# Relative efficiency within a tax administration: the effects of result improvement

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## Abstract

Governments have opted to implement new taxes and increased tax rates in the hope of finding a solution to a wane in tax revenue, whereas improving the efficacy and efficiency of the body charged with overseeing taxation might offset this need. This paper analyses the Spanish tax administration, evaluating the relative efficiency of each of the regional offices that are its constituent parts via output-oriented two-stage data envelopment analysis.

The study was carried out in 2007 and a total of 47 regional offices were analysed, considering three inputs: 1) current expenditure in goods and services; 2) the number of tax returns processed, in terms of the two main direct taxes; and, 3) personnel numbers. Revenue resulting from tax assessments was considered as output. Taking a fresh approach, we considered variance in fiscal capacity between offices dependent upon their area of operation, weighting the output by GDP per capita of the province in question in comparison with the national average.

Efficient action on the part of regional offices might have represented a 44.4% improvement in the results of the management afforded by the Administration in question.

**Keywords:** Tax Administration Agency, Data Envelopment Analysis, Regional Tax Offices, Efficiency.

**JEL codes:** H20, H21, H83

## I. Introduction

The results presented by the body charged with overseeing the tax system are essential to the fulfilment of the objectives established by any government. Therein resides the source of the revenue, in the form of taxation, that enables the meeting of any expenditure incurred. Where this body proves ineffective, it can compromise fiscal policy (Faría and Yucelik, 1995), to the extent that, as the body charged with overseeing the tax system, it has direct bearing on its efficiency and therefore its capacity to produce revenue resulting from collection (Rubio, 2010).

The success of any tax system is dependent upon the Administration charged with its implementation (Lasheras and Herrera, 1991). Governments have opted for the introduction of new taxes and an increase in tax rates in scenarios where such action may have proved unnecessary, had greater efforts been made on ensuring optimal organisation within the management of the tax system.

Therefore, a tax system should not be considered solely in terms of the structure of taxation or the quantification of taxable events, but rather, must also be approached with a view to the efficiency and efficacy of the tax administration charged with overseeing it (Jiménez and Barrilao, 2001). The tendency towards offsetting deficit by incrementing fiscal pressure might be substituted by a more rigorous control of the management of the tax system, increasing its efficiency, whilst reducing the incidence of fraud (Rubio, 1996; Ruibal, 2008 ).

Over the course of the last decade, the organisation of the functions of the public sector has undergone considerable change (OECD, 2008). The tax administration, swept along by this reformist tendency, created quasi-autonomous bodies to achieve certain improvements, in terms of collection, the provision of services or self-financing. Such structural modifications gave rise to various forms of carrying out the task of overseeing taxation. More specifically, four categories of organisation might be established: a) a single directorate within the framework of the Ministry of Finance, or corresponding Ministry; b) several directorates within the framework of the Ministry of Finance, or corresponding Ministry; c) a unified quasi-autonomous body that is a dependency of a Ministry; and d) a unified quasi-autonomous body overseen by a governing board. Table 1 reflects the predominance of unified quasi-autonomous bodies within the OECD countries and additional countries that were studied. Attention should be drawn to the fact that approximately 50% of OECD member countries have created quasi-autonomous bodies.

TABLE 1
*Tax Institutions*

| Single directorate within the framework of the MOF | Several directorates within the framework of the MOF | Quasi-autonomous Body | Quasi-autonomous body featuring a governing board |
|---|---|---|---|
| • Belgium | • Germany | • Australia | • Argentina |
| • Denmark | • Austria | • Korea | • Bulgaria |
| • Estonia | • Chile | • Slovenia | • Canada |
| • France | • Cyprus | • Spain | • USA |
| • Netherlands | • Greece | • Finland | • Mexico |
| • Czech Republic | • Italy | • Hungary | • United Kingdom |
| • Switzerland | • Luxembourg | • Ireland | • Singapore |
| | • Malta | • Iceland | |
| | • Poland | • Japan | |
| | • Portugal | • Latvia | |
| | | • Malaysia | |
| | | • Norway | |
| | | • New Zealand | |
| | | • Slovakia | |
| | | • Romania | |
| | | • South Africa | |
| | | • Sweden | |

