)$ should satisfy some regularity conditions, i.e. it must be non-decreasing in input vector, x, non-increasing in output vector,

[7] Technological homogeneity requires analysing each industry on its own. The disaggregation of the sample was carried out bearing in mind the potential trade-off between the need to have homogeneous groups and the risk associated with small-sample bias. More details on the composition of the sample will be provided in Section 3.

[8] In principle, by sector technology might be estimated using a production frontier (see the study by Harris (2001) who applied a stochastic frontier production function to derive estimates of technical efficiency for several UK manufacturing industries). However, this approach does not allow accounting for potential allocative distortions in the use of inputs.

[9] Violation of cost-minimising assumption would occur in a number of circumstances, such as when performance of highly regulated or public firms is evaluated, and, more in general, when bureaucratic behaviour imposes utility maximisation rather than cost minimisation. Such an input distance function property is also suitable when market forces are expected to fail organizing available resources in an economically convenient manner, so that public intervention is needed in order to promote adjustment of input misallocation.

[10] The input distance function, ranging from 1 to infinity, is the inverse of the input-oriented Farrell technical efficiency measure (Farrell, 1957), which ranges from 0 to 1.

y, and linearly homogeneous and concave in x.

The duality relationship between the input distance function and the shadow cost function is defined by the two following equations:

$$C(y, w^s) = \min_x\{ w^s x: D_I(y, x) \geq 1\} \quad (2)$$

$$D_I(y, x) = \min_{W^s}\{W^s x: C(y, W^s) \geq 1\} \quad (3)$$

where $C(y, w^s)$ is the shadow cost of producing an output vector, y, given the input shadow price vector, w^s, and $W^s = w^s/C(y, w^s)$ are cost-deflated input shadow prices obtained by dividing this vector by the value of $C(y, w^s)$. Since the cost function is homogenous of degree 1 in input prices, the resulting value of $C(y, W^s)$ will be greater or equal to one. Shadow prices, w^s, represent implicit (unobserved) input prices that support managers' optimal input demand, given the output level to be produced. If relative input shadow prices differ from relative input market prices, then an allocative distortion problem will arise, meaning that input demand levels deviate from the cost-minimising input combination.

Following Färe and Grosskopf (1990), in a shadow price model – like the one defined in eqs. (2)-(3) – where firms are assumed to minimise the shadow cost, the application of the dual Shephard's lemma yields the following expression for the first partial derivative of the input distance function with respect to input quantity x_i:

$$\frac{\partial D_I(y,x)}{\partial x_i} = W_i^s(y,x) = \frac{w_i^s}{C(y, w^s)}$$

for $i = 1,\dots N$ (4)

Since the shadow cost function $C(y,w^s)$ is not observable, the input shadow prices, w^s, can not be directly calculated. However, the ratio between the two first partial derivatives of the input distance function with respect to inputs i and j yields the shadow price ratio (Grosskopf *et al.*, 2001; Rodriguez-Álvarez *et al.*, 2004):

$$\frac{\partial D_I(y,x)/\partial x_i}{\partial D_I(y,x)/\partial x_j} = \frac{w_i^s}{w_j^s}$$

for $i, j = 1,\dots, N$ and $i \neq j$ (5)

This ratio can be used to evaluate the existence of input misallocation. Indeed, a measure of input allocative distortion can be obtained by comparing the shadow price ratio with the market price ratio (or, in other words, by comparing the slopes of the two isocost lines depicted in Figure 1) as follows:

$$\frac{w_i^s / w_j^s}{w_i / w_j} = k_{ij} \quad (6)$$

If $k_{ij} = 1$ (i.e. $w_i^s/w_j^s = w_i/w_j$), then allocative efficiency exists. Based on the magnitude of the price ratios index, it is possible to retrieve information on the extent of allocative distortion. If $k_{ij} > 1$ firms' preference behaviour to under-utilise input i relative to input j occurs, while if $k_{ij} < 1$ firms' preference behaviour to over-utilise input i relative to input j holds. In both the cases, the non-optimal input mix deviates from the cost-minimising one, as the prices that support the managers' input demand differ from market prices, thus providing expense preference behaviour in one or another direction.

3. DATA AND ESTIMATED MODEL

We use data from the last two waves (8th and 9th) of the Capitalia survey on Italian manufacturing firms, covering the periods 1998-2000 and 2001-2003 respectively (Capitalia, 2002 and 2005). The survey conducted by Capitalia is based on a representative rotating panel of firms stratified by sector of activity, Pavitt (1984) taxonomy, geographical area and size. The rotating nature of the panel implies that about half of the firms included in the 8th wave have been dropped in the 9th wave, while new firms have being added in such a way to preserve the stratified nature of the sample. The survey provides both balance sheet data and a number of qualitative information. However, the latter are available only for a three-year period as a whole in most cases. Our estimations are based on yearly balanced sheet data.

TABLE 2: SAMPLE COMPOSITION
(BALANCED PANEL 1998-2003 AND CAPITALIA SAMPLES 1998-2000/2001-2003)

	Panel 1998-2003 (N=1019)	**Capitalia 1998-2000 (N=4289)**	**Capitalia 2000-2003 (N=4289)**
Size	**%**	**%**	**%**
11-20 employees	34.00	39.9	22.1
21-50 employees	37.6	37.1	29.6
51-250 employees	21.8	16.2	36.9
251-500 employees	3.3	3.9	5.1
>500 employees	3.2	2.9	6.1
Location	**%**	**%**	**%**
North West	37.39	37.6	35.9
North East	31.5	27.4	30.1
Centre	18.8	20.6	17.7
South	12.27	14.4	16.3
Pavitt	**%**	**%**	**%**
Traditional sectors	51.2	52.3	51.9
Scale sectors	16.8	18.1	16.8
Specialized sectors	27.7	24.3	26.7
High-tech sectors	4.0	5.3	4.6

In order to increase the time span of our analysis, we used the balanced panel of firms obtained in Morone *et al.* (2007) by merging the 8^{th} and 9^{th} waves of the Capitalia survey[11]. Hence, we observe firms' behaviour over the period 1998-2003. This choice implies a reduction in the number of firms in the sample. However, data reported in Table 2 show that the composition of the sample by size, geographical area and Pavitt taxonomy remains essentially unchanged, which implies that our sample is as representative as the Capitalia one.

As for the estimated model, based on Shephard's lemma, we formulate the following input distance function system in log terms:

$$\begin{aligned} &\ln(1) = \ln D_I(y,x) + v \\ &\frac{w_i x_i}{C(y,w)} = \frac{\partial \ln D_I(y,x)}{\partial \ln(x_i)} + v_i \end{aligned} \qquad (7)$$

where C(y, w) is the actual cost and v and vi denote the usual normally distributed with zero mean random noise terms. The first equation in the stochastic frontier model (7) represents the input distance function. The log specification of the input distance function implies that a firm is technically inefficient with respect to the stochastic boundary if lnDI(y, x) is greater than ln(1), i.e. if the distance function DI(y,x) is greater than 1. The second equation represents the i-th input cost share derived from the input distance function. To formally explain this relationship, we express the dual Shephard's lemma defined in eq. (4) as follows:

$$\frac{\partial ln \mathrm{D_I}(\mathrm{y,x})}{\partial ln(\mathrm{x_i})} = \frac{\mathrm{w_i^s}}{\mathrm{C}(\mathrm{y,w^s})}\frac{\mathrm{x_i}}{\mathrm{D_I}(\mathrm{y,x})} \qquad (8)$$

Recalling that at the frontier the shadow cost is equal to the radially contracted actual cost (Rodriguez-Álvarez and Lovell, 2004) – i.e., $C(y, w^s) = C(y, w)/D_I(y, x)$ – we obtain:

$$\frac{\partial ln \mathrm{D_I}(\mathrm{y,x})}{\partial ln(\mathrm{x_i})} = \frac{\mathrm{w_i^s x_i}}{\mathrm{C}(\mathrm{y,w})} \qquad (9)$$

which defines the optimal input cost share. Deviation from such optimal share is attributable to both allocation inefficiency and noise, both encompassed into the unique disturbance term, v_i[12].

