Disability and Work: A Two-Stage Empirical Analysis of Italian Evidence at Provincial Level in Providing Employment for Disabled Workers

M. Agovino · A. Rapposelli

Abstract Law 68 of March 12, 1999, whose aim is the regulation and promotion of the employment of persons with disabilities, has contributed significantly to their employment of disabled people, and consequently to their social inclusion, by transferring the responsibility for its implementation to the local authorities. The main objective of this study is to evaluate the performance of Italian provinces in providing employment of disabled people according to law 68/99 and to examine which are the factors that could lead to an improvement of efficiency of the provinces that are not classified among the most efficient ones in the application of article 13 of this law. To this purpose, we propose a two-step analysis. First, we apply data envelopment analysis (DEA) technique in order to evaluate provinces' performance with respect to the number of disabled people employed. Then, we apply models for censored data (Tobit model) to the efficiency scores obtained from DEA analysis. The results show that the sheer presence of potential employers and of employment offices is not enough to make a province able to correctly apply the law 68/1999. A second group of variables, i.e. socio-welfare factors, has to be considered, as the environmental context where each Province operates could influence the efficiency of each province in providing employment for disabled people. Hence, socio-welfare variables ought to be included as policy instruments in order to promote the integration of disabled people in the labour market.

Keywords Disabled people · Public policy · Non-labour market discrimination · Technical efficiency · Data envelopment analysis (DEA) · Truncated and censored models

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1 Introduction

In North America and most European countries, disability as an issue of law has commonly been addressed as an aspect of social security and welfare legislation, health law or guardianship (Degener and Quinn 2002). People with disabilities, therefore, were only considered as objects of welfare, health and charity programs.

Fortunately, when some countries made attempts to take a more inclusive approach to disability policy, by considering disability as a social issue, too, and not only as a medical issue, a lot of progress has been made in terms of legislation. With the paradigm shift from the medical to the social model of disability (Oliver 1990), laws in this area were intended to provide equal opportunities for disabled people in many social life aspects, such as employment, education, housing, etc.

Then, the reform process in disability law has been going on in all parts of the world. In the 90's the paradigm strongly turned towards civil rights law, by recognizing human rights of disabled people. Consequently, we have witnessed the promotion of human rights legislation for disabled people in many nations, such as the *Americans with Disabilities Act* in the United States or the *Disability Discrimination Act* in the UK in 1996.

By focusing on Italy, it's well known that Law 68 of March 12, 1999 represents a key pillar in our disability legislation. Its aim is the promotion of work placement and work integration of persons with disabilities by supporting special services and "targeted employment", so that the employment of disabled people is based on quotas of compulsory hiring, but also on a careful assessment of their residual ability, on providing, where necessary, training courses, internship and business mentoring, and on special three sided employment contracts (Agovino and Rapposelli 2013a).

Law 68 has contributed significantly to the employment of Italian disabled people, and consequently to their social inclusion, by transferring the responsibility for its implementation to the local authorities. In particular, its main innovation has been the transfer to the provinces of public employment services,[1] i.e. the current employment offices, and training (Orlando and Patrick 2006).

In this context of reform process in disability law, a key issue for policy-makers is to determine the extent to which such reforms have achieved their objectives. Hence, the aim of this study is to evaluate the performance of Italian provinces in providing employment of disabled people according to law 68/99 and to examine which are the factors that could lead to an improvement of efficiency of the provinces classified among the less virtuous ones.

To this purpose, we have proposed a two-step analysis focusing on Italian provinces for the year 2005. In the first step, we have applied data envelopment analysis (DEA) technique in order to evaluate, in terms of technical efficiency, their performance with respect to the number of disabled people placed in employment in accordance with article 13[2] of

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[1] The prerequisite to take advantage of the benefits provided by law 68/99 is the inclusion in the compulsory employment lists, that are held by the employment services of the provincial governments. Employment services usually enroll the applicant in the lists of compulsory employment conditionally to further assessment of disability by health care bodies. Next to the entering, the disabled is then able to join the job opportunities that come to the employment service from both public bodies and private companies, by filling out the form reservation.

[2] Article 13 of law 68/99 offers exemption from national security contributions to private employers that employ disabled people. More specifically, it provides total exemption for each disabled people employed who has a reduced capacity to work of more than 79 %; for a maximum of 8 years, and the exemption of 50 % for each disabled person employed who has a reduced capacity to work between 67 and 79 %, for a maximum of 5 years.

law 68/99. In the second phase of our analysis, we have applied models for censored data (Tobit model) to the efficiency scores obtained from DEA analysis.