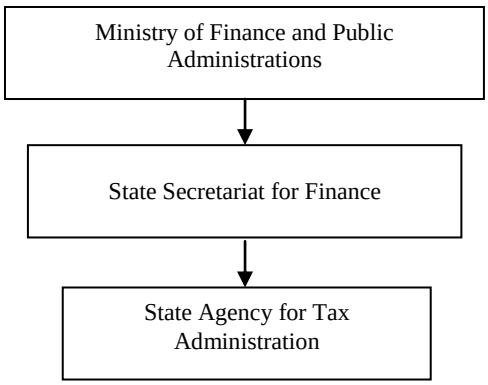
*Source*: drawn up by the author. Data obtained from OECD 2007.

Since 1992, the Spanish State has boasted its own specific, quasi-autonomous body, distinguished from the remainder of the General State Administration: the State Agency for Tax Administration (AEAT or Tax Agency), charged with the integrated management of the state tax and customs system, a task that entails a wide range of activities and functions. The Agency manifests itself as a body charged exclusively with the management of the tax system, in its entirety, whilst lacking any powers in terms of its design (Gaitero, 1993). Forming a part of the Central Public Administration, the AEAT nevertheless exists as a legal entity in its own right and boasts a certain degree of autonomy in terms of budgetary matters and personnel expenditure, thereby enabling us to classify it as a quasi-autonomous body that is a dependency of a Ministry, as outlined above[1].

Given the importance and singularity of the functions assigned to the Agency, the legislature saw a need to devise a specific legal status, with the aim of promoting greater agility and operational efficiency. Thus, it is constituted as a body governed by public law that is a dependency of the Ministry of Finance and Public Administrations, through the State Secretariat for Finance (Diagram 1).

[1] However, this interpretation is not without its detractors, as the legal standing of the AEAT has often been the subject of debate (Sánchez Galiana, 1995), to the extent of denying it a place amongst Public Administrations, as Márquez notes (1994: 14), "*Tax Agency is not State*", whereby "*it does not form a part of the Tax Administration*". Ferreiro (1991: 401) maintains that "*it is technically an autonomous body, which is nevertheless subjected to designs to exclude it from the regulations applicable to such bodies*". There are those who suggest that the body's inception represents a move towards decentralisation and privatisation (Garrido, 1991)

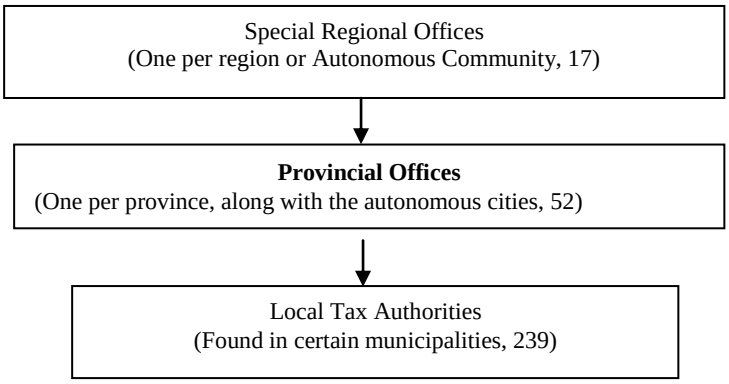
DIAGRAM 1
*Institutional Hierarchy*




*Source:* Authors

Within the AEAT's sphere of operation, a distinction must be made where its actions entail a centralised or peripheral focus. The central AEAT services are essentially based on an organisational model ordered into operative functional areas, devised around six departments: tax management, financial and tax inspection, tax collection, customs and excise, IT department and the department of human resources, complemented by several support structures, such as the legal service, the financial management service, the fiscal and statistical studies service and the planning and institutional relations service.

DIAGRAM 2
*Peripheral structure of the offices forming the AEAT*




*Source:* Authors

The peripheral or territorial services are made up by 17 special territorial offices, one in each Autonomous Community, 52 provincial offices [2], the focus of this paper, incorporating 239 local tax authorities, found in a number of municipalities, 36 of which are customs offices. The peripheral structure is illustrated in diagram 2.