The index of allocative distortion, k_{ij}, introduced in eq. (6), has been computed for each observation using the following

[11] The adopted merging procedure is described in detail in Morone *et al.* (2007).

[12] Rodriguez-Alvarez and Lovell (2004) and Rodriguez-Alvarez *et al.* (2004) propose a model to separate input-specific systematic allocative inefficiency from noise.

expression:

$$\frac{\partial \ln D_I(y,x)}{\partial \ln x_i} \Bigg/ \frac{\partial \ln D_I(y,x)}{\partial \ln x_j} = k_{ij}\left(\frac{w_i x_i / C}{w_j x_j / C}\right)$$

for $i, j = 1,\ldots,N$ and $i \neq j$ (10)

where C is the actual total cost. Given that the first partial derivative of the log distance function with respect to the log of input *i* represents the *i*-th input optimal cost share, the k_{ij} coefficient may be seen as the ratio of the optimal input cost shares compared to the ratio of the actual input cost shares.

4. EMPIRICAL SPECIFICATION

In order to estimate the model, we have specified by sector flexible (translog) input distance function systems, as follows:

$$\begin{aligned}\ln(1) = {} & \alpha_0 + \alpha_y \ln y_{ht} + \sum_{i=1}^{M} \beta_i \ln x_{hit} \\ & + \frac{1}{2}\alpha_{yy}(\ln y_{ht})^2 + \frac{1}{2}\sum_{i=1}^{M}\sum_{j=1}^{M}\beta_{ij}\ln x_{hit}\ln x_{hjt} \\ & + \sum_{i=1}^{M}\beta_{yi}\ln y_{ht}\ln x_{hit} + \sum_{t=1}^{T}\gamma D_t + \delta D_{SOUTH} + \varepsilon_{ht}\end{aligned} \quad (11)$$

$$\frac{w_i x_i}{C(y,w)} = \beta_i + \sum_{j=1}^{M}\beta_{ij}\ln x_{hjt} + \beta_{yi}\ln y_{ht} + v_{iht}$$

where y is turnover, xi (i=1,…,M) denotes the input vector – including labour (number of employees, L), operating costs for materials and services (CMS) and capital (tangible and intangible fixed asset values, K) – and h denotes firms[13]. All monetary variables were opportunely deflated at 2000 prices. As for turnover and CMS, specific production price indices were used[14]. Deflation of the capital time series variable was carried out using a perpetual inventory method. Since capital stock value may be affected by jumps due to monetary revaluation, it was necessary to adjust the deflated capital series to account for these changes. Therefore, it was assumed that the last capital value reflected the most accurate estimate as it embodies all the previous adjustments. Adjusted capital stock series for the entire period was then determined by starting from the last year and proceeding backwards by subtracting yearly deflated net investments.

A set of dummy variables was also included. D_t ($t = 1,\ldots,T$) are time dummies controlling for technical progress (or regress). The geographical dummy D_{SOUTH} takes on value 1 if firms are located in the Mezzogiorno area and 0 otherwise (that is, for firms located in Northern and Central regions), thus capturing the effect on the distance function of time-invariant characteristics associated with location. By including such dummies into the model, we aimed at testing whether – and if so, to which extent – Southern economic environment and time play a role in affecting technical efficiency. Intuitively, given that the first equation in the distance function system (11) must equal zero, a negative sign for D_{SOUTH} and D_t would mean an upward shift of the distance function, thus indicating a deterioration in performance (obviously the inverse is valid when a positive sign occurs). Based on the discussion provided in Section 1, we expect a negative sign for D_{SOUTH}, which would confirm the existence of a technical gap suffered by Southern firms, according to the predictions of the "structural and technological gap" view.

The stochastic input distance function has then be used to calculate technical efficiency indices for each firm in each year, as well as mean technical efficiency by year and for the whole period. Following Greene (1980) and Grosskopf *et al.* (2001), measure of technical efficiency by firm and by year are given by:

$$\mathrm{TE}_{ht} = \frac{1}{exp\left(ln\mathrm{D}_\mathrm{I}(\mathrm{y},\mathrm{x}) + \left|min(\hat{\varepsilon})\right|\right)} \quad (12)$$

where the intercept correction – obtained by adding the absolute value of the most negative residual – forces the predicted values of $\ln D_I(y,x)$

[13] Due to the singularity problem one of the cost share equation was dropped, the results not being affected by the choice on the dropped share equation. As one of the aims of this study is to analyse the coefficients of allocative distortion for each input pair, the model has been run two times, getting parameters estimates for two share equations (for instance, including K and L, and dropping CMS) and then re-running the system of equations including the dropped share equation and dropping another one.

[14] To this purpose we used ATECO 2 digits industry-specific production price indices, with base year in 2000.

to be greater than 1[15]. Then, inverting the distance function value yields the traditional measure of Farrell technical efficiency, ranging from 0 to 1 (with 1 indicating full technical efficiency). In addition, through the observation of the *k*-factors we can verify the existence of different patterns of allocative distortion across macro-regions.

The question to be addressed is whether the main source of the performance gap dividing Southern firms and those located in the rest of the Country mainly stems from either technical or allocative inefficiency. The associated policy implication would be to provide empirical support to either what we have referred to as the "structural and technological gap" view or the "market-oriented" one.

5. RESULTS

By industry results of the maximum likelihood estimation of the equation system (11) are not presented here[16]. In all cases, however, the input distance function is found to be well-shaped, satisfying the regularity conditions at the majority of the observations.

Average technical efficiency estimates for each industry – calculated using eq. (12) – are reported in Table 3. Average efficiency scores seem quite low and range from 0.504 for textile industry to 0.771 for the wood & paper industry. This seems to reveal a generalised lack of competition, implying poor incentives to decision makers to enforce benchmarking activities in order to achieve higher performance.

The sign and magnitude of D_{SOUTH} address the question whether geographical location actually affects productive efficiency. Results are shown in Table 4.

The coefficients are always negative and statistically significant at 1% level (with exception of the "electrical machinery" industry), and range from –0.028 to –0.073. In line with previous studies implementing different approaches within the frontier literature – see, for instance, Destefanis (2001) and Giannola and Petraglia (2006) – these results show that Southern firms face a less favorable environment as compared to firms located in the rest of the Country. This confirms our *ex*-ante assumption on the competitive disadvantage suffered by Southern firms. Explanations for these results are various and range – as already noted – from poor infrastructural endowment to less qualified workforce. Besides, an important point concerns the role of credit market imperfections which heavily impact on investment opportunities and growth process (Sarno, 2003). As for the peculiarities of such imperfections in the Mezzogiorno area, many remarks are in order here. First, it is well documented that financial pressure is higher, *ceteris paribus*, for Southern firms in terms of higher interest rates (ISAE, 2003). This may hinder Southern firms from achieving larger size, thus preventing them from taking advantage from scale economies. Moreover, Nickell and Nicolitsas (1999) – analysing a sample of UK manufacturing firms – point out that a rise in borrowing costs leads to long-run negative effect on employment and very small positive effects on long-run productivity gains. Secondly, Southern firms are mainly oriented towards traditional and less innovative productions. This is likely to worsen the selective power of risk adverse financial operators, making credit rationing more binding. Third, the consolidation process experienced by the Italian banking system during the 1990s, has followed a clear territorial pattern: the acquisition of local Southern banks by Northern large credit institutes. This warns about the worsening of external financial conditions for firm growth in the South (Giannola, 2002).

[15] Given that, in eq. (12), $\ln D_I(y, x) = \ln\tilde{D}_I(y,x) + \sum_{t=1}^{T}\gamma_t D_t + \delta D_{SOUTH}$, the first term should represent a measure of pure technical inefficiency while the other two terms capture the effects associated with time and location respectively. Given such formulation, $\ln\tilde{D}_I(y,x)$ is cleaned out of the exogenous effects which bring about shifts in the efficient frontier. However, since the rescaling approach used in eq. (12) is based on the estimated residuals, ε_{ht}, from the first equation in the distance function system (11), the use of $\ln D_I(y,x)$, instead of $\ln\tilde{D}_I(y,x)$, became compulsory. As a consequence, the technical efficiency score, TE_{ht}, must be interpreted as the efficiency level attained by a firm observed at a certain time and operating in a certain geographical context.

