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Municipal Sustainability Influence by European Union Investment Programs on the Portuguese Local Government

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Abstract: The assessment of the impact of European Structural and Investment Funds (ESIF) on Portuguese local government and which factors determine it is important given the magnitude of funds involved. As part of this larger question, this paper considers whether the holistic sustainability of local authorities—as measured by a Council Sustainability Index—can influence the impact of ESIF on the performance of Portuguese councils and which factors best explain these performance differences. Using a geometric distance function jointly with the Hicks-Moorsteen index, we investigate and present a conclusion on the differential impact of ESIF on sustainable and non-sustainable Portuguese councils over the period 2000 to 2014. Our findings also suggest that ESIF should continue fostering economic and social development at the local level regardless of council size or regional location since overall development will flow from this economic and social structural adjustment strategy.

Keywords: European Structural and Investment Funds; municipal sustainability; Council Sustainability Index (CSI); Portuguese local government

1. Introduction

As in many European countries, Portuguese local government is responsible for major public investments, as well as for a wide range of local services. They deal with a range of public policy issues and functions that support economic development and improve the quality of life [1]. Local council performance is thus especially important in an era of economic uncertainty and increasing complexity [2]. Moreover, performance measurement and benchmarking in local government help to align the goals of governments with the goals of citizens [3]. Portuguese councils play a pivotal role since they are responsible for almost 30% of total investment, 15% of public employment, and 3% of public debt [4].

The European Structural and Investment Funds (ESIF), established in 1986, plays a crucial role in the economic and social development of Portugal, especially at the local level. An important question in this regard hinges on determining whether ESIF have resulted in significant improvements in municipality performance and in the quality of life of residents. A thorough survey on the 308 Portuguese councils over the period 2000 to 2014, corresponding to the two final European Structural and Investment Funds (ESIF) (ESIF III and National Strategic Reference Framework (NSRF)), identified those aspects of EU programs which improved the performance and sustainability of Portuguese local government, namely competitiveness, territory development, and education factors [5]. Moreover, it highlighted the significance of this impact given the context of major productivity divergences between countries [6] and increasing political integration to guarantee, in the medium term, economic and social cohesion between all European Countries [7].

By contrast, council size and regional location had no direct influence on performance. However, development "catch up" and "growth convergence" seemed significant [8].

In view of previous analysis, the current research analyzes the impact of the ESIF on the 308 Portuguese councils for the period 2000 to 2014 [9]. In an empirical contribution to existing literature on this question, the paper investigates whether the holistic sustainability level of Portuguese local councils influenced that uneven impact. Put clearly, do significant differences exist between sustainable and non-sustainable councils with respect to the impact of EU funding programs? Using a rigorous model embodying a geometric distance function (GDF) and the Hicks-Moorsteen Index (HMI), we investigate the different impact of ESIF on sustainable and non-sustainable Portuguese councils.

We have reached some interesting conclusions: first, for both EU programs, the difference in the investment impact was not significant regardless of whether a council exhibited higher or lower levels of sustainability, notwithstanding the importance of the EU programs to the structural adjustment of the Portuguese economy. Second, the size and regional location of local authorities seem to have no direct influence on the impact of EU investments. Finally, we found that both efficiency and productivity are higher on ESIF III (2000–2006) than under NSRF (2007–2013)—for sustainable and non-sustainable councils alike—because of the stronger effects of ESIF III on the economic and social circumstances of residents, including increased competitiveness, spatial development, and the human potential of individual councils and specific regions.

The paper is divided into six main sections. Section 2 considers the ESIF contribution to Portuguese local authority performance and sustainability. Section 3 presents a holistic sustainability perspective of local government evaluation by means of a new Council Sustainability Index (CSI), which was recently applied to Portuguese local government. Section 4 outlines the model used to test different council investment impacts based on sustainability. Section 5 analyzes the Portuguese council EU program impact on key performance and sustainability indicators, distinguishing between sustainable and non-sustainable councils for ESIF III (2000–2006) and NSRF (2007–2013). The paper concludes with some brief comments in Section 5.

2. European Structural Investment and Funds Impact on Municipal Performance and Sustainability

2.1. European Structural Investment and Funds Impact on Municipal Performance

European structural investment funds (ESIF) represent one of the main instruments which the EU uses to sustain regional development and eliminate disparities between member states [8].