[2] The currently applicable Spanish Constitution of 1978 addresses the division of the State into provinces, stating that [the State] "*will be organised, territorially, into municipalities, provinces and into the Autonomous Communities [Autonomous Regions] that might be established*. *All of these entities are afforded autonomy for the management of their respective interests*". Spain takes in a total of 50 provinces, along with the autonomous cities of Ceuta and Melilla.

## II. Review of the empirical literature

The study of efficiency within the Public Sector is a controversial subject, given the difficulty of measurement entailed and the multitude and heterogeneity of its constituent sectors: justice, health, citizen security, education, tax administration, amongst others. Nevertheless, analysis of the efficiency of the tax administration, in spite of the difficulty it presents, proves necessary in order to reinforce a sense of fiscal commitment amongst citizens. This is due to the fact that efficient management on the part of the tax administration legitimises its activity, promoting voluntary compliance amongst taxpayers and encouraging them to continue financing the public sector with confidence via revenue resulting from taxation (Gale and Holtzblatt, 2000).

The need to determine and measure the efficiency of the body charged with overseeing the Spanish tax system has led us to undertake analysis of the AEAT. This paper sets out to provide an approximate value for the relative efficiency of the regional offices that make up the tax administration, employing a series of variables that are held to be essential to its correct operation. Whilst efficiency of the tax administration is one of the maxims put forward by Adam Smith (1776) in his famous work addressing taxation, research into efficiency within tax offices remains relatively scant, due to the difficulty of accessing data, the limited amount of data and the confidentiality of such data in the majority of countries (Barros, 2007; Hasseldine, 2010; and Onrubia, 2010). This prevents us from ascertaining whether the tax administration achieves universal compliance with the tax system, or whether, in contrast, it warrants certain reforms.

To put it into context, a review of the literature on analysis into efficiency and productivity within tax offices reveals that the published studies employ frontier techniques: stochastic frontier analysis and, primarily, data envelopment analysis (hereinafter, DEA). Table 2 indicates the references and a number of the most important characteristics of empirical studies into efficiency within tax administrations.

TABLE 2

*Empirical analysis of efficiency within tax administrations*

| *Reference* | *Country* | *Sample years* | *Sample units* | *Methodological approach*[1] |
|---|---|---|---|---|
| Jha et al. (1999) | India | 1980-1993 | 15 states | SFA |
| González and Miles (2000) | Spain | 1995 | 15 inspection tax offices | DEA, BA |
| Thirtle et al. (2000) | India | 1980-1993 | 15 states | DEA, MI |
| Jiménez and Barrilao (2001) | Spain | 1997 | 14 regional tax offices | DEA |
| Moesen and Persoon (2002) | Belgium | 1991 | 289 regional tax offices | DEA, FDH |
| Esteller (2003) | Spain | 1992 and 1995-1998 | 45 provincial tax offices | SFA |
| Barros (2005) | Portugal | 1999-2002 | 41 tax offices | SFA |
| Førsund et al. (2005) | Norway | 2002-2004 | 98 tax offices | DEA, MI |
| Lewis (2006) | Indonesia | 2003 | 224 local tax offices | SFA |
| Barros (2007) | Portugal | 1999-2002 | 41 tax offices | DEA, 2nd |
| Katharaki and Tsakas (2010) | Greece | 2001-2006 | 27 tax offices | DEA, WA, 2nd |

*Source*: Drawn up by the author on the basis of the literature reviewed.

*Notes*: 1. BA: bootstrap analysis; DEA: data envelopment analysis; FDH: free disposal hull; MI: Malmquist index; SFA: stochastic frontier analysis; WA: window analysis; 2nd: second stage analysis.