The paper is organized as follows. Section 2 reviews the DEA method, then presents the data used and describes the results obtained, Sect. 3 introduces the Tobit model and verifies the determinants of efficiency, Sect. 4 gives the conclusions.

2 Data Envelopment Analysis

The concept of efficiency is based on the ratio of output y to input x quantities of a production process. Consequently, for a firm, producing the maximum quantities of outputs from a given amount of inputs or producing a given amount of outputs with the minimum quantities of inputs, is very successful. According to this concept, a DMU is efficient if it is operates on its corresponding production frontier. The efficiency of a DMU j ($j = 1, \ldots, n$) with multiple inputs and multiple outputs can be presented as follows:

$$\frac{\sum_{r=1}^{n} u_{rj} y_{rj}}{\sum_{i=1}^{n} v_{ij} x_{ij}} = \theta_k \tag{2.1}$$

where u_{rj} indicates the weight of each output y_{rj}, $r = 1, \ldots, s$, and v_{ij} indicates the weight of each input x_{ij}, $i = 1, \ldots, m$.

The concept of best practice frontier (or efficiency frontier), with $\theta = 1$, and the idea of measuring efficiency as a relative distance from this frontier was developed by Farrell (1957). This framework was reformulated as a mathematical programming problem by Charnes et al. (1978), thus initiating the linear programming approach to efficiency measurement known as DEA.

The efficiency score (2.1) can be transformed into a maximisation or minimisation problem (output or input orientation) according to the orientation of a DMU manager to improve efficiency. In this application we calculate the output efficiency of Italian provinces by implementing the BCC model, which allows for variable returns to scale assumption. The scale assumptions secures that any composite unit extrapolated is similar in size to the reference unit.

The model we use (Banker et al. 1984), under the dual formulation, for DMU j_0 under evaluation is the following:

$$\max \ \theta_0$$

$$\text{subject to}$$

$$\sum_{j=1}^{n} \lambda_j x_{ij} - \theta_0 x_{i0} \geq 0 \tag{2.2}$$

$$y_{r0} - \sum_{j=1}^{n} \lambda_j y_{rj} \geq 0, \tag{2.3}$$

$$\lambda_j \geq 0, \tag{2.4}$$

where λ_j represents the weights of DMU j and indicates the needed combination of efficient DMUs (reference units or peers) for each inefficient units in order to form a virtual unit located on the frontier.

This linear programming problem must be solved n times, once for each unit in the sample, for obtaining an efficiency score value for each province. The efficiency score is bounded between 0 and 1. DMU j_0 is said to be efficient (has a score of unity) if no other DMU or combination of DMUs can produce more than DMU j_0 on at least one output without producing less in some other output or requiring more of at least one input.

2.1 Data and Results

In this study the DEA technique is used in order to evaluate the technical efficiency of the 103 Italian provinces for the year 2005 with respect to the number of disabled people who have obtained a work in accordance with article 13 of the law 68/1999.

The production process undertaken by Provinces leads to the employment of disabled people, which is viewed as the output. This output results from the combination of two groups of factors (inputs), i.e. the actors involved in the integration of disabled people in the labour market, and the environmental factors within which the production process takes place.

As actors, i.e. inputs involved in the production process of finding employment for disabled people, we consider:

- the number of potential employers of disabled people, i.e. the number of profit-making firms[3] and the number of cooperative societies of type B,[4] which together indicate the potential[5] demand for the work of disabled people in the private sector. In fact with regard to potential employers, law 68/1999 provides that private enterprises with a minimal number of employees have to hire a certain number of disabled people, defined according to the total number of employees.[6] Among the profit-making firms we consider only the service sector, because this is the sector where disabled people are mainly employed, due to the job typology, more appropriate to their status. In addition, we distinguish private firms into six categories: education services, environmental health services and cemetery management, public health and veterinary services, other social services, community services and other cultural services, personal services. Besides, cooperative societies of type B carry out different activities (agriculture, industry, commerce, services) in order to integrate disadvantaged people in the labour market.
- the number of employment offices, as the hiring of disabled people formally takes place through public employment centers, which are involved in the matching process between supply and demand for the employment of disabled people.

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[3] In this paper we omit the number of public sector organizations, that have been considered in a previous paper (Agovino and Rapposelli 2013b), because here we are referring specifically to article 13 of the law 68/1999, which consider only the private sector.

[4] B type of cooperatives were established in article 1 of Law 381 of November 8, 1991. They are not for profit organizations, aiming at providing employment for disadvantaged groups, such as disabled people, formerly convicted people, people formerly involved with substances.

[5] Potential in the sense that not all firms which ought to employ disabled people actually do so (see for instance Ministry of Employment 2004–2005).