In Portugal, public investment has seen an increase of competitiveness and an improvement in the quality of life made over the past three decades which would have been impossible without ESIF. Table A1 in the Appendix A summarizes the ESIF implemented over 1986–2013 in Portugal.

Structural and cohesion programs are implemented under a common regulatory framework, but in widely differing national and regional circumstances. Programs comprise a range of interventions, targeting physical infrastructure, economic development, human resources, innovation, and technology, as well as environmental improvement, through a mix of financial instruments and many different types of beneficiary. In addition, there is also co-financing of EU funds through national public or private funding which originates from several different organisations and schemes [10].

EU cohesion policy effects have been considered mainly by empirical work on the investment impact on citizens' economic and social conditions, regional growth, and global convergence. Table 1 provides a synopsis of empirical research to date.

Table 1. Research literature on EU investment impact and economic and social convergence.

Authors	Main Findings
Sala-i-Martin [11]	USA, Japan, and European Countries tend to converge at a rate of approximately 2% per year. Interregional distribution of income in all countries has shrunk over time.
Delhey [12]	"Catch-up" process is facilitated by EU integration policies not guaranteed.
Boldrin et al. [13]	Stability and inequality of EU regional distribution of income per capita. EU regional funds impact is positive on GDP per capita growth of poorer countries.
Atkinson et al. [14]	Proposal of alternatives to the EU indicators for social inclusion (distribution of income, social transfers, regional disparities, persistence of poverty, unemployment, and educational rate), such as housing, health, access to essential services, and social participation.
Ederveen et al. [15]	Structural funds are globally (13 regions of Europe) ineffective. Structural funds are only effective for countries with a proper "institutional framework", based on transparency, control of corruption, good governance, and institutional quality.
Cappelen et al. [16]	EU regional policy is effective and positively related to accompanying policies that improve the competence of the receiving environments.
Beugelsdijk and Eiffnger [17]	Structural funds have a positive impact based on institutional capacity. Moral hazard and substitution effects may result from use of structural funds. Structural funds contribute to fewer interregional disparities.
Dall'erba and Le Gallo [18]	Convergence takes place, but the funds have no impact on it. Investments targeted to peripheral zones never spill over to neighbors.
Fritsche and Kuzin [19]	Regional clusters exist in the consumer price level. Existence of convergence clubs, including a fast-growing countries club, without strong regional linkages.
Bartkowska and Riedl [20]	Existence of convergence clubs, indicating that European regions form six separate groups converging to their own steady state paths. The level of initial conditions such as human capital and per capita income plays a crucial role in determining the formation of convergence clubs among European regions.
Borsi and Metiu [8]	Economic "catch-up" exists based on institutional changes and macro-economic adjustment processes. No overall real income per capita growth; the existence of sub-groups that converge to different steady states. Regional linkages play an important role in determining the formation of convergence clubs. A clear separation between the new and the old EU member states in the long run.

Using cross-sectional regressions, Sala-i-Martin [11] found that regional growth and convergence patterns in the EU were not markedly different from those in other federations which lacked such an extensive cohesion program. Several other authors, including Boldrin et al. [13], Ederveen et al. [15], Cappelen et al. [16], Beugelsdijk and Eiffnger [17], Dall'erba and Le Gallo [18], Fritsche and Kuzin [19], and Bartkowska and Riedl [20], using different parametric and non-parametric methods, empirically examined ESIF expenditure and GDP per capita growth, with inconclusive results about growth convergence, but almost all of them highlighted the importance of institutional capacity, as demonstrated above.

Delhey [12] analysed Ireland, Greece, Portugal, and Spain, concluding that EU integration facilitates processes of catching up but it does not guarantee them. This was demonstrated by using three indicators: (1) GDP per capita adjusted for purchasing power; (2) social security spending in relation to GDP (proxing the level of social protection); and (3) citizen satisfaction with life in general and living conditions. In general, EU policy aims to improve economic and social conditions, as well as life circumstances in a broader sense, using a wider perspective by employing quality of life concepts [21,22].

Atkinson et al. [14] measured specific social outcomes in EU member states, suggesting various extensions and alternatives to existing EU indicators for social inclusion (distribution of income, social transfers, regional disparities, persistence of poverty, unemployment, and educational rate), including housing, health, access to essential services, and social participation.

Borsi and Metiu [8] concluded that economic "catch up" exists, but it depends on institutional changes and macroeconomic adjustment. They did not find any overall economic convergence, but instead distinct sub-groups of countries which converged to different steady states. The main conclusion of this study is that EU cohesion policy contributes to improving development in different EU countries, but in a varied way, based on differences in community budget, institutional capacity, the structure of national economies, and the kind of investments chosen.