[16] They are however available upon request.

TABLE 3: TECHNICAL EFFICIENCY ESTIMATES

Industry	*Average Technical Efficiency*	*Min Technical Efficiency*	*Standard deviation*
Food	0.623	0.468	0.059
Textiles, Apparel & Leather	0.504	0.194	0.056
Wood & Paper	0.771	0.533	0.057
Chemicals & Rubber	0.687	0.498	0.062
Non-metallic Mineral Products	0.667	0.471	0.063
Metal Products	0.629	0.360	0.065
Non-electrical Machinery	0.626	0.357	0.067
Electrical Machinery	0.692	0.412	0.065

TABLE 4: PARAMETERS FOR DUMMY D_{SOUTH} IN THE INPUT DISTANCE FUNCTION

Industry	*Coefficient*	*t-statistics*
Food	-0.030	-3.94 ***
Textiles, Apparel & Leather	-0.037	-3.97 ***
Wood & Paper	-0.030	-2.96 ***
Chemicals & Rubber	-0.073	-6.04 ***
Non-metallic Mineral Products	-0.028	-2.93 ***
Metal Products	-0.032	-4.35 ***
Non-electrical Machinery	-0.052	-2.71 ***
Electrical Machinery	-0.009	-0.49

*** Statistically significant at 1% level

Other than technical efficiency, our main focus is on input misallocation. The parameters of the equation system (11) were used to calculate yearly measures of input allocative distortions at the firm level. Mean allocative distortion values, k_{ij} (with $i, j = L, K, CMS$) by geographical area and industry, along with their confidence intervals (at 95% level), are presented in Table 5.

In general, $k_{K,CMS}$ is significant and greater than 1 in both macro-regions. This implies that – with a few exceptions – capital is significantly under-utilised with respect to variable inputs (typically, materials and services), both in the full sample and in each sector. As for regional differences, the magnitude of the *k*-coefficients reveals a major under-utilization problem for Southern firms. Two remarks are worth to be discussed here.

First, this finding is consistent with the growing deverticalisation trend that characterized Italian manufacturing starting from the 1970s in the North (Traù, 1999; Trento, 2003) and more recently in Central and Southern regions (Giunta and Scalera, 2006). Typically, deverticalisation and contracting out processes involving non-core activities – through the creation of a network of vertical supply relationships – have allowed Italian firms to lighten their asset structures and to save on both labour and capital costs with the aim of improving profitability. If such a restructuring process has led to better performances is a questionable issue. Our findings try to address this question, suggesting that deverticalisation processes have often taken the form of excessive external purchases, violating allocative efficiency conditions. In that, Southern firms show stronger evidence.

Secondly, the finding of higher capital under-utilization for Southern firms is coherent with the specialization of Southern firms in traditional and relatively low value added productions. One way to enhance capital level (and consequently capital cost share) with respect to *CMS* might consist in addressing major efforts to attain a capital quality improvement, through a multi-level investment program which in turn requires a strong commitment on behalf of both firms and government. Obviously this would require a more efficient credit market and removing the rigidities in the allotment of financial resources.

TABLE 5: MEAN INPUT ALLOCATIVE DISTORTION COEFFICIENTS[a]

	CENTRE-NORTH				SOUTH			
	N.	$k_{L,K}$	$k_{K,CMS}$	$k_{L,CMS}$	N.	$k_{L,K}$	$k_{K,CMS}$	$k_{L,CMS}$
Food	300	1.110	0.983	0.984	186	1.035	**1.409***	**1.095***
		(0.987-1.233)	(0.827-1.139)	(0.957-1.011)		(0.953-1.117)	(1.264-1.555)	(1.057-1.132)
Textiles, Apparel & Leather	816	1.214	**1.189**	0.985	120	0.865*	**2.091**	1.018*
		(0.694-1.734)	(1.078-1.299)	(0.959-1.012)		(0.671-1.059)	(1.763-2.420)	(0.948-1.088)
Wood & Paper	504	0.907	**1.243**	1.005	36	0.832	**1.948**	**1.164**
		(0.664-1.151)	(1.123-1.362)	(0.988-1.022)		(0.633-1.031)	(1.553-2.343)	(1.054-1.274)
Chemicals & Rubber	582	1.058	**1.118**	1.019	48	0.876*	**1.529**	**1.149**
		(0.656-1.460)	(1.055-1.180)	(0.996-1.042)		(0.750-1.002)	(1.359-1.700)	(1.082-1.217)
Non-metallic Min. Prod.	294	1.048	**1.189**	**1.042**	90	1.947	1.018	**1.055**
		(0.927-1.168)	(1.107-1.271)	(1.014-1.070)		(0.781-3.112)	(0.920-1.117)	(1.004-1.106)
Metal Products	905	1.074	**1.202**	1.001	132	**0.889***	**1.478**	1.031
		(0.971-1.176)	(1.149-1.255)	(0.987-1.016)		(0.781-0.997)	(1.300-1.655)	(0.977-1.085)
Non-electr. Machinery	870	**1.081**	**1.209**	**1.015**	24	**0.773***	**2.108**	**1.128**
		(1.020-1.143)	(1.155-1.263)	(1.000-1.030)		(0.556-0.990)	(1.596-2.620)	(1.053-1.203)
Electrical Machinery	522	1.065	**1.323**	1.006	30	1.095	**1.335**	**1.069**
		(0.965-1.164)	(1.161-1.485)	(0.984-1.028)		(0.850-1.340)	(1.075-1.595)	(1.001-1.138)
Overall mean		1.079	1.194	1.005		1.070	1.552	1.071

[a] Confidence intervals, calculated by percentile method at 95% statistical level, are in parentheses. Values statistically different from 1 are in bold. Asterisks in SOUTH columns indicate that allocative distortion for Southern area changes direction with respect to CENTRE-NORTH (i.e. k_{ij} for SOUTH is > 1 while it is < 1 for CENTRE-NORTH, or viceversa).

As for $k_{L,CMS}$, a slightly average under-utilization of L with respect to CMS is observed for Southern firms. By industry results of the k-coefficients reveal a greater – and generally significant – potential for Southern firms to achieve higher cost saving via a reduction of CMS share and a simultaneous increase in the labour cost share. This evidence is consistent with the above considerations associated with the capital-CMS mix. On the contrary, firms located in the rest of the Country seem to adopt an allocatively efficient labour-CMS mix in most sectors. Finally, the finding of major labour misallocation in Southern regions, is in line with their relatively high – and in some cases dramatic – unemployment rates and with the persistent mismatch between the two sides of local labour markets.

As for $k_{L,K}$, results indicate the absence of a systematic distortion in the choice of the capital-labour mix. “Metal products” and “non-electrical machinery” sectors in the Mezzogiorno and “non-electrical machinery” sector in the Centre-North are the only exceptions. This result is partly in contrast to Destefanis (2001). Indeed, Destefanis (2001) provides non-parametric estimations of allocative inefficiency differentials between Southern and Northern manufacturing firms over the period 1989-1997 and – assuming a two input (capital and labour) technology – finds capital over-utilization to be significantly higher in the South. However, due to the adoption of a different approach, the consideration of a different time span and the imposition of alternative assumptions on the technology, his results are not directly comparable to ours.

In summary, Southern and Centre-Northern firms show similarities in terms of allocative distortions between labour and capital on the one hand, and CMS on the other. The main peculiarity related to firm location is the difference in magnitude of the k-coefficients across the two macro-regions (especially $k_{K,CMS}$). On the other hand, the k-coefficients change direction among regional contexts (that is, they assume values greater than 1 in one macro-region and less that 1 in the other one, or viceversa) only in a few cases. These cases are labelled with an asterisk in Table 5. In particular, in the food industry, Southern firms show significant labour and capital under-utilisation with respect to CMS, whereas we find very small (and not significant) over-utilisation for firms located elsewhere. On the other hand, in the “metal products” and “non-electrical machinery" sectors, labour is over-utilized with respect to capital in the South, whereas the opposite occurs in Northern firms.

This set of results on allocative efficiency regional differentials – in combination with the evidence on the sign of the dummy D_{SOUTH} – provides useful information for the policy maker. Indeed, our results suggest that development policies should be committed to reducing the structural gap of the Mezzogiorno prior to providing reallocation incentives under the form of financial support to local firms, and mainly addressed to contrast the under-investment problem in relation to the excessive outsourcing for Southern firms.