Thus, productive efficiency in the larger Indian states was analysed over the period between 1980 and 1993, via stochastic frontier analysis (Jha et al. 1999), data envelopment analysis and the Malmquist Index (Thirtle et al., 2000). The work carried out by Moesen and Persoon (2002) analyses efficiency in 289 Belgian tax offices in 1991 using Free Disposal Hull and DEA. In the case of the tax offices in Portugal, Barros (2005) employed a stochastic evolution model combined with a DEA approach, whilst Barros (2007) evaluates technical and allocative efficiency of the same offices over the 1999-2002 period. Similarly Forsund et al. (2005) apply DEA and the Malmquist Productivity Index to the analysis of tax offices in Norway between 2002 and 2004. In turn, Lewis (2006) studies inefficiency in 224 local tax offices in Indonesia employing stochastic frontier analysis with a cost frontier approach. More recently, Katsahari (2010) used DEA to estimate efficiency in tax offices in Greece from 2001 to 2006, with the aim of determining those that maximized tax collection levels.

In Spain, attention should be drawn to the work of González and Miles (2000), who analyse the efficiency of 15 regional Spanish tax offices over the course of 1995 via DEA, employing a bootstrap technique. For their part, Jiménez and Barrilao (2001) use DEA to study management efficiency in 14 regional tax offices with the objective of comparing and ranking the efficiency of the various special territorial offices in Spain. Finally, the work of Esteller (2003) measures and explains the level of technical efficiency within the administration of the taxes collected from the Autonomous Communities in 1992 and between 1995 and 1998, via the estimation of the stochastic frontier.

## III. Estimating efficiency within the provincial offices of the AEAT in Spain

### a. Methodology

There are three main types of efficiency (Farrell, 1957): technical efficiency, which consists of maximising results with a determined amount of resources; price or allocative efficiency, based on maximising results within the context of certain fixed expenditure levels, or a set price for resources; and global (or economic) efficiency, which reflects the production of goods and services that afford the greatest benefits to society at the lowest possible social cost. This paper is concerned with the concept of technical efficiency, given that analysing other types of efficiency entails the need for awareness of market prices, or, where necessary, social cost, values that, in the case of the public sector, remain largely unknown.

Existing techniques to measure efficiency within the public sector can be grouped into various types. A distinction can be made between parametric and non-parametric methods, whilst statistical methods can be employed or discounted when estimating the frontier that, ultimately, may be specified as stochastic (random) or deterministic. This paper employs DEA methodology, based on the article by Charnes et al. (1978), set up as a non-parametric,

deterministic approach that enables us to obtain a measurement of relative efficiency between regional offices, understood as decision-making units (DMU's), in order to identify those that present optimal performance when compared with the remainder.

This methodology entails priorities that make it particularly suitable for application to the measurement of efficiency within the public sector, in which sense, attention might be drawn to the following[3]: it does not make assumptions with regards the functional form in the production function; the model accounts for inputs and outputs of a multi-dimensional nature; it is a flexible model that places few restrictions when defining production as a whole and its corresponding frontier.

In view of the peculiarities of the AEAT production process, an output-oriented two-stage DEA methodology was held to be appropriate, in keeping with the BCC model (Banker et al. 1984), as, within AEAT management, we believe that priority is placed on the objective of concerting efforts to achieve the greatest possible output with the inputs in question, leaving little room for manoeuvres in terms of adjusting inputs.

The two-stage method entails problem solving within each unit. In the first stage, the objective is to determine the greatest proportional increase that would need to occur within the outputs in order to bring about a situation wherein each DMU under study achieved the efficiency of the Farrell-Debreu measure, or weak-form efficiency. In the second stage, on the basis of the optimum obtained in the first stage, the outputs are adjusted and the surplus variables maximised to radially shift the projected point in the first stage, which complies with Farrell's efficiency condition (1957), to a point on the efficient envelopment where it complies with the Pareto-Koopmans optimal, or strong-form efficiency. In this manner, the maximum possible increase to outputs within a DMU can be calculated as the sum of a radial component and the corresponding surplus variable.

## b. Data and variables

Data corresponding to 2007 was analysed, the most recent year for which data was available when drawing up this paper, due to the backlog (there is normally a lag of 3 or 4 years) in the publication of data on the part of the Ministry of Finance and Public Administrations.