To sum up, the findings synthetically presented above demonstrated that the "Catch-up" process is facilitated by EU integration policies, but not guaranteed. Moreover, differentiated EU investment impact and economic and social convergence depend, in most cases, on the "proper institutional capacity" of each country and region to absorb and convert EU programs and funds intervention into economic and social sustainable growth. In Portugal, EU adhesion contributed to economic, social, and cultural openness, perhaps even to a rupture through structural modernization after fifty years of dictatorship in Portugal (until 1974).

2.2. Understanding the Importance of "Holistic" Sustainability

Performance assessment is nonetheless important, because it allows for an effective inter-council comparison in terms of value for money of the service provision on the one hand, and management performance in terms of happiness and community satisfaction on the other hand [23]. Efficiency focuses attention on the inputs and outputs used and produced, whereas effectiveness concentrates on community satisfaction with the council services and investment capacity for sustainable development.

Sustainable development forms a capstone of the approach we advocate for local government. In this scope, Bartelmus [24] presented the foundations of sustainable development, contending that after repeated failure of the International Development Strategies of the United Nations, an alternative development concept was necessary. The World Conservation Strategy was the first to define "sustainable development" by means of conserving living resources [25]. The United Nations later established the World Commission on Environment and Development (WCED) in 1985 to investigate the causes and remedies of development failures. The WCED defined "sustainable development" as a process which meets the needs of the present without compromising the ability of future generations to meet their own needs, thereby joining environmental objectives and economic growth objectives [26].

This general definition of sustainability forms the basis for our local government evaluation approach. Thus, in contrast to the narrow financial viability, community sustainability would embrace wider economic, political, and sociological attributes. In its broader connotation, "holistic sustainability is the ability of a local authority to function effectively over the long term" [27].

In Europe, several conceptual frameworks or methods to develop local sustainability indicators have been carried out (for an overview of similar projects, see Pires et al. [28]).

Key financial performance indicators, ratios, and indexes are only broadly indicative of the real situation of individual councils. Local government sustainability should be assessed in a broader perspective, in terms of a council's ability to perform effectively over the long term and the satisfaction of community interests, as presented below in Table 2 [23].

Table 2. Different holistic sustainability definitions.

Author	Date	Concepts and Definitions
Vetter and Kersting [29]	2003	Economic and political attributes must be considered.
Aulich [30]	2005	Local government dual role (democratic organization and service provider); the importance of efficient service provision together with effective local democracy.
Dollery, Garcea and Lesage [31]	2008	Five main pillars of local government sustainability: demographic factors, council revenue, council expenditure, council financial management, and council governance.
Dollery, Crase and Grant [32]	2011	The importance of local democracy (good governance), local social capital (citizens "sense of community" and "sense of place"), and local government capacity (well-functioning elected leadership and administrative and technical expertise).
Bell and Morse [33]	2013	Measuring sustainability at local and regional levels. New ways of thinking about sustainability indicators.
Warburton [34]	2013	Community participation and sustainable development. The connections between environmental action and community-based activities.
Wates [35]	2014	New methods of community planning. How communities become safer, stronger, wealthier, and more sustainable.

The concept of local government sustainability is indeed much broader than simple financial sustainability. Communities or "holistic" sustainability really matters concerning local government evaluation [36].

Councils currently compete for practical and tangible issues, such as financial resources and new investments. However, financial and investment decisions, transparency, corruption control, and public participation and satisfaction gained an objective pathway and a trustful local government assessment tool.

Therefore, a fresh approach, conceptualizing and implementing a Councils' Sustainability Index (CSI), is required to address the problems of strategic management, in addition to funding and sustainable development in local government.

2.3. A Portuguese Council Sustainability Index (CSI)

The development and application of a new CSI to Portuguese local government represented an important step forward in improving the informational basis for future policymaking.

The CSI constructed by Caldas et al. [23] developed weighted evaluation criteria in conjunction with a range of stakeholders, including municipal officeholders and empirical experts on local government. Four major aspects of council sustainability were combined (governance, government effectiveness, economic and social development, as well as financial sustainability) containing 25 specific criteria. Figure 1—the "value tree"—summarizes all the elements comprising the CSI, together with their respective weights [23]. Caldas et al. argued that their CSI approach, which was applied to Portuguese local government, can be employed for the evaluation of any local government system *mutatis mutandis* [37].