[6] In this application we do not identify private firms according to the number of employees, because a problem would be faced: due to the high number of variables included in the DEA analysis with respect to the number of units, there would not be a reasonable level of differentiation between DMUs evaluated (Dyson et al. 2001).

Moreover, we improve the application by also considering the environmental context in each Province analyzed, i.e. the socio-economic context where the Province operates, which is not under the control of the managers and could influence the efficiency of the DMU analysed (Coelli et al. 1998). Consequently, the input set is expanded to include two environmental variables (Charnes et al. 1981) in the DEA analysis:

- the number of temporary layoff hours, that is a variable that acts as an indicator of the state of the local labour market, because law 68/1999 provides that companies with employees in temporary layoffs are not enforced to employ disabled people;
- the number of employed women, that is a variable that represent a measure of openness "to other" and whose purpose is to capture the presence of an open and friendly environment to those who have previously had a marginal role in society.[7]

The data required are based on several sources. Outputs data and the number of employment offices is published by the Ministry of Employment, the number of private firms and the number of temporary layoff hours have been drawn from INPS (National Social Security Institute), while the number of cooperative societies type B and the number of employed women have been obtained from ISTAT (Italian National Institute of Statistics).

For eight provinces (Asti, Alessandria, Biella, Como, Bolzano, Gorizia, Caltanissetta and Enna) information on the number of disabled people included in the local labour market is not available. The missing data have been replaced by multiple imputation achieved through the implementation of a MCMC algorithm (Cameron and Trivedi 2005). Since the DEA analysis is sensitive to the presence of outliers, we verify their existence through the implementation of the Grubbs test (Grubbs 1969; Stefansky 1972).[8] Once outliers are identified, we apply the winsorization[9] to data.

For a preliminary investigation we have plotted the output of the production process, i.e. the number of disabled people employed, and some inputs. In Fig. 1 we can observe that disabled people placed in employment are more numerous in the Provinces located in the North-East of Italy and in the Toscana Provinces. Figure 2 shows that the number of temporary layoff hours is concentrated not only in the Provinces of Northern Italy but also in some Provinces of the Centre-South Italy, i.e. Lazio, Campania and Puglia. Besides, Fig. 3 shows that the number of employed women is higher in Northern Italy (Piemonte, Lombardia, Veneto and Emilia Romagna) and in Lazio (Central Italy). This highlights that the socio-economic environment is more open in Northern Italy.

Table 1 presents the results of the output-orientated BCC model, for each province evaluated. According to the efficiency scores obtained, the mean efficiency score is 0.602 and 32 of the 103 Italian provinces are best performers in the implementation of article 13 of law 68/99. Besides, about a tenth of them is very close to the frontier, while several of the others do not show a good performance, as they receive very low ratings. The efficiency score distribution is plotted in Fig. 4.

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[7] There are a number of ways in which environmental variables can be accommodated in a DEA analysis. In our application we incorporate them directly into the linear programming formulation (Ferrier and Knox Lovell 1990).

[8] This test can be used to identify outliers in a data set and allows us to create a new variable that takes value equal to 1 if the observation is an outlier, 0 otherwise. The Grubbs test detects one outlier at each iteration and this operation is iterated until no outliers remain.

[9] The winsorization is a statistical procedure for the artificial modification of the sampling distribution of random variables. It allows the replacement of outliers with threshold values appropriately constructed.

Fig. 1 Number of disabled
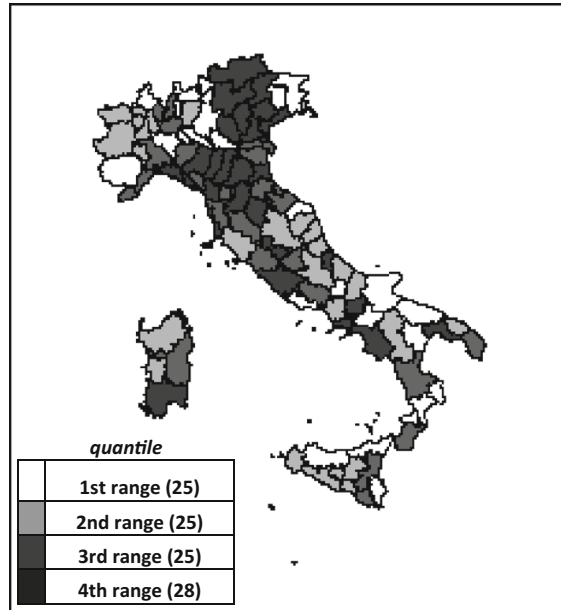people employed, 2005
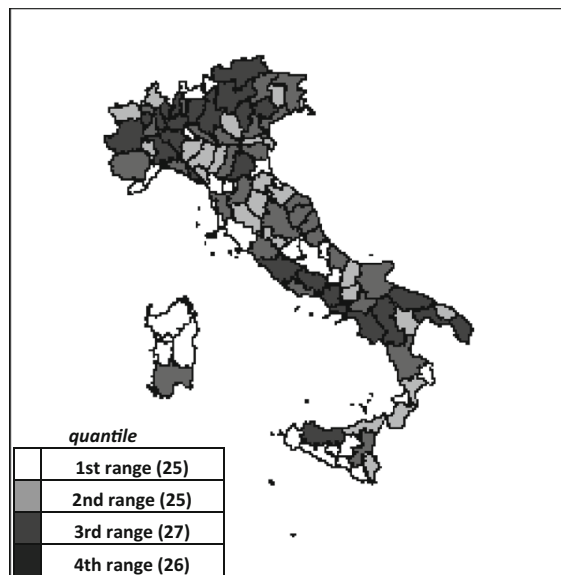