Of the 52 existing provincial offices, 47 were taken into consideration for the purposes of this paper, excluding the offices in the provinces of Madrid, Navarre, Alava, Gipuzkoa and Biscay. Madrid was excluded as it houses the Central Directorate for Major Taxpayers[4], whilst in the remaining cases, exclusion is justified as they are provinces lying within Autonomous

[3] Further details on DEA might be found in Cooper et al. (2007).

[4] From 2006 onwards, the Central Directorate for Major Taxpayers has existed, established as a body with powers throughout the national territory, focused on the coordinated control of major taxpayers and the improvement of the attention and service afforded to them.

Communities with different economic systems [5], whereby their data is not homogeneous and therefore not subject to extrapolation to the remaining offices. Indeed, their inclusion would have undermined the coherence of the results to a considerable extent[6].

Selecting inputs and outputs is of vital importance and, in many occasions highly complex, given that it requires prior clarification of the objectives established by each DMU, giving rise to the need to select the inputs and outputs that best represent the activity to be studied. In this case, three inputs were taken into consideration: 1) current expenditure in goods and services (EXPEN), addressed in chapter II of the AEAT expenditure budget and required for effective application of the tax system; 2) the number of tax returns (TAX_RET) processed in each of the offices, identifying a return per taxpayer and tax[7]; and, 3) personnel numbers (STAFF) in the employ of each of the offices under analysis, taking in both contractual staff and civil servants.

A number of these inputs have also been selected by other authors when analysing efficiency within their respective Tax Administrations: Jiménez and Barrilao (2001) included both the EXPEN and STAFF inputs in their analysis and the works of Barros (2007), Esteller (2003), Hunter and Nelson (1996), Katharaki and Tsakas (2010), Maekawa and Atoda (2001) and Moesen and Persoon (2002) all include the STAFF input.

The main contribution of this paper entails the analyse of an output that, up to this point, has not been employed: revenue resulting from tax assessments (hereafter IAL[8]) was considered as output, representing the revenue collected by the various offices as a result of effective application of available resources, employing all coercive measures at their disposal. Previous studies have employed other concepts of tax collection (Barros, 2005; Esteller, 2003; Hyun et al. 2001; Jha and Sahni, 1997; Jha et al. 1999; Katharaki and Tsakas, 2010; Maekawa and Atoda, 2001; Thirtle, 2000), which, in the case of Spain, might be comparable to Tax Revenue Allocated to the Budget (ITAPE[9]), representing revenue obtained automatically, without direct action on the part of the resources employed by each office, in the form of self-assessed tax contributions in most instances.

This paper also takes variances in fiscal capacity between offices into account, which conditions the output obtained in each case (Esteller, 2003), to which end, the output was weighted by the GDP per capita (hereinafter, GDPpc) of the respective province in relation to the average GDPpc at national level. Thus, a model is presented wherein output (IAL) is calculated without GDP weighting and a second model, wherein output (IALc) is adjusted in accordance with GDP.

[5] The Autonomous Community of Navarre (formed by a single province: Navarre) and the Basque Country (formed by the provinces of Alava, Gipuzkoa and Biscay) are Autonomous Communities of chartered regime and operate a special system within the Spanish State.

[6] These offices are also excluded from the simple in the case of González and Miles (2000).

[7] The number of returns makes reference to the returns resulting from the taxes that generate the greatest deal of activity within the AEAT: Personal Income Tax and Company Tax.

[8] IAL: *Ingresos por Actos de Liquidación*.

[9] ITAPE: *Ingresos Tributarios Afectos al Presupuesto*.

(1) $$IAL_c = \frac{average\ national\ GDPpc}{provincial\ GDPpc} \times IAL$$

The ratio is lower than 1 where GDPpc is higher than the national average, and greater than 1 where the contrary is true. The descriptive statistics of the inputs and outputs employed are detailed in Table 3.