Several dimensions of local government are aggregated in CSI using a Multi-criteria Decision Analysis model, encompassing council management, stakeholders, and community objectives. Integrating different stakeholders' interests contributes to an accurate evaluation of council sustainability, needs, and performance, and provides guidelines for better local government decision-making. Alternative methods (e.g., direct scoring methods or other probabilistic, empirical, and knowledge-based techniques) would have resulted in failure of the main goal of this investigation (i.e., to determine overall assessment of Portuguese local government performance and sustainability).

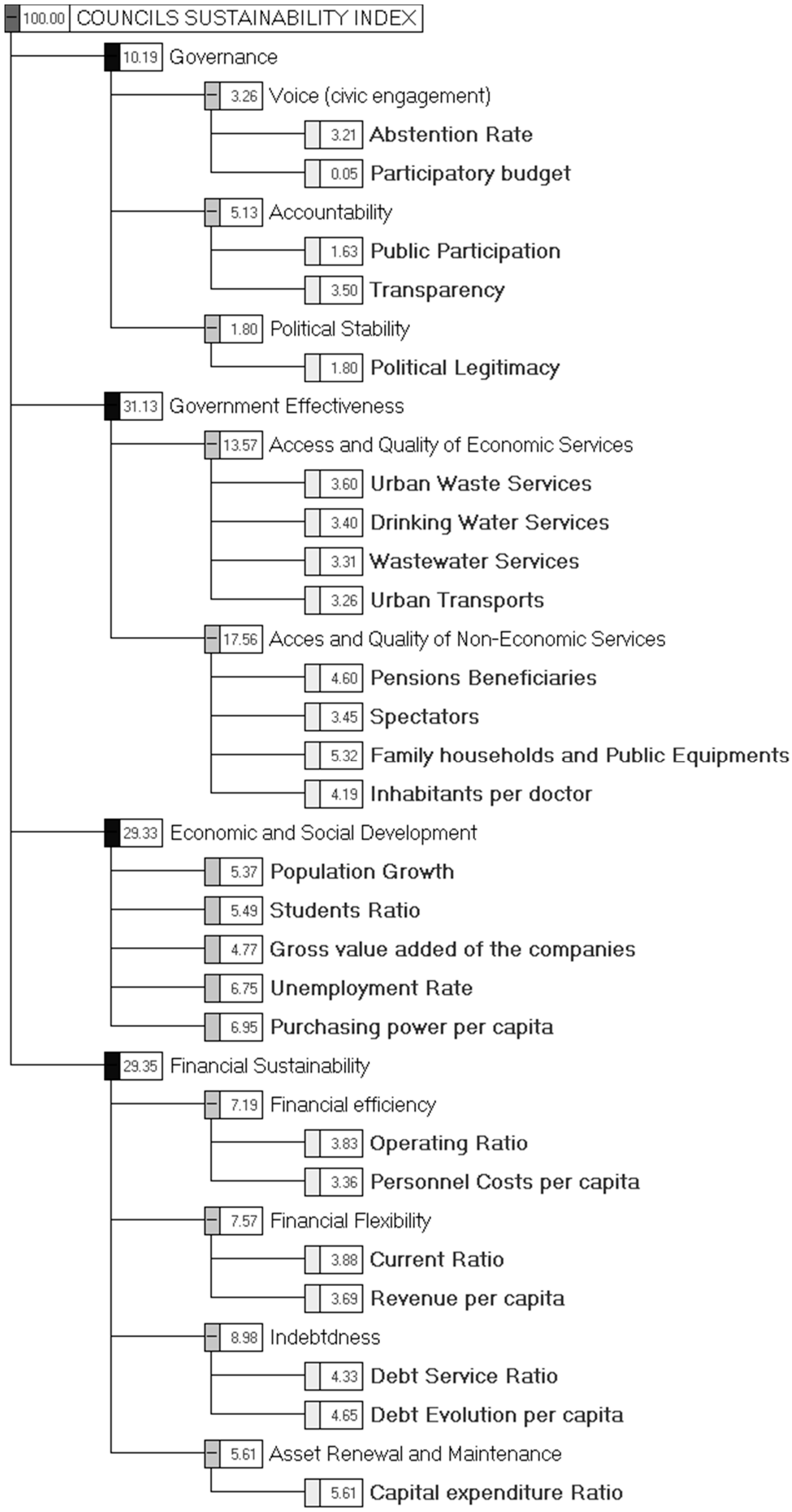

Figure 1. CSI Value Tree with CSI weights (source: [23]).