Fig. 2 Number of temporary
layoff hours, 2005

Figure 5 shows that in Northern Italy most of Italian regions (Valle d'Aosta, Trentino, Veneto, Liguria) exhibit a high number of virtuous provinces, with efficiency scores above the national average. In Central Italy, Toscana, Umbria and Lazio rank among the most efficient regions. In Southern Italy, the most efficient regions are Calabria, Abruzzo, Campania, Molise and Sardegna. The regions that show very low levels of efficiency are Piemonte, Lombardia and Friuli in Northern Italy, Marche and Emilia Romagna in Central Italy and Puglia and Sicilia in Southern Italy. Moreover, we can observe that, in terms of efficiency scores, Umbria's and Friuli's provinces and many Southern Italy provinces are very different, contrarily to Northern Italy regions.

It is also possible to identify inefficient provinces and their relatively efficient peers, because DEA method is able to give information on the extent to which an efficient unit is used as an efficient peer for other DMUs. Table 2 displays the frequency with which
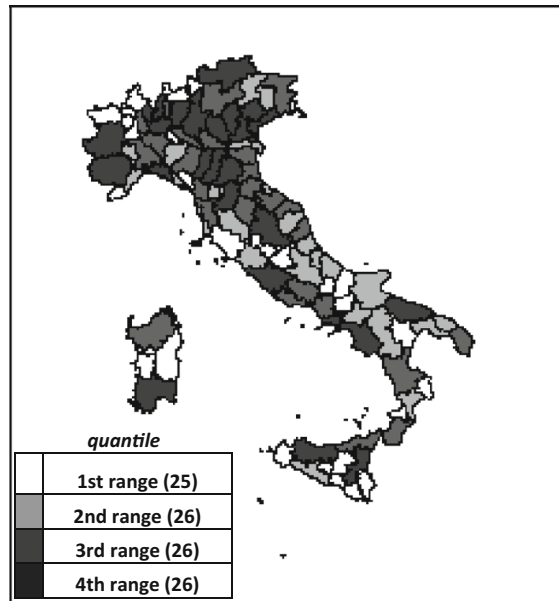
Fig. 3 Number of employed
women, 2005

Table 1 DEA efficiency scores by Italian provinces, 2005

DMU	BCC score	DMU	BCC score	DMU	BCC score	DMU	BCC score	DMU	BCC score
LE	0.511	OR	1	PT	0.722	BZ	0.899	SP	1
CH	0.170	RG	1	LU	1	PR	0.627	SO	0.109
KR	1	CB	0.514	TR	1	TN	0.975	VA	0.234
PZ	0.338	SA	1	PI	0.573	PN	0.040	CN	0.042
CL	1	ME	0.113	FI	0.865	FC	0.354	MI	0.322
TA	0.816	NU	1	RO	0.458	RN	0.839	LC	0.113
CA	0.815	RC	0.557	SI	0.587	BO	0.798	CO	0.359
CT	0.404	TP	1	PU	0.437	VR	1	BS	0.062
CE	0.191	CS	0.447	AP	0.379	RE	0.575	VB	0.343
BA	0.042	MT	1	PG	0.259	FE	0.667	BG	0.117
SS	0.338	CZ	0.224	AN	0.062	VI	0.953	CR	1
SR	0.044	FG	0.151	RI	1	BL	1	AT	0.334
PA	0.031	VV	1	MC	0.339	MO	0.504	VC	1
BR	0.339	AG	0.270	FR	0.543	PC	0.365	PV	0.115
PE	1	EN	1	MS	1	TV	0.952	LO	1
IS	1	LI	1	RO	0.994	PD	1	AL	0.437
NA	0.950	VT	0.580	UD	1	AO	1	GE	0.963
TE	0.457	GR	1	GO	1	BI	0.319	NO	0.713
BN	1	PR	1	TS	1	IM	1	TO	0.126
AV	0.159	AR	0.957	VE	1	MN	0.126		
AQ	1	LT	0.064	RA	1	SV	0.911		