TABLE 3
*Descriptive statistics of the sample*

| | | *Average* | *Standard Deviation* | *Minimum* | *Maximum* |
|---|---|---|---|---|---|
| *Inputs* | | | | | |
| | EXPEN* | 2,036.89 | 2,965.16 | 168 | 16,726 |
| | TAX_RET** | 363,007.11 | 428,428.80 | 24,899 | 2,760,986 |
| | STAFF** | 441.30 | 582.13 | 51 | 3,318 |
| *Output* | | | | | |
| | IAL (model 1)* | 69,816.13 | 119,480.39 | 4,234 | 805,636 |
| | IALc (model 2)* | 74,812.33 | 106,396.23 | 4,734 | 685,093 |

*Notes:*
*The "EXPEND" input and the output for model 1 and 2, "IAL" and "IALc", are expressed in thousands of euro.
** The remaining inputs are expressed in units.

## IV. Results

First, in order to analyse the correlation between model 1, which considers output without adjusting for GDP, and model 2, which does adjust the IAL in accordance with GDP, the Spearman test was employed (Table 4).

TABLE 4
*Results of the Spearman correlation test*

| | |
|---|---|
| Spearman's rho | 0.8035 |
| p-value | 0.0000 |
| N | 47 |

The results indicate a high correlation between the two models, whereby the adjustment of the output in model 2 (IALc), offsets variances in fiscal capacity between the 47 offices analysed, although their ranking, in accordance with the degree of relative efficiency achieved, varies little. Comparing the efficiency ranking obtained for the DMUs analysed in each model, the offices that undergo the greatest change in ranked position are Zaragoza and Burgos (which fall 18 and 16 positions, respectively, although they remain inefficient irrespective of the model employed). This drop in ranked position is justified as both Zaragoza and Burgos are provinces

that present a GDPpc that is higher than the national GDPpc, positioning themselves as the 6th and 5th provinces ranked according to the highest GDPpc, whereby, weighting output by GDP gives rise to this descent within the rankings.

At the opposite end, attention should be drawn to Jaen and Seville, as the provinces that undergo the greatest change within the rankings in terms of ascending, improving their positions by 17 and 16 places, respectively (although remaining inefficient irrespective of the model employed). In contrast to the previous case, this improvement is justified by the fact that Jaen and Seville present a GDPpc that is lower than the average: more specifically, Jaen possesses the lowest GDPpc of the 47 provinces that were studied, whilst Seville occupies the 35th position, which justifies their somewhat dramatic rise through the rankings where output is weighted by GDP.

As indicated above, DEA analysis enables us to determine the most efficient office in comparison with the remaining offices under study. That is, the best practice observed is then employed to evaluate all other practice, which explains the reference to relative efficiency (Charnes et. Al 1981). On the other hand, an inefficient office proves inefficient precisely because another exists, or a linear combination of others, that can produce the same output whilst expending fewer inputs, whereby the former is forced to emulate the performance of the latter.

Applying the BCC model to the variables under study we obtain the descriptive statistics deriving from the efficiency analysis for the two models employed (Table 5). Determining an average efficiency value of 1.610 for model 2 indicates that, in most cases, the offices could improve revenue resulting from tax assessments by 61%, evidencing clear room for improvement.

TABLE 5
*Descriptive statistics of efficiency results*

| | *Average Efficiency* | *Standard Deviation* | *Minimum* | *Maximum* |
|---|---|---|---|---|
| Model 1 | 1.478 | 0.380 | 1 | 2.368 |
| Model 2 | 1.610 | 0.491 | 1 | 2.776 |

Variance in the efficiency of units depending upon the model affects a limited number of provinces: only Almeria and Huelva are efficient where output remains unadjusted by GDP and yet inefficient once weighting by GDP occurs. The opposite is true in the case of Cordoba, which becomes efficient when the economic dynamism of the respective province is taken into

consideration, an entirely coherent result given that Cordoba presents GDPpc levels that are below average, whereby it moves from inefficient to efficient once output is weighted by GDP.

From this point, considering only the analysis carried out wherein output was adjusted by GDP (model 2), as it is held to afford a more faithful reflection of the true dimension of the output analysed, we obtain the efficiency results indicated in the appendix for each of the 47 offices under study. Of the 47 offices analysed, 9 were identified as proving efficient, in the terms of the Farrel-Debreu definition, or as evidencing weak-form efficiency (Table 6), given that their efficiency results were equal to one; moreover, as they all presented surplus variable values of zero, they prove efficient in accordance with the Pareto-Koopmans definition, that is, evidencing strong-form efficiency.