It is important to recognize, however, that the CSI model possesses various limitations, requiring further attention. While this paper considered financial sustainability, governance, and sustainable development, other variables could also be assessed (or weighted in a different manner) to measure "holistic sustainability". Additionally, the prospect of applying the CSI beyond Portugal is important from a policy perspective. The crucial issue on this matter is that institutional framework and contextual information of the region/country analyzed is imperative to determine the most adequate DMG, as well as the variables selection. Consideration of different forms of governance and different local *modus operandi* should determine a customized CSI. This could address different institutional realities. We would, then, be able to compare holistic sustainability ratios and local government performance. Simultaneously, we could assess the effectiveness of CSI format to evaluate local government performance and sustainability worldwide.

Tables A2 and A3 in the Appendix A detail the most sustainable councils (best 10% of performers) and non-sustainable councils (worst 10% of performers), respectively. These groupings form the two different clusters examined in this paper with respect to EU funding program impact. Considering decile (top and bottom line of CSI), rather than, for example, quartile, allowed us to catch more significant differences on the level of council sustainability, based on financial and non-financial factors. Thus, this option allowed a clearer distinction of the potential capacity each council might have for investments and funds absorption and development (conceiving that a priori top sustainability predetermines higher EU impact and bottom sustainability lower EU impact).

3. Methodological Considerations

The methodology employed in the present study follows Ferreira and Marques [38]. Consider a council whose performance relative to a set of different groups (or clusters) is being assessed. Because one should compare likes with likes, those authors proposed a three-cycle Monte Carlo procedure to search for comparable potential benchmarks (best practices) in the different clusters. This procedure avoids the endogeneity problem, which can be very serious. Gaps between achieved benchmarks disentangle potential frontier shifts, and efficiency spreads. The former discloses which cluster is the most productive, whereas the latter reflects the consistency of the efficiency levels of each group. Hence, Ferreira and Marques [38] augmented the radial HMI to account for any inefficiency source and benchmarking adopted model. The new index of productivity HMI was, then, coupled with the three-cycle Monte Carlo procedure to obtain a large set of efficiency estimates and, for that reason, if offers robust and statistical tools for efficiency and productivity analysis. The framework is summarized in Figure 2 and detailed hereinafter.

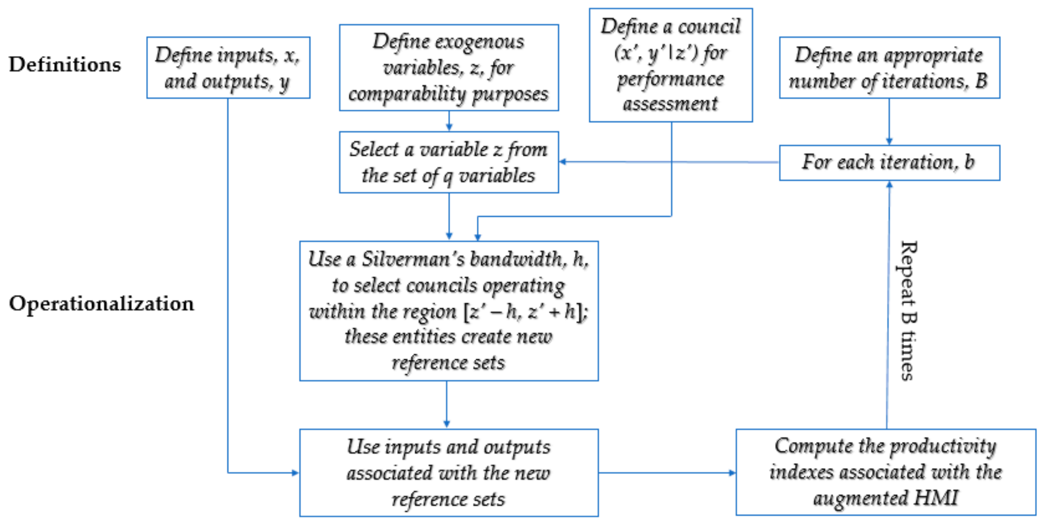

Figure 2. Summary of the Monte-Carlo procedure for efficiency and productivity assessment of clusters.