In the "Appendix" we report the ID codes for each Italian province (Table 4)

efficient provinces appear in the peer group of the inefficient ones. We may note that Teramo, Lecce, Bolzano, Arezzo and Latina appears very frequently in the reference sets (39, 30, 20, 15 and 15 times, respectively).
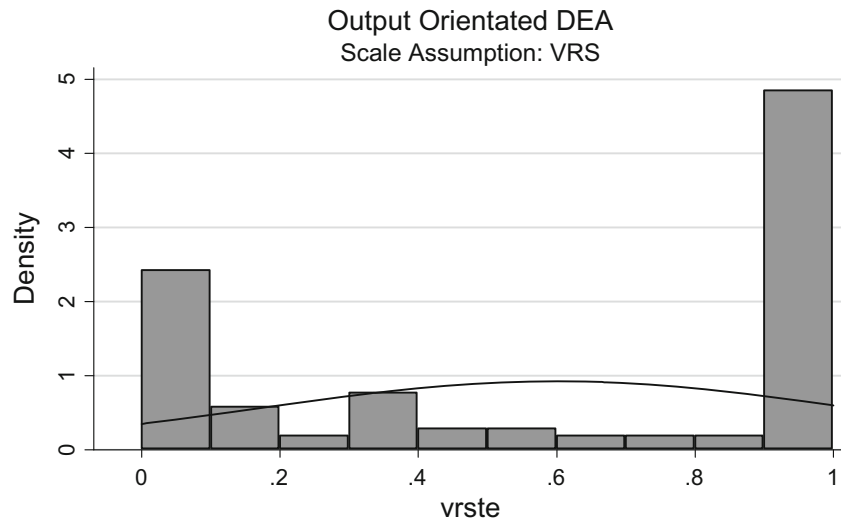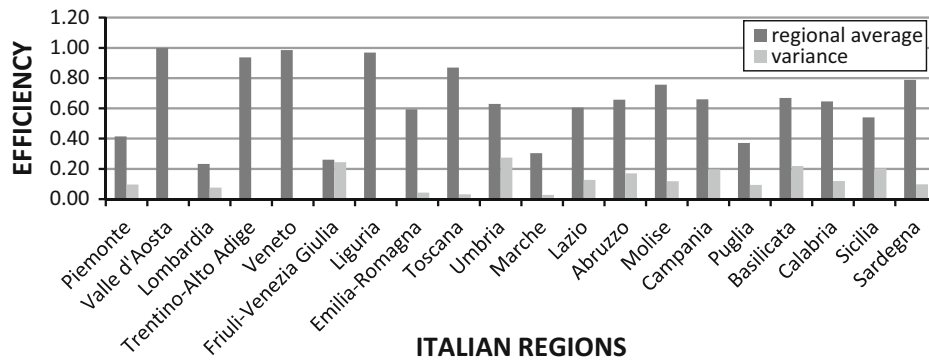
Fig. 4 VRS efficiency score distribution

Fig. 5 Mean efficiency scores and variance by Italian regions, 2005

Table 2 Reference sets

Peer set	Frequency to other DMUs	Peer set	Frequency to other DMUs
Gorizia	2	Teramo	39
Ravenna	9	Asti	14
Livorno	1	Forlì Cesena	1
Arezzo	15	Avellino	1
Bolzano	20	Sondrio	3
Rovigo	3	Messina	13
Treviso	5	Latina	15
Genova	1	Siracusa	2
Cagliari	9	Torino	2
R.Calabria	14	Bari	11
Lecce	30	Trieste	1
Pesaro Urbino	4	Udine	7
Modena	3	Cremona	1

3 Tobit Estimation Model

In the second step of the analysis, we proceed to examine which are the factors that could lead to an improvement of efficiency of the provinces classified among the less virtuous ones. More specifically, we investigate the relationship between a set of socio-welfare factors and technical efficiency.