Finally, time dummies effects are presented in Table 6. Signs are mostly negative and significant especially in the last years (i.e., for the period after 2001). Therefore, evidence concerning performance deterioration along time exists. In general, this evidence reflects the productivity slowdown recently experienced by the Italian economy.

TABLE 6: TIME DUMMIES IN THE INPUT DISTANCE FUNCTION

	$D_{t=1999}$	$D_{t=2000}$	$D_{t=2001}$	$D_{t=2002}$	$D_{t=2003}$
Food	-0.012	-0.005	-0.025	-0.035	-0.023
	(-0.95)	(-0.38)	(-2.02)**	(-2.74)***	(-1.86)*
Textiles, Apparel &	-0.005	0.007	-0.011	-0.024	-0.046
Leather	(-0.47)	(0.66)	(-1.05)	(-2.26)**	(-4.32)***
Wood & Paper	-0.012	0.026	-0.014	-0.038	-0.037
	(-1.27)	(2.73)***	(-1.48)	(-4.06)***	(-3.87)***
Chemicals & Rubber	-0.005	0.178	-0.028	-0.057	-0.062
	(-0.42)	(1.61)*	(-2.51)***	(-5.15)***	(-5.58)***
Non-metallic Mineral	0.013	0.038	0.017	0.024	0.010
Products	(0.91)	(2.67)***	(1.23)	(1.71)*	(0.71)
Metal Products	-0.027	0.0004	-0.043	-0.077	-0.076
	(-3.16)***	(0.05)	(-5.05)***	(-9.09)***	(8.93)***
Non-electrical Machinery	0.001	0.001	-0.039	-0.065	-0.098
	(0.10)	(0.09)	(-3.68)***	(-6.06)***	(-9.18)***
Electrical Machinery	-0.003	-0.004	-0.060	-0.100	-0.114
	(-0.21)	(-0.28)	(-4.35)***	(-7.18)***	(-8.21)***

t-statistics are in parenthesis; *** statistically significant at 1%; ** statistically significant at 5%;
* statistically significant at 10%

6. CONCLUSIONS

We have studied regional economic efficiency differentials at the firm level in the Italian manufacturing sector, by estimating sector specific flexible (translog) input distance functions over the period 1998-2003. The implementation of such approach represents a methodological advance in the literature on the topic, allowing for pure measures of both technical and allocative efficiency within the same framework.

As for technical inefficiency, our results are in line with previous studies showing that firms located in the Italian Mezzogiorno suffer from a significant relative gap. Such a result provides empirical support to the so-called "structural and technological gap" interpretation of the Italian dualism. On the other hand, we have found less remarkable regional differentials in allocative distortions in the choice of input mixes. In particular, capital and labour have been estimated to be both under-utilised with respect to variable inputs (typically represented by materials and services) for all firms in the sample. As main differences between firms in the two macro-regions, we found that capital is under-utilized to a higher extent in the South and labour under-utilization is statistically significant only for a few sectors in Northern firms. On the other hand, we do not find strong evidence of systematic distortion in the choice of the capital-labour mix.

A general policy recommendation follows from our analysis: a re-allocation of public resources available for development policies from business incentives measures towards public investment is needed. As a matter of fact, in contrast to the priorities declared by the policy maker, recent data on public spending in favour of Italian backward regions show that regional policies still devote too many resources to business incentives, rather than public investments. However, our results indicate that business support policy instruments are likely to be ineffective in the absence of a stronger commitment to narrow the structural gap of Southern regions.

REFERENCES

Barca, F. (2003) "Rethinking development policies in Italy", in Di Matteo, M. and Piacentini, P. (eds) *The Italian Economy at the dawn of the 21st century*, Ashgate.

Barca, F. (2006) "European Union evaluation between myth and reality: reflections on the Italian experience", *Regional Studies*, 40(2): 273–276.

Bauer, P.W. (1990) "Recent developments in the econometric estimation of frontiers", *Journal of Econometrics*, 46: 39–56.

Capitalia (2002) "Indagine sulle Imprese Manifatturiere. Ottavo Rapporto sull'Industria Italiana e sulla Politica Industriale", Rome.

Capitalia (2005) "Indagine sulle Imprese Manifatturiere. Nono Rapporto sull'Industria Italiana e sulla Politica Industriale", Rome.

Cenci, M. and Scarlato, M. (2002) "Istituzioni e mercato del lavoro nel Mezzogiorno d'Italia: un'analisi dinamica", *Rivista di Politica Economica*, 92(5/6): 281-320.

Costabile, L. (1996) *Istituzioni e sviluppo economico del Mezzogiorno*, il Mulino, Bologna.

Coelli, T. and Perelman, S. (2000) "Technical Efficiency of European Railways: A Distance Function Approach", *Applied Economics*, 32(15): 1967-76.

Del Monte, A. and Giannola, A. (1997) *Istituzioni economiche e Mezzogiorno*, Nuova Italia Scientifica, Roma.

Destefanis, S. (2001) "Differenziali territoriali di produttività ed efficienza negli anni 90: I livelli e l'andamento", *CELPE discussion paper* No. 59, University of Salerno.

Destefanis, S. and Storti G. (2006) "Evaluating business incentives through DEA: an analysis of Capitalia firm data", mimeo (http://valutazione2003.stat.unipd.it/pdf/VeneziaMag2006/Paper/DeStefanis_Storti.pdf).

Färe, R. and Grosskopf, S. (1990) "A distance function approach to price efficiency", *Journal of Public Economics*, 43(1): 123-26.

Färe, R. and Primont, D. (1995) "On inverse homotheticity", *Bulletin of Economic Research*, 47(2): 161-66.

Farrell, M.J. (1957) "The measurement of productive efficiency", *Journal of the Royal Statistical Society*, 120(3): 253-90.

Giannola, A. (2002) *Il credito difficile*, L'Ancora del Mediterraneo, Napoli.

Giannola, A. and Petraglia, C. (2006) "Efficienza tecnica e di costo dell'impresa meridionale: frontiere deterministiche e stocastiche a confronto" in Giannola, A. (ed) *Riforme e mutamento strutturale in Italia. Mercato, imprese ed istituzioni in un sistema dualistico*, Carocci editore, Roma.

Giunta, A. and Scalera, D. (2006) "Le relazioni di subfornitura tra le imprese in Italia. Uno studio sull'evoluzione degli anni Novanta" in Giannola, A. (ed) *Riforme e mutamento strutturale in Italia. Mercato, imprese ed istituzioni in un sistema dualistico*, Carocci editore, Roma.

Greene, W. (1980) "Maximum likelihood estimation of econometric frontier functions", *Journal of Econometrics*, 13: 27-56.

Grosskopf, S., Hayes, K.J., Taylor, L.L. and Weber, W.L. (2001) "On the determinants of school district efficiency: comparison and monitoring", *Journal of Urban Economics*, 49: 453-478.

Harris, R.I.D. (2001) "Comparing Regional Technical Efficiency in UK Manufacturing Plants: The Case of Northern Ireland 1974-1995", *Regional Studies*, 35(6): 519-534.

ISAE (2003), "I rapporti banca-impresa e I vincoli finanziari alla crescita delle piccolo e medie imprese", in *Rapporto ISAE 2003:*

Priorità nazionali: dimensioni aziendali, competitività, regolamentazione, Rome.

Kumbhakar S.C. and Tsionas, E.G. (2005) "Measuring technical and allocative inefficiency in the translog cost system: a Bayesian approach", *Journal of Econometrics*, 126: 355-384.

Kumbhakar, S.C. and Wang, H.J. (2006) "Estimation of technical and allocative inefficiency: a primal system approach", *Journal of Econometrics*, 134: 419-440.

Ministero dello Sviluppo Economico (2006) *Relazione sugli interventi di sostegno alle attività economiche e produttive*, agosto 2006, Roma.

Morone, P., Petraglia, C. and Testa, G. (2007) "Research, knowledge spillovers and innovation: evidence for the Italian manufacturing sector", *Birkbeck Working Papers in Economics and Finance* No. 703.