In general, empirical studies rely either on parametric or nonparametric methods, creating full frontiers. In other words, entire samples are considered in these analyses. However, and regarding nonparametric methods—data envelopment analysis (DEA) and free disposal hull (FDH) [39]—full frontiers are particularly prone to the presence of outliers, extreme values, and the curse of dimensionality, which biases the results by overestimating the extent of inefficiency. The adoption of partial frontiers, like order-m and order-α [40], seems to be more appropriate for (in) efficiency assessment in local government since they are less sensitive to these effects. Furthermore, the advantage of GDF-HMI is that it is a true measure of the total factor productivity and it is model-free because it is defined by means of targets (instead of direct measures of efficiency, like Shephard's radial distances). Thus, any model able to compute efficient targets can be utilized with GDF-HMI. One example of such a model is the directional order-α, as mentioned.

After a cluster has been selected as the reference, say A, we then seek comparable decision-making units (councils) in another cluster, say B. Comparability is based on a set of variables, like demographic variables, the scope of services, and the like. In the present context, we use a single variable: *population size*. Statistical robustness is ensured through bootstrapping iterations (15,000 iterations in our case) (see Ferreira and Marques [38] for details of this procedure).

It is important to distinguish between the two main performance measures: efficiency and productivity.

Definition 0 (Efficiency and productivity)**.** *Consider two groups (clusters) of councils, whose performance is being assessed. Each group has a specific frontier characterizing its underlying production technology. Benchmarks (or best practices) of each technology are placed onto the corresponding frontier. Thus:*

- *Efficiency focuses on the relative position of the councils from a group with respect to their own corresponding frontier; the more below the frontier, the more inefficient these councils.*
- *Productivity concerns the relative position of both frontiers (i.e., technologies); one cluster is more productive than the other if the former benchmarks can produce more outputs with fewer inputs than the best practices of the other group* [41]*. Let us consider two clusters, A = {non-sustainable councils} and B = {sustainable councils}, as achieved through the CSI approach (vide supra). Each cluster is totally characterized by a set of m inputs (consumed resources), X_i, i = 1 … , m, and s produced outputs (goods and/or services), Y_r, r = 1, … , s. Suppose these clusters have sizes n_A and n_B, respectively. These n_* councils are responsible for the production process, say $\Psi_A = \{1, \ldots, j_A, \ldots, n_A\}$ and $\Psi_B = \{1, \ldots, j_B, \ldots, n_B\}$, and at the same time they face a set of q exogenous variables, Z_p, p = 1, … , q. Some of those councils are more efficient than the others in the very same cluster. The Pareto-efficient councils are placed in the efficient frontier (or technology), $\partial\Psi_A$ and $\partial\Psi_B$, which in turn can be constructed via non/semi-parametric tools, such as data envelopment analysis (DEA)-like methods. Now, consider a single council$_0$ from a specific cluster, say A, and denote it by $\left(x_{0,i}, y_{0,r} \middle| z_{0,p}\right) \in \Psi_A$. We intend to achieve its targets on the frontier of another cluster, say B. $\left(x^{\star B}_{0,i,\vec{d}}, y^{\star B}_{0,r,\vec{d}}\right) \in \mathbb{R}_+^{(m+s)\times 1}$ is the set of m+s targets of council$_0$ with respect to the frontier of that cluster, $\partial\Psi_B$, and $\vec{d} = \left(\vec{d}_X, \vec{d}_Y\right)$ is a directional vector controlling for the direction in which council$_0$ is projected on $\partial\Psi_*$. Targets can be pre-defined or empirically determined. In the latter case, if DEA-like methods are employed, a linear combination of (at least, one) Pareto-efficient councils in $\partial\Psi_B$ is used to compute $\left(x^{\star B}_{0,i,\vec{d}}, y^{\star B}_{0,r,\vec{d}}\right)$. Assessing these values assumes a prominent role in Ferreira and Marques' approach, as shown later. The next subsection describes how these targets can be computed through a very robust semi-parametric frontier-based method.*

Assessing Targets. This paper adopts the bidirectional order-α (BDO-α) method, as introduced by Daraio and Simar [42]. Unlike standard DEA programs, BDO-α is less sensitive to outliers, extreme values, and the so-called curse of dimensionality, which results from many variables (either inputs or outputs) alongside a very low number of councils. It constructs an empirical nonconvex frontier by fixing the value of 1–α, which measures the probability of observing points above that frontier. These points are likely outliers or extreme values. Another advantage of this method (over its standard input- and output-oriented versions) is that it allows both input contraction and output expansion following the direction path defined by $\vec{d} = (\vec{d}_X, \vec{d}_Y)$.