For the econometric estimation we use a Tobit model in order to take into account the characteristics of the efficiency score distribution which has a mass of points at the maximum value (Fig. 4), because DEA results show a high frequency of provinces with efficiency score equal to one. In this case, utilization of ordinary least squares (OLS) will yield biased and inconsistent parameter estimates. The regression analysis with classical criteria, in fact, is not recommended when censored variables are involved (as in our case) because the area in which we work is limited, the domain of the dependent variable is a subset of the original one.[10]

The most appropriate Tobit technique is that developed by Tobin (1958), which is especially effective for the analysis of small samples, where the dependent variable is limited. For the study of censored data we define a new variable y_i that is a transformation of the original variable y_i^* related to the province i. The standard Tobit model can be defined as follows:

$$y_i^* = \beta' x_i + \varepsilon_i$$

$$y_i = 0 \quad if \ y_i^* \geq 1 \tag{4.1}$$

$$y = y^* \quad if \ y_i^* < 1$$

with $\varepsilon_i \approx N(0; \ \sigma^2)$. If $y_i^* \approx N(\mu; \ \sigma^2)$, y_i^* will be normal for $y_i^* < 1$ and equal to $1 - \varphi_i(\mu/\sigma)$ for $y_i = 1$, then the distribution of the modified censored variable is a mixture of a continuous and a discrete part, because the whole region of the censored probability is assigned to the censoring value (in our case the unit value). y_i^* is a latent variable and y_i is the efficiency score obtained from DEA analysis.

The maximum likelihood function maximized with respect to parameters β and σ, based on 103 observations y_i and x_i, is:

$$L = \prod_{y_i=1} (1 - \Phi_i) \prod_{y_i < 1} \frac{1}{(2\pi\sigma^2)^{1/2}} \times e^{-\left[1/(2\sigma^2)\right](y_i - \beta' x_i)^2} \tag{4.2}$$

The first product refers to efficient provinces, whilst the second one to inefficient provinces, with efficiency score less than unity.

3.1 Analysis of the Determinants of Efficiency

In this phase, we identify the effects on efficiency of various variables, whose aim is to support, prepare, initiate and assist disabled people in their integration in the labour market. In particular, we focus on the following socio-welfare factors: educational services for disabled people, curriculum counselling and/or careers guidance, empowerment

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[10] In the censored regression model, the exogenous variables are also observed for the units where the dependent variable takes values higher (or lower) the threshold, while in the truncated regression model these observations are completely eliminated from the sample.

Table 3 Results from Tobit model

Variables	(I)	(II)
Constant	1.246 (0.258)***	1.193 (0.260)***
Driving licences	0.035 (0.016)**	0.032 (0.016)*
Curriculum counseling	0.075 (0.024)***	0.075 (0.023)***
Accompaniment and social inclusion	0.028 (0.018)	
Educational services	0.021 (0.011)*	0.017 (0.010)*
Empowerment training	0.066 (0.020)***	0.071 (0.020)***
Listening	0.048 (0.016)***	0.039*** (0.013)
Support	−0.022 (0.015)	
LR chi2	21.96***	18.09***
log-lik	−77.872	−79.804
McFadden's R2	0.124	0.102
ML (Cox–Snell) R2	0.192	0.161
Cragg–Uhler (Nagelkerke) R2	0.234	0.196
McKelvey and Zavoina's R2	0.205	0.174
BIC	197.457	192.052
AIC	173.744	173.609

() standard errors

***, **, * Significant at 1, 5, 10 % level

training, accompaniment and social inclusion, listening, moral support and assistance.[11] These variables, social capital oriented,[12] are considered in terms of number of institutions which offer the above services at provincial level (source ISTAT). In addition to these variables we also consider the number of special driving licenses that represents a proxy for the availability of training services.

The results of Tobit regression, where VRS efficiency scores are used as dependent variables, are presented in Table 3. We can observe (column I) that most regressors have expected positive signs and are statistically significant, whilst accompaniment and moral support are not statistically significant. Hence, by excluding not significant variables from our analysis (column II), we verify that regressors continue to be statistically significant and show a positive impact on the efficiency level.

The positive impact of variables such as curriculum counselling and/or careers guidance, educational services, and listening is in line with law 68's idea, that tries to reach the matching between a system characterized by quotas of compulsory hiring and supporting special services for disabled people, such as training courses and business mentoring, and "targeted employment" (Orlando and Patrizi 2006).

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[11] These services are provided by cooperatives societies type A. They are directly involved in care, rehabilitation and education of disabled people, sick, elderly people, children, the homeless, people with mental distress, and they usually work in cooperation with public bodies.

[12] In Italy the social capital supply was mainly used as one of the elements that help to explain the significant spatial differences that characterize the development of the country (Micucci and Nuzzo 2005). The inclusion in our analysis of socio-welfare factors is supported by the widespread idea that it is not possible to correctly interpret economic phenomena without regard to their relational dimension (Sabatini 2004). These relational phenomena contribute to the performance of companies no less than the availability of physical capital such as machinery and sheds.