Having determined which offices are efficient, it is possible to rank them in accordance with the frequency with which these offices appear as a reference for the inefficient offices (Table 6). For each inefficient office, DEA enables us to determine a series of contrastingly efficient offices, which thereby form a reference group, the so-called *peers*, that is, they provide a reference point for improvement for the inefficient unit. As Table 6 reflects, there are three offices that present clearly higher efficiency levels within the group of efficient DMUs: Cordoba, Malaga and Avila, ordered from higher to lower frequency, providing the reference point for inefficient offices on 28, 24 and 23 occasions, respectively.

TABLE 6
*Frequency and weights of efficient DMUs (model 2)*

| *Efficient Office* | *Frequency* | *Weights* |
|---|---|---|
| Avila | 23 | 13.23 |
| Cordoba | 28 | 11.02 |
| Malaga | 24 | 10.14 |
| Ceuta | 11 | 1.68 |
| Segovia | 3 | 1.53 |
| Barcelona | 3 | 0.40 |
| Melilla | 0 | 0 |
| Soria | 0 | 0 |
| Teruel | 0 | 0 |

The provincial office of Cordoba can be considered as the *Global Leader*, a term introduced by Oral and Yolalan (1990), employed to draw attention to the unit within the sample that can be considered as presenting the best overall performance. As El-Mahgary and Lahdelma (1995) and Avkiran (1999) point out, the *Global Leader* is the efficient unit that appears with greatest frequency within the reference groups for inefficient units. The office of Ceuta appears on a

frequency of 11 occasions, whilst the provincial offices of Segovia and Barcelona only appear as reference points on 3 occasions, which calls into question their status as a model. In the case of Melilla, Soria and Teruel, though classed as efficient, they never serve as a reference point for any other office, which suggests that "either the efficient unit in question is only efficient within a very limited sector, due to a high degree of specialisation, or it possesses an Input/Output relationship that is highly unusual" (El- Mahgary y Lahdelma, 1995:706).

In parallel, we analysed the weights of each of the reference units (benchmark), determining the extent to which each of the benchmarks within the reference group for an inefficient unit contributes towards the target values of this unit (Table 6), thereby providing a more faithful representation of the true intensity with which each benchmark intervenes in the construction of the corresponding inefficient units. The results of the analysis of weights evidences that Avila is the office with the greatest weight (13.23) as a reference for the remaining units, followed by Cordoba, with a weight of 11.02, and, in third position, the provincial office of Malaga, with a weight of 10.14. The remaining offices present residual weights.

Once the estimates of technical efficiency have been obtained for the 47 offices under study, it is equally important to determine those offices that stand out for the opposite reason, that is, those offices that present the greatest degree of inefficiency. In this case, as the appendix shows, the provincial offices of Lleida, Girona and Tarragona are those that prove most inefficient when compared with their peers. It should be pointed out that the three offices are located within the Autonomous Community of Catalonia, whereby this region is most susceptible to improvement as a result of changes in management.

The second step, representing an important contribution of the analysis undertaken, is to determine, via the surplus values obtained in the second stage, the possible increase in revenue resulting from tax assessments, if the offices in question had displayed efficient behaviour. In this case, the IAL might have risen 44.4%, that is, if all of the DMUs had acted efficiently, this would have represented a rise in the average annual IAL over the 47 offices analysed of 1561 million euros.

Efficient action on the part of a tax administration does not only directly occasion an increase in collection, but also gives rise to a reduction in tax fraud, given the greater degree of voluntary compliance amongst taxpayers, who perceive a more efficient administration that pursues undeclared taxable events. Thus, in addition to increasing revenue resulting from tax assessments, an even greater increase would be observed in terms of voluntary contribution, in addition to the beneficial effects afforded to any society that observes compliance with tax regulations, irrespective of the origin of the taxpayer.

## V. Conclusions

Tax systems should not be considered solely in terms of the structure of taxation or the quantification of taxable events, but rather, must also be approached with a view to the efficiency and efficacy of the tax administration charged with overseeing it, as a means of obtaining higher revenue resulting from taxation and a lower instance of fiscal fraud.