Nickell, S. and Nicolitsas, D. (1999) "How Does Financial Pressure Affect Firms?", *European Economic Review*, 43(8): 1435-1456.

Pavitt, K. (1984) "Sectoral patterns of technical change: towards a taxonomy and a theory", *Research Policy*, 13: 343-373.

Rodríguez-Álvarez, A. and Knox Lovell, C.A. (2004) "Excess capacity and expense preference behaviour in National Health Systems: an application to the Spanish public hospitals", *Health Economics*, 13: 157–169.

Rodríguez-Álvarez, A., Fernández-Blanco, V. and Knox Lovell, C.A. (2003) "Allocative inefficiency and its cost: The case of Spanish public hospitals", *International Journal of Production Economics*, 92: 99–111.

Sarno, D. (2003) "Un modello di razionamento del credito operativo alle imprese: il caso delle piccole e medie imprese del Mezzogiorno", *Economia Politica*, 3: 371-390.

Schmidt, P. and Lovell, C.A.K. (1979) "Estimating technical and allocative inefficiency relative to stochastic production and cost frontiers", *Journal of Econometrics*, 9: 343-366.

Shephard, R.W. (1953) *Cost and Production Functions*, Princeton University Press, Princeton.

Traù, F. (1999) "La discontinuità dei pattern di sviluppo dimensionale delle imprese nei paesi indistriali: fattori endogeni ed esogeni di mutamento dell'ambiente competitivo", *Working paper Centro Studi Confindustria* No. 19, Roma.

Trento, S. (2003) "Stagnazione e frammentazione produttiva", *Il Mulino*, 6: 1093-1102.

WORKING PAPER SERIES (2008-1993)

2008

1/08 *Nouveaux instruments d'évaluation pour le risque financier d'entreprise*, by Greta Falavigna

2/08 *Drivers of regional efficiency differentials in Italy: technical inefficiency or allocative distortions?,* by Fabrizio Erbetta and Carmelo Petraglia

3/08 *Modelling and measuring the effects of public subsidies on business R&D: theoretical and econometric issues,* by Giovanni Cerulli

4/08 *Investimento pubblico e privato in R&S: effetto di complementarietà o di sostituzione?*, by Mario Coccia

5/08 *How should be the levels of public and private R&D investments to trigger modern productivity growth? Empirical evidence and lessons learned for italian economy*, by Mario Coccia

6/08 *Democratization is the determinant of technological change,* by Mario Coccia

7/08 *Produttività, progresso tecnico ed efficienza nei paesi OCSE*, by Alessandro Manello

8/08 *Best performance-best practice nelle imprese manifatturiere italiane*, by Giuseppe Calabrese

9/08 *Evaluating the effect of public subsidies on firm R&D activity: an application to Italy using the community innovation survey*, Giovanni Cerulli and Bianca Potì

10/08 *La responsabilité sociale, est-elle une variable influençant les performances d'entreprise?*, by Greta Falavigna

2007

1/07 *Macchine, lavoro e accrescimento della ricchezza: Riflessioni sul progresso tecnico, occupazione e sviluppo economico nel pensiero economico del Settecento e Ottocento*, by Mario Coccia

2/07 *Quali sono i fattori determinanti della moderna crescita economica?Analisi comparativa delle performance dei paesi*, by Mario Coccia

3/07 *Hospital Industry Restructuring and Input Substitutability: Evidence from a Sample of Italian Hospitals*, by Massimiliano Piacenza, Gilberto Turati and Davide Vannoni

4/07 *Il finanziamento pubblico alla ricerca spiazza l'investimento privato in ricerca? Analisi ed implicazioni per la crescita economica dei paesi*, by Mario Coccia

5/07 *Quanto e come investire in ricerca per massimizzare la crescita economica? Analisi e implicazioni di politica economica per l'Italia e l'Europa*, by Mario Coccia

6/07 *Heterogeneity of innovation strategies and firms' performance*, by Giovanni Cerulli and Bianca Potì

7/07 *The role of R/D expenditure: a critical comparison of the two (R&S and CIS) sources of data*, by Bianca Potì, Emanuela Reale and Monica Di Fiore

8/07 *Sviluppo locale e leadership. Una proposta metodologica*, by Erica Rizziato

9/07 *Government R&D funding: new approaches in the allocation policies for public and private beneficiaries*, by Bianca Potì and Emanuela Reale

10/07 *Coopération et gouvernance dans deux districts en transition*, by Ariel Mendez and Elena Ragazzi

11/07 *Measuring Intersectoral Knowledge Spillovers: an Application of Sensitivity Analysis to Italy*, by Giovanni Cerulli and Bianca Potì

2006

1/06 *Analisi della crescita economica regionale e convergenza: un nuovo approccio teorico ed evidenza empirica sull'Italia*, by Mario Coccia

2/06 *Classifications of innovations: Survey and future directions*, by Mario Coccia

3/06 *Analisi economica dell'impatto tecnologico*, by Mario Coccia

4/06 *La burocrazia nella ricerca pubblica.* PARTE I *Una rassegna dei principali studi*, by Mario Coccia and Alessandro Gobbino

5/06 *La burocrazia nella ricerca pubblica.* PARTE II *Analisi della burocrazia negli Enti Pubblici di Ricerca*, by Mario Coccia and Alessandro Gobbino

6/06 *La burocrazia nella ricerca pubblica.* PARTE III *Organizzazione e Project Management negli Enti Pubblici di Ricerca: l'analisi del CNR*, by Mario Coccia, Secondo Rolfo and Alessandro Gobbino

7/06 *Economic and social studies of scientific research: nature and origins*, by Mario Coccia

8/06 *Shareholder Protection and the Cost of Capital: Empirical Evidence from German and Italian Firms*, by Julie Ann Elston and Laura Rondi

9/06 *Réflexions en thème de district, clusters, réseaux: le problème de la gouvernance*, by Secondo Rolfo

10/06 *Models for Default Risk Analysis: Focus on Artificial Neural Networks, Model Comparisons, Hybrid Frameworks*, by Greta Falavigna

11/06 *Le politiche del governo federale statunitense nell'edilizia residenziale. Suggerimenti per il modello italiano*, by Davide Michelis

12/06 *Il finanziamento delle imprese Spin-off: un confronto fra Italia e Regno Unito*, by Elisa Salvador

13/06 SERIE SPECIALE IN COLLABORAZIONE CON HERMES: *Regulatory and Environmental Effects on Public Transit Efficiency: a Mixed DEA-SFA Approach*, by Beniamina Buzzo Margari, Fabrizio Erbetta, Carmelo Petraglia, Massimiliano Piacenza

14/06 *La mission manageriale: risorsa delle aziende*, by Gian Franco Corio

15/06 *Peer review for the evaluation of the academic research: the Italian experience*, by Emanuela Reale, Anna Barbara, Antonio Costantini

2005

1/05 *Gli approcci biologici nell'economia dell'innovazione*, by Mario Coccia

2/05 *Sistema informativo sulle strutture operanti nel settore delle biotecnologie in Italia*, by Edoardo Lorenzetti, Francesco Lutman, Mauro Mallone

3/05 *Analysis of the Resource Concentration on Size and Research Performance. The Case of Italian National Research Council over the Period 2000-2004*, by Mario Coccia and Secondo Rolfo

4/05 *Le risorse pubbliche per la ricerca scientifica e lo sviluppo sperimentale nel 2002*, by Anna Maria Scarda

5/05 *La customer satisfaction dell'URP del Cnr. I casi Lazio, Piemonte e Sicilia*, by Gian Franco Corio

6/05 *La comunicazione integrata tra uffici per le relazioni con il pubblico della Pubblica Amministrazione*, by Gian Franco Corio

7/05 *Un'analisi teorica sul marketing territoriale. Presentazione di un caso studio. Il "consorzio per la tutela dell'Asti"*, by Maria Marenna

8/05 *Una proposta di marketing territoriale: una possibile griglia di analisi delle risorse*, by Gian Franco Corio

9/05 *Analisi e valutazione delle performance economico-tecnologiche di diversi paesi e situazione italiana*, by Mario Coccia and Mario Taretto