An important issue for social inclusion of disabled people is mobility. Our results confirm that a higher mobility of persons with disabilities (empowerment training and driving licences) helps the matching process between demand and supply of jobs at provincial level. By focusing on 2006 data, we note that disabled people use local public transport with the same frequency of people without disabilities (20.3 and 24.4 %, respectively). On the contrary, disabled people face many difficulties in using both train and car. In the first case the percentage of disabled people that use the train is equal to 13.7 %, whilst for not-disabled people the percentage is 31.2. With regard to car, instead, the percentage is equal to 28.7 for persons with disabilities and reaches 73.5 % for people without disabilities (ISTAT 2006). This suggests new public transport policy actions in order to reduce disabled people difficulties.

Finally, the LR statistic suggests us to reject in both estimates the null hypothesis, and leads us to prefer the model estimated respect to the trivial one with only the constant among regressors. The log-likelihood as a measure of the goodness of fit is higher in the first model, which presents a higher number of regressors (column I). Other indicators, such as McFadden's R2, ML (Cox–Snell) R2, Cragg–Uhler (Nagelkerke) R2, McKelvey and Zavoina's R2, provide the same information. However, AIC and BIC tests suggest to choose the second model, as it shows the lowest BIC and AIC values.

4 Conclusion

In this paper we have evaluated the performance of Italian provinces for the year 2005 with respect to the implementation of article 13 of law 68/1999 by means of the non-parametric approach to efficiency measurement, represented by DEA. To this purpose, we have obtained measures of technical efficiency from VRS production frontiers.

The results provided by DEA show that out of the 103 units analysed thirty-two are efficient. In particular, we observe that the highest number of provinces with high efficiency scores are located in Northern Italy (Valle d'Aosta, Trentino, Veneto, Liguria). In Central Italy, Toscana is the region with the highest efficiency level, while in Southern Italy Molise and Sardegna represents the most efficient regions. On the other hand, regions that show very low levels of efficiency are Lombardia and Friuli in Northern Italy, Marche in Central Italy and Puglia in Southern Italy.

By focusing on the second stage the analysis, where VRS efficiency scores are used as dependent variables in a Tobit model in order to investigate their relationship with a set of socio-welfare factors, we can observe a positive relationship between many socio-welfare factors, such as curriculum counselling, empowerment training, educational services, listening, and technical efficiency scores. These results confirm that a positive impact of these variables helps the matching process between demand and supply of jobs for disabled people at provincial level.

Important policy implications derive from these findings. First of all, the sheer presence of the actors involved in the employment process, i.e. potential employers and employment offices, is not enough to make a province able to correctly apply the law 68/1999. The results, in fact, point out the importance of support services for disabled people in their integration in the labour market: therefore, also socio-welfare factors, such as curriculum counselling and/or careers guidance, educational services, listening and mobility, have to be considered, as they are important in determining the efficiency of each province in providing employment for disabled people.

Hence, the present study represents an additional source of useful information to policy makers for future economic policy actions in order to promote the integration of disabled people in the labour market. First, economic policies geared at improving the general state of the labour market are essential in order to promote the employment of disabled people in the private sector. Second, social policies are equally essential: also socio-economic factors, in fact, ought to be included as policy instruments within the context of law 68/1999 in order to promote the integration of disabled people in the labour market.

However, our results could be improved, along two lines of development. First of all, the analysis would provide more information if a measure of national insurance contributions relief granted to the Provinces for the employment of disabled people in relation to different percentages of disability covered by Article 13 of Law 68 were available. Last, the efficiency analysis would be more revealing if developed over time, when data become available.

Appendix

See Table 4.

Table 4 ID codes for Italian province

Provinces code	Provinces	Provinces code	Provinces	Provinces code	Provinces
LE	Lecce	EN	Enna	VR	Verona
CH	Chieti	LI	Livorno	RE	Reggio Emilia
KR	Crotone	VT	Viterbo	FE	Ferrara
PZ	Potenza	GR	Grosseto	VI	Vicenza
CL	Caltanissetta	PO	Prato	BL	Belluno
TA	Taranto	AR	Arezzo	MO	Modena
CA	Cagliari	LT	Latina	PC	Piacenza
CT	Catania	PT	Pistoia	TV	Treviso
CE	Caserta	LU	Lucca	PD	Padova
BA	Bari	TR	Terni	AO	Aosta
SS	Sassari	PI	Pisa	BI	Biella
SR	Siracusa	FI	Firenze	IM	Imperia
PA	Palermo	RO	Rimini	MN	Mantova
BR	Brindisi	SI	Siena	SV	Savona
PE	Pescara	PU	Pesaro e Urbino	SP	La Spezia
IS	Isernia	AP	Ascoli Piceno	SO	Sondrio
NA	Napoli	PG	Perugia	VA	Varese
TE	Teramo	AN	Ancona	CN	Cuneo
BN	Benevento	RI	Rieti	MI	Milano
AV	Avellino	MC	Macerata	LC	Lecco
AQ	L'Aquila	FR	Frosinone	CO	Como
OR	Oristano	MS	Massa-Carrara	BS	Brescia
RG	Ragusa	RO	Rovigo	VB	Verbano-Cusio-O.