This paper entails an analysis of relative efficiency amongst 47 territorial offices that formed a part of the Spanish State Agency for Tax Administration in 2007. This work was motivated by the present need to achieve higher volumes of collection via tax administrations, given the current high levels of public deficit. Our research indicates that improved efficiency within the offices that make up the body charged with managing taxes in Spain (the AEAT), would entail an increase in revenue resulting from tax assessments (output) of 1561 million euros, that is, a rise in collection of 44.4%. This would offset the intensity of a collection policy focused on the introduction of new taxes and an increase on tax rates, or imply fewer cutbacks in public expenditure, with the ensuing political and social cost that this implies.

On the basis of the output-oriented two-stage data envelopment analysis carried out, attention should be drawn to the fact that, amongst the 47 offices under study, only 9 were identified as technically efficient. On average, taking into account the output weighted by GDP per capita of the corresponding province in relation to the national average GDP per capita, it is found that the offices could have increased revenue resulting from tax assessments by 61%, which corroborates the premise that there is a great deal of scope for improvement, acting on those offices that prove inefficient in relation to those offices presenting optimal behaviour.

Amongst the offices that proved efficient, stress must be placed on the provincial office of Cordoba, as the *global leader*, representing the reference point for the greatest number of inefficient offices; however, if we take weights into consideration, understood as the intensity with which each efficient office intervenes in the construction of an inefficient office, Avila would displace Cordoba in this sense. At the other end of the scale, amongst the values calculated for technical efficiency throughout the entire body of offices that were studied, Lleida, Girona and Tarragona bear particular mention as the least efficient.

Finally, it is important to point out the difficulty entailed when attempting to gather information, along with the time lag affecting the publication of the limited data provided by the Ministry of Finance and Public Administrations. It is precisely this lack of information that prevents a more detailed analysis, such as the analysis of more precise data provided by provincial offices, subordinated offices and local tax authorities that might enable us to register more than two hundred observations. With regards to the methodology employed, despite proving particularly widespread in this type of research, we believe that it is a highly useful tool that enables us to drawn important conclusions with regards to public and fiscal policy.

## Appendix

TABLE A1. *Technical efficiency of the entire sample (model 2)*

| *DMU Name* | *Efficiency* | *DMU Name* | *Efficiency* |
|---|---|---|---|
| AVILA | 1 | PONTEVEDRA | 1.6113 |
| CORDOBA | 1 | CANTABRIA | 1.63602 |
| MALAGA | 1 | CIUDAD REAL | 1.67237 |
| CEUTA | 1 | CASTELLON | 1.69666 |
| SEGOVIA | 1 | ASTURIAS | 1.73556 |
| BARCELONA | 1 | CUENCA | 1.74048 |
| MELILLA | 1 | PALENCIA | 1.78722 |
| SORIA | 1 | ZAMORA | 1.80159 |
| TERUEL | 1 | BALEARIC ISLANDS | 1.84351 |
| HUELVA | 1.00634 | SARAGOSSA | 1.90132 |
| OURENSE | 1.00737 | A CORUÑA | 1.90158 |
| ALMERIA | 1.10246 | VALLADOLID | 1.92423 |
| CADIZ | 1.18146 | BADAJOZ | 2.00366 |
| VALENCIA | 1.37781 | BURGOS | 2.07673 |
| SEVILLE | 1.37809 | HUESCA | 2.08503 |
| TENERIFE | 1.39267 | LA RIOJA | 2.1092 |
| MURCIA | 1.39822 | CACERES | 2.12356 |
| JAEN | 1.40141 | ALICANTE | 2.1284 |
| GRANADA | 1.4202 | LUGO | 2.24057 |
| ALBACETE | 1.4416 | TOLEDO | 2.38412 |
| LAS PALMAS | 1.4839 | TARRAGONA | 2.50487 |
| GUADALAJARA | 1.5336 | GIRONA | 2.73689 |
| SALAMANCA | 1.55858 | LLEIDA | 2.77631 |
| LEON | 1.5659 | | |

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