10/05 *The patenting regime in the Italian public research system: what motivates public inventors to patent,* by Bianca Potì and Emanuela Reale

11/05 *Changing patterns in the steering of the University in Italy: funding rules and doctoral programmes,* by Bianca Potì and Emanuela Reale

12/05 *Una "discussione in rete" con Stanley Wilder*, by Carla Basili

13/05 *New Tools for the Governance of the Academic Research in Italy: the Role of Research Evaluation*, by Bianca Potì and Emanuela Reale

14/05 *Product Differentiation, Industry Concentration and Market Share Turbulence***,** by Catherine Matraves, Laura Rondi

15/05 *Riforme del Servizio Sanitario Nazionale e dinamica dell'efficienza ospedaliera in Piemonte*, by Chiara Canta, Massimiliano Piacenza, Gilberto Turati

16/05 SERIE SPECIALE IN COLLABORAZIONE CON HERMES: *Struttura di costo e rendimenti di scala nelle imprese di trasporto pubblico locale di medie-grandi dimensioni*, by Carlo Cambini, Ivana Paniccia, Massimiliano Piacenza, Davide Vannoni

17/05 *Ricerc@.it - Sistema informativo su istituzioni, enti e strutture di ricerca in Italia*, by Edoardo Lorenzetti, Alberto Paparello

2004

1/04 *Le origini dell'economia dell'innovazione: il contributo di Rae*, by Mario Coccia

2/04 *Liberalizzazione e integrazione verticale delle utility elettriche: evidenza empirica da un campione italiano di imprese pubbliche locali*, by Massimiliano Piacenza and Elena Beccio

3/04 *Uno studio sull'innovazione nell'industria chimica*, by Anna Ceci, Mario De Marchi, Maurizio Rocchi

4/04 *Labour market rigidity and firms' R&D strategies*, by Mario De Marchi and Maurizio Rocchi

5/04 *Analisi della tecnologia e approcci alla sua misurazione*, by Mario Coccia

6/04 *Analisi delle strutture pubbliche di ricerca scientifica: tassonomia e comportamento strategico*, by Mario Coccia

7/04 *Ricerca teorica vs. ricerca applicata. Un'analisi relativa al Cnr*, by Mario Coccia and Secondo Rolfo

8/04 *Considerazioni teoriche sulla diffusione delle innovazioni nei distretti industriali: il caso delle ICT*, by Arianna Miglietta

9/04 *Le politiche industriali regionali nel Regno Unito*, by Elisa Salvador

10/04 *Going public to grow? Evidence from a panel of Italian firms*, by Robert E. Carpenter and L. Rondi

11/04 *What Drives Market Prices in the Wine Industry? Estimation of a Hedonic Model for Italian Premium Wine*, by Luigi Benfratello, Massimiliano Piacenza and Stefano Sacchetto

12/04 *Brief notes on the policies for science-based firms*, by Mario De Marchi, Maurizio Rocchi
13/04 *Countrymetrics e valutazione della performance economica dei paesi: un approccio sistemico*, by Mario Coccia
14/04 *Analisi del rischio paese e sistemazione tassonomica*, by Mario Coccia
15/04 *Organizing the Offices for Technology Transfer*, by Chiara Franzoni
16/04 *Le relazioni tra ricerca pubblica e industria in Italia*, by Secondo Rolfo
17/04 *Modelli di analisi e previsione del rischio di insolvenza: una prospettiva delle metodologie applicate*, by Nadia D'Annunzio e Greta Falavigna
18/04 *SERIE SPECIALE: Lo stato di salute del sistema industriale piemontese: analisi economico-finanziaria delle imprese piemontesi*, Terzo Rapporto 1999-2002, by Giuseppe Calabrese, Fabrizio Erbetta, Federico Bruno Rolle
19/04 *SERIE SPECIALE: Osservatorio sulla dinamica economico-finanziaria delle imprese della filiera del tessile e dell'abbigliamento in Piemonte*, Primo rapporto 1999-2002, by Giuseppe Calabrese, Fabrizio Erbetta, Federico Bruno Rolle
20/04 *SERIE SPECIALE: Osservatorio sulla dinamica economico-finanziaria delle imprese della filiera dell'auto in Piemonte,* Secondo Rapporto 1999-2002, by Giuseppe Calabrese, Fabrizio Erbetta, Federico Bruno Rolle

2003

1/03 *Models for Measuring the Research Performance and Management of the Public Labs,* by Mario Coccia, March
2/03 *An Approach to the Measurement of Technological Change Based on the Intensity of Innovation,* by Mario Coccia, April
3/03 *Verso una patente europea dell'informazione: il progetto EnIL*, by Carla Basili, June
4/03 *Scala della magnitudo innovativa per misurare l'attrazione spaziale del trasferimento tecnologico,* by Mario Coccia, June
5/03 *Mappe cognitive per analizzare i processi di creazione e diffusione della conoscenza negli Istituti di ricerca*, by Emanuele Cadario, July
6/03 *Il servizio postale: caratteristiche di mercato e possibilità di liberalizzazione*, by Daniela Boetti, July
7/03 *Donne-scienza-tecnologia: analisi di un caso di studio*, by Anita Calcatelli, Mario Coccia, Katia Ferraris and Ivana Tagliafico, July
8/03 SERIE SPECIALE. OSSERVATORIO SULLE PICCOLE IMPRESE INNOVATIVE TRIESTE. *Imprese innovative in Friuli Venezia Giulia: un esperimento di analisi congiunta*, by Lucia Rotaris, July
9/03 *Regional Industrial Policies in Germany*, by Helmut Karl, Antje Möller and Rüdiger Wink, July
10/03 SERIE SPECIALE. OSSERVATORIO SULLE PICCOLE IMPRESE INNOVATIVE TRIESTE. *L'innovazione nelle new technology-based firms in Friuli-Venezia Giulia*, by Paola Guerra, October
11/03 SERIE SPECIALE. *Lo stato di salute del sistema industriale piemontese: analisi economico-finanziaria delle imprese piemontesi,* Secondo Rapporto 1998-2001, December
12/03 SERIE SPECIALE. *Osservatorio sulla dinamica economico-finanziaria delle imprese della meccanica specializzata in Piemonte*, Primo Rapporto 1998-2001, December
13/03 SERIE SPECIALE. *Osservatorio sulla dinamica economico-finanziaria delle imprese delle bevande in Piemonte*, Primo Rapporto 1998-2001, December

2002

1/02 *La valutazione dell'intensità del cambiamento tecnologico: la scala Mercalli per le innovazioni*, by Mario Coccia, January
2/02 SERIE SPECIALE IN COLLABORAZIONE CON HERMES. *Regulatory constraints and cost efficiency of the Italian public transit systems: an exploratory stochastic frontier model*, by Massimiliano Piacenza, March
3/02 *Aspetti gestionali e analisi dell'efficienza nel settore della distribuzione del gas*, by Giovanni Fraquelli and Fabrizio Erbetta, March
4/02 *Dinamica e comportamento spaziale del trasferimento tecnologico*, by Mario Coccia, April
5/02 *Dimensione organizzativa e performance della ricerca: l'analisi del Consiglio Nazionale delle Ricerche*, by Mario Coccia and Secondo Rolfo, April
6/02 *Analisi di un sistema innovativo regionale e implicazioni di policy nel processo di trasferimento tecnologico,* by Monica Cariola and Mario Coccia, April
7/02 *Analisi psico-economica di un'organizzazione scientifica e implicazioni di management: l'Istituto Elettrotecnico Nazionale "G. Ferraris"*, by Mario Coccia and Alessandra Monticone, April
8/02 *Firm Diversification in the European Union. New Insights on Return to Core Business and Relatedness*, by Laura Rondi and Davide Vannoni, May
9/02 *Le nuove tecnologie di informazione e comunicazione nelle PMI: un'analisi sulla diffusione dei siti internet nel distretto di Biella,* by Simona Salinari, June
10/02 *La valutazione della soddisfazione di operatori di aziende sanitarie,* by Gian Franco Corio, November
11/02 *Analisi del processo innovativo nelle PMI italiane*, by Giuseppe Calabrese, Mario Coccia and Secondo Rolfo, November

12/02 *Metrics della Performance dei laboratori pubblici di ricerca e comportamento strategico*, by Mario Coccia, September