Table 4 continued

Provinces code	Provinces	Provinces code	Provinces	Provinces code	Provinces
CB	Campobasso	UD	Udine	BG	Bergamo
SA	Salerno	GO	Gorizia	CR	Cremona
ME	Messina	TS	Trieste	AT	Asti
NU	Nuoro	VE	Venezia	VC	Vercelli
RC	Reggio di Calabria	RA	Ravenna	PV	Pavia
TP	Trapani	BZ	Bolzano	LO	Lodi
CS	Cosenza	PR	Parma	AL	Alessandria
MT	Matera	TN	Trento	GE	Genova
CZ	Catanzaro	PN	Pordenone	NO	Novara
FG	Foggia	FC	Forlì-Cesena	TO	Torino
VV	Vibo Valentia	RN	Roma		
AG	Agrigento	BO	Bologna		

References

Agovino, M., & Rapposelli, A. (2013a). Employment of disabled people in the private sector: An analysis at the level of Italian Provinces according to article 13 of law 68/99. *Quality & Quantity,*. doi:10.1007/s11135-013-9851-3.

Agovino, M., & Rapposelli, A. (2013b). Inclusion of disabled people in the Italian labour market: An efficiency analysis of law 68/1999 at regional level. *Quality & Quantity, 47*, 1577–1588.

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management Science, 30*, 1078–1092.

Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: Methods and applications*. New York: Cambridge University Press.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research, 2*, 429–444.

Charnes, A., Cooper, W. W., & Rhodes, E. (1981). Evaluating program and managerial efficiency: An application of data envelopment analysis to program follow through. *Management Science, 27*, 668–697.

Coelli, T. J., Prasada Rao, D. S., & Battese, G. E. (1998). *An introduction to efficiency and productivity analysis*. Boston: Kluwer.

Degener, T., & Quinn, G. (2002). A survey of international, comparative and regional disability law reform. In M. L. Breslin & S. Yee (Eds.), *Disability rights law and policy: International and national perspectives*. Ardsley, NY: Transnational Publishers.

Dyson, R. G., Allen, R., Camanho, A. S., Podinovski, V. V., Sarrico, C. S., & Shale, E. A. (2001). Pitfalls and protocols in DEA. *European Journal of Operational Research, 132*, 245–259.

Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society, Series A, 120*, 253–290.

Ferrier, G. D., & Knox Lovell, C. A. (1990). Measuring cost efficiency in banking: Econometric and linear programming evidence. *Journal of Econometrics, 46*, 229–245.

Grubbs, F. (1969). Procedures for detecting outlying observations in samples. *Technometrics, 11*(1), 1–21.

ISTAT. (2006). *Indagine Aspetti della vita quotidiana*. Roma.

Micucci, G., & Nuzzo, G. (2005). La misurazione del capitale sociale. In L. F. Signorini & M. Omiccioli (Eds.), *Economie locali e competizione globale*. Il Mulino, Bologna.

Ministry of Employment. (2004–2005). *Terza relazione al parlamento sullo stato di attuazione della legge 12 marzo 1999, n. 68*. Norme per il diritto al lavoro dei disabili, Roma.

Oliver, M. (1990). *The politics of disablement: A sociological approach*. London: St. Martin's.

Orlando, N., & Patrizio, M. (2006). Il collocamento mirato dei disabili: l'applicazione della legge 68/1999 nella Provincia di Bolzano. In G. Parodi (Ed.), *Aspetti socioeconomici della disabilità* (pp. 179–216). ARACNE editrice, Roma.

Sabatini, F. (2004). *Il concetto di capitale sociale. Una rassegna della letteratura economica, sociologica e politologica.* Development and Comp Systems 0411014, EconWPA.

Stefansky, W. (1972). Rejecting outliers in factorial designs. *Technometrics, 14*, 469–479.

Tobin, J. (1958). Estimation of relationships for limited dependent variables. *Econometrica, 26*, 24–36.