13/02 *Technometrics basata sull'impatto economico del cambiamento tecnologico*, by Mario Coccia, November

2001

1/01 *Competitività e divari di efficienza nell'industria italiana*, by Giovanni Fraquelli, Piercarlo Frigero and Fulvio Sugliano, January

2/01 *Waste water purification in Italy: costs and structure of the technology*, by Giovanni Fraquelli and Roberto Giandrone, January

3/01 SERIE SPECIALE IN COLLABORAZIONE CON HERMES. *Il trasporto pubblico locale in Italia: variabili esplicative dei divari di costo tra le imprese*, by Giovanni Fraquelli, Massimiliano Piacenza and Graziano Abrate, February

4/01 *Relatedness, Coherence, and Coherence Dynamics: Empirical Evidence from Italian Manufacturing*, by Stefano Valvano and Davide Vannoni, February

5/01 *Il nuovo panel Ceris su dati di impresa 1977-1997*, by Luigi Benfratello, Diego Margon, Laura Rondi, Alessandro Sembenelli, Davide Vannoni, Silvana Zelli, Maria Zittino, October

6/01 *SMEs and innovation: the role of the industrial policy in Italy*, by Giuseppe Calabrese and Secondo Rolfo, May

7/01 *Le martingale: aspetti teorici ed applicativi*, by Fabrizio Erbetta and Luca Agnello, September

8/01 *Prime valutazioni qualitative sulle politiche per la R&S in alcune regioni italiane*, by Elisa Salvador, October

9/01 *Accords technology transfer-based: théorie et méthodologie d'analyse du processus, by Mario Coccia,* October

10/01 *Trasferimento tecnologico: indicatori spaziali,* by Mario Coccia, November

11/01 *Does the run-up of privatisation work as an effective incentive mechanism? Preliminary findings from a sample of Italian firms*, by Fabrizio Erbetta, October

12/01 SERIE SPECIALE IN COLLABORAZIONE CON HERMES. *Costs and Technology of Public Transit Systems in Italy: Some Insights to Face Inefficiency*, by Giovanni Fraquelli, Massimiliano Piacenza and Graziano Abrate, October

13/01 *Le NTBFs a Sophia Antipolis, analisi di un campione di imprese*, by Alessandra Ressico, December

2000

1/00 *Trasferimento tecnologico: analisi spaziale,* by Mario Coccia, March

2/00 *Poli produttivi e sviluppo locale: una indagine sulle tecnologie alimentari nel mezzogiorno,* by Francesco G. Leone, March

3/00 *La mission del top management di aziende sanitarie,* by Gian Franco Corio, March

4/00 *La percezione dei fattori di qualità in Istituti di ricerca: una prima elaborazione del caso Piemonte,* by Gian Franco Corio, March

5/00 *Una metodologia per misurare la performance endogena nelle strutture di R&S,* by Mario Coccia, April

6/00 *Soddisfazione, coinvolgimento lavorativo e performance della ricerca,* by Mario Coccia, May

7/00 *Foreign Direct Investment and Trade in the EU: Are They Complementary or Substitute in Business Cycles Fluctuations?*, by Giovanna Segre, April

8/00 *L'attesa della privatizzazione: una minaccia credibile per il manager?*, by Giovanni Fraquelli, May

9/00 *Gli effetti occupazionali dell'innovazione. Verifica su un campione di imprese manifatturiere italiane*, by Marina Di Giacomo, May

10/00 *Investment, Cash Flow and Managerial Discretion in State-owned Firms. Evidence Across Soft and Hard Budget Constraints*, by Elisabetta Bertero and Laura Rondi, June

11/00 *Effetti delle fusioni e acquisizioni: una rassegna critica dell'evidenza empirica*, by Luigi Benfratello, June

12/00 *Identità e immagine organizzativa negli Istituti CNR del Piemonte*, by Paolo Enria, August

13/00 *Multinational Firms in Italy: Trends in the Manufacturing Sector*, by Giovanna Segre, September

14/00 *Italian Corporate Governance, Investment, and Finance*, by Robert E. Carpenter and Laura Rondi, October

15/00 *Multinational Strategies and Outward-Processing Trade between Italy and the CEECs: The Case of Textile-Clothing*, by Giovanni Balcet and Giampaolo Vitali, December

16/00 *The Public Transit Systems in Italy: A Critical Analysis of the Regulatory Framework*, by Massimiliano Piacenza, December

1999

1/99 *La valutazione delle politiche locali per l'innovazione: il caso dei Centri Servizi in Italia,* by Monica Cariola and Secondo Rolfo, January

2/99 *Trasferimento tecnologico ed autofinanziamento: il caso degli Istituti Cnr in Piemonte,* by Mario Coccia, March

3/99 *Empirical studies of vertical integration: the transaction cost orthodoxy,* by Davide Vannoni, March

4/99 *Developing innovation in small-medium suppliers: evidence from the Italian car industry,* by Giuseppe Calabrese, April

5/99 *Privatization in Italy: an analysis of factors productivity and technical efficiency,* by Giovanni Fraquelli and Fabrizio Erbetta, March
6/99 *New Technology Based-Firms in Italia: analisi di un campione di imprese triestine,* by Anna Maria Gimigliano, April
7/99 *Trasferimento tacito della conoscenza: gli Istituti CNR dell'Area di Ricerca di Torino,* by Mario Coccia, May
8/99 *Struttura ed evoluzione di un distretto industriale piemontese: la produzione di casalinghi nel Cusio,* by Alessandra Ressico, June
9/99 *Analisi sistemica della performance nelle strutture di ricerca,* by Mario Coccia, September
10/99 *The entry mode choice of EU leading companies (1987-1997),* by Giampaolo Vitali, November
11/99 *Esperimenti di trasferimento tecnologico alle piccole e medie imprese nella Regione Piemonte,* by Mario Coccia, November
12/99 *A mathematical model for performance evaluation in the R&D laboratories: theory and application in Italy,* by Mario Coccia, November
13/99 *Trasferimento tecnologico: analisi dei fruitori,* by Mario Coccia, December
14/99 *Beyond profitability: effects of acquisitions on technical efficiency and productivity in the Italian pasta industry,* by Luigi Benfratello, December
15/99 *Determinanti ed effetti delle fusioni e acquisizioni: un'analisi sulla base delle notifiche alle autorità antitrust,* by Luigi Benfratello, December

1998
1/98 *Alcune riflessioni preliminari sul mercato degli strumenti multimediali,* by Paolo Vaglio, January
2/98 *Before and after privatization: a comparison between competitive firms,* by Giovanni Fraquelli and Paola Fabbri, January
3/98 **Not available**
4/98 *Le importazioni come incentivo alla concorrenza: l'evidenza empirica internazionale e il caso del mercato unico europeo,* by Anna Bottasso, May
5/98 *SEM and the changing structure of EU Manufacturing, 1987-1993,* by Stephen Davies, Laura Rondi and Alessandro Sembenelli, November
6/98 *The diversified firm: non formal theories versus formal models,* by Davide Vannoni, December
7/98 *Managerial discretion and investment decisions of state-owned firms: evidence from a panel of Italian companies,* by Elisabetta Bertero and Laura Rondi, December
8/98 *La valutazione della R&S in Italia: rassegna delle esperienze del C.N.R. e proposta di un approccio alternativo,* by Domiziano Boschi, December
9/98 *Multidimensional Performance in Telecommunications, Regulation and Competition: Analysing the European Major Players,* by Giovanni Fraquelli and Davide Vannoni, December

1997
1/97 *Multinationality, diversification and firm size. An empirical analysis of Europe's leading firms,* by Stephen Davies, Laura Rondi and Alessandro Sembenelli, January
2/97 *Qualità totale e organizzazione del lavoro nelle aziende sanitarie,* by Gian Franco Corio, January
3/97 *Reorganising the product and process development in Fiat Auto,* by Giuseppe Calabrese, February
4/97 *Buyer-supplier best practices in product development: evidence from car industry,* by Giuseppe Calabrese, April
5/97 *L'innovazione nei distretti industriali. Una rassegna ragionata della letteratura,* by Elena Ragazzi, April
6/97 *The impact of financing constraints on markups: theory and evidence from Italian firm level data,* by Anna Bottasso, Marzio Galeotti and Alessandro Sembenelli, April
7/97 *Capacità competitiva e evoluzione strutturale dei settori di specializzazione: il caso delle macchine per confezionamento e imballaggio,* by Secondo Rolfo, Paolo Vaglio, April
8/97 *Tecnologia e produttività delle aziende elettriche municipalizzate,* by Giovanni Fraquelli and Piercarlo Frigero, April
9/97 *La normativa nazionale e regionale per l'innovazione e la qualità nelle piccole e medie imprese: leggi, risorse, risultati e nuovi strumenti,* by Giuseppe Calabrese, June
10/97 *European integration and leading firms' entry and exit strategies,* by Steve Davies, Laura Rondi and Alessandro Sembenelli, April
11/97 *Does debt discipline state-owned firms? Evidence from a panel of Italian firms,* by Elisabetta Bertero and Laura Rondi, July
12/97 *Distretti industriali e innovazione: i limiti dei sistemi tecnologici locali,* by Secondo Rolfo and Giampaolo Vitali, July
13/97 *Costs, technology and ownership form of natural gas distribution in Italy,* by Giovanni Fraquelli and Roberto Giandrone, July
14/97 *Costs and structure of technology in the Italian water industry,* by Paola Fabbri and Giovanni Fraquelli, July

15/97 *Aspetti e misure della customer satisfaction/dissatisfaction,* by Maria Teresa Morana, July

16/97 *La qualità nei servizi pubblici: limiti della normativa UNI EN 29000 nel settore sanitario,* by Efisio Ibba, July

17/97 *Investimenti, fattori finanziari e ciclo economico,* by Laura Rondi and Alessandro Sembenelli, rivisto sett. 1998

18/97 *Strategie di crescita esterna delle imprese leader in Europa: risultati preliminari dell'utilizzo del data-base Ceris "100 top EU firms' acquisition/divestment database 1987-1993",* by Giampaolo Vitali and Marco Orecchia, December

19/97 *Struttura e attività dei Centri Servizi all'innovazione: vantaggi e limiti dell'esperienza italiana,* by Monica Cariola, December

20/97 *Il comportamento ciclico dei margini di profitto in presenza di mercati del capitale meno che perfetti: un'analisi empirica su dati di impresa in Italia,* by Anna Bottasso, December

1996

1/96 *Aspetti e misure della produttività. Un'analisi statistica su tre aziende elettriche europee,* by Donatella Cangialosi, February

2/96 *L'analisi e la valutazione della soddisfazione degli utenti interni: un'applicazione nell'ambito dei servizi sanitari,* by Maria Teresa Morana, February

3/96 *La funzione di costo nel servizio idrico. Un contributo al dibattito sul metodo normalizzato per la determinazione della tariffa del servizio idrico integrato,* by Giovanni Fraquelli and Paola Fabbri, February

4/96 *Coerenza d'impresa e diversificazione settoriale: un'applicazione alle società leaders nell'industria manifatturiera europea,* by Marco Orecchia, February

5/96 *Privatizzazioni: meccanismi di collocamento e assetti proprietari. Il caso STET,* by Paola Fabbri, February

6/96 *I nuovi scenari competitivi nell'industria delle telecomunicazioni: le principali esperienze internazionali,* by Paola Fabbri, February

7/96 *Accordi, joint-venture e investimenti diretti dell'industria italiana nella CSI: Un'analisi qualitativa,* by Chiara Monti and Giampaolo Vitali, February

8/96 *Verso la riconversione di settori utilizzatori di amianto. Risultati di un'indagine sul campo,* by Marisa Gerbi Sethi, Salvatore Marino and Maria Zittino, February

9/96 *Innovazione tecnologica e competitività internazionale: quale futuro per i distretti e le economie locali,* by Secondo Rolfo, March

10/96 *Dati disaggregati e analisi della struttura industriale: la matrice europea delle quote di mercato,* by Laura Rondi, March

11/96 *Le decisioni di entrata e di uscita: evidenze empiriche sui maggiori gruppi italiani,* by Alessandro Sembenelli and Davide Vannoni, April

12/96 *Le direttrici della diversificazione nella grande industria italiana,* by Davide Vannoni, April

13/96 *R&S cooperativa e non-cooperativa in un duopolio misto con spillovers,* by Marco Orecchia, May

14/96 *Unità di studio sulle strategie di crescita esterna delle imprese italiane*, by Giampaolo Vitali and Maria Zittino, July. **Not available**

15/96 *Uno strumento di politica per l'innovazione: la prospezione tecnologica,* by Secondo Rolfo, September

16/96 *L'introduzione della Qualità Totale in aziende ospedaliere: aspettative ed opinioni del middle management,* by Gian Franco Corio, September

17/96 *Shareholders' voting power and block transaction premia: an empirical analysis of Italian listed companies,* by Giovanna Nicodano and Alessandro Sembenelli, November

18/96 *La valutazione dell'impatto delle politiche tecnologiche: un'analisi classificatoria e una rassegna di alcune esperienze europee,* by Domiziano Boschi, November

19/96 *L'industria orafa italiana: lo sviluppo del settore punta sulle esportazioni,* by Anna Maria Gaibisso and Elena Ragazzi, November

20/96 *La centralità dell'innovazione nell'intervento pubblico nazionale e regionale in Germania,* by Secondo Rolfo, December

21/96 *Ricerca, innovazione e mercato: la nuova politica del Regno Unito,* by Secondo Rolfo, December

22/96 *Politiche per l'innovazione in Francia,* by Elena Ragazzi, December

23/96 *La relazione tra struttura finanziaria e decisioni reali delle imprese: una rassegna critica dell'evidenza empirica,* by Anna Bottasso, December

1995

1/95 *Form of ownership and financial constraints: panel data evidence on leverage and investment choices by Italian firms,* by Fabio Schiantarelli and Alessandro Sembenelli, March

2/95 *Regulation of the electric supply industry in Italy,* by Giovanni Fraquelli and Elena Ragazzi, March

3/95 *Restructuring product development and production networks: Fiat Auto,* by Giuseppe Calabrese, September

4/95 *Explaining corporate structure: the MD matrix, product differentiation and size of market,* by Stephen Davies, Laura Rondi and Alessandro Sembenelli, November

5/95 *Regulation and total productivity performance in electricity: a comparison between Italy, Germany and France,* by Giovanni Fraquelli and Davide Vannoni, December
6/95 *Strategie di crescita esterna nel sistema bancario italiano: un'analisi empirica 1987-1994,* by Stefano Olivero and Giampaolo Vitali, December
7/95 *Panel Ceris su dati di impresa: aspetti metodologici e istruzioni per l'uso,* by Diego Margon, Alessandro Sembenelli and Davide Vannoni, December

1994
1/94 *Una politica industriale per gli investimenti esteri in Italia: alcune riflessioni,* by Giampaolo Vitali, May
2/94 *Scelte cooperative in attività di ricerca e sviluppo,* by Marco Orecchia, May
3/94 *Perché le matrici intersettoriali per misurare l'integrazione verticale?,* by Davide Vannoni, July
4/94 *Fiat Auto: A simultaneous engineering experience,* by Giuseppe Calabrese, August

1993
1/93 *Spanish machine tool industry,* by Giuseppe Calabrese, November
2/93 *The machine tool industry in Japan,* by Giampaolo Vitali, November
3/93 *The UK machine tool industry,* by Alessandro Sembenelli and Paul Simpson, November
4/93 *The Italian machine tool industry,* by Secondo Rolfo, November
5/93 *Firms' financial and real responses to business cycle shocks and monetary tightening: evidence for large and small Italian companies,* by Laura Rondi, Brian Sack, Fabio Schiantarelli and Alessandro Sembenelli, December

Free copies are distributed on request to Universities, Research Institutes, researchers, students, etc.
Please, write to:
MARIA ZITTINO, Working Papers Coordinator
CERIS-CNR, Via Real Collegio, 30; 10024 Moncalieri (Torino), Italy
Tel. +39 011 6824.914; Fax +39 011 6824.966; m.zittino@ceris.cnr.it; http://www.ceris.cnr.it