Hypothesis 1(H1) (Parameters). *In this study, we select α = 0.99, i.e., assuming the existence of 1% of potential outliers. Furthermore,* $\vec{d} = (\vec{d_X}, \vec{d_Y}) = (\vec{1}, \vec{1})$ *is adopted. This choice of directional vector imposes that the input contraction and output expansion occur at the same rate.*

Definition 1 (BDO-α). *Consider the transformation* $(X^t_{ij_A}, Y^t_{rj_A}) = \left(\exp\left\{\frac{X_{ij_A}}{d_X}\right\}, \exp\left\{\frac{Y_{rj_A}}{d_Y}\right\}\right)$, $j_A = 1, \ldots, N_A$ *[42], and the equation :*

$$\mathfrak{F}^A(x_{0,i}, y_{0,r}) = \min\left\{\min_{i=1,\ldots,m}\left(\frac{x^t_{0,i}}{X^t_{ij_A}}\right), \min_{r=1,\ldots,s}\left(\frac{Y^t_{rj_A}}{y^t_{0,r}}\right)\right\}, \quad (1)$$

where $\mathbb{I}$ *is the indicator function. Let us denote by* $\mathfrak{F}^{xy}_{(\mathcal{L})}$ *the* $\mathcal{L}$*th order statistic of the* N_A *councils, such that* $\mathfrak{F}^A_{(1)} \leq \cdots \leq \mathfrak{F}^A_{(\mathcal{L})} \leq \cdots \leq \mathfrak{F}^A_{(N_A)}$. *The radial order-α based distance of council* $\left(x^{\star B}_{0,i,\vec{d}}, y^{\star B}_{0,r,\vec{d}}\right) \in \Psi_A$ *with respect to* $\partial\Psi_A$ *is given as follows*:

$$\widehat{\mathscr{B}}(x_{0,i}, y_{0,r}) = \log\begin{cases}\mathfrak{F}^A_{(\alpha n_A)} & \text{if } \alpha n_A \text{ is an integer}\\ \mathfrak{F}^A_{([\alpha n_A]+1)} & \text{otherwise}\end{cases}. \quad (2)$$

Council $(x_{0,i}, y_{0,r})$ *is technically efficient regarding the α-level frontier of* Ω_A*, say* $\partial\Omega^{(\alpha)}_A$*, if* $\widehat{\mathscr{B}} = 0$*. It is technically inefficient if* $\widehat{\mathscr{B}} > 0$ *and super-efficient if* $\widehat{\mathscr{B}} < 0$*. Targets of council* $(x_{0,i}, y_{0,r})$ *are, then, computed through Equation (3) [because of Hypothesis 1].*

$$\begin{cases} x^{\star A}_{0,i,\vec{d}} = x_{0,i} - \widehat{\mathscr{B}} \cdot \vec{d} = x_{0,i} - \vec{\widehat{\mathscr{B}}} \\ y^{\star A}_{0,r,\vec{d}} = y_{0,r} + \widehat{\mathscr{B}} \cdot \vec{d} = y_{0,r} + \vec{\widehat{\mathscr{B}}} \end{cases}, \quad (3)$$

where $\vec{\mathrm{d}} = (\vec{\mathrm{d}_X}, \vec{\mathrm{d}_Y}) = (\vec{1}, \vec{1})$*. Mutatis mutandis, it is easy to obtain the targets of councils in A with respect to the frontier of B, and vice-versa.*

Assessing the Relative Performance of Clusters. This paper uses the decomposition of the Total Factor Productivity (TFP), as proposed by Ferreira and Marques [38], to evaluate the relative performance of a set of four different clusters:

$$\begin{cases} A = \{\text{non-sustainable councils, ESIF III}\} \\ B = \{\text{sustainable councils, ESIF III}\} \\ C = \{\text{non-sustainable councils, NSRF}\} \\ D = \{\text{sustainable councils, NSRF}\} \end{cases}$$

For what follows, let us consider the Definition 2 of TFP between two councils. Definition 1 and Hypothesis 1 will be employed henceforth. From Definition 1, we can state that $TFP_{AB}(x_1, y_1; x_2, y_2) > 1$ when council$_2$ (read sustainable councils) is more productive than council$_1$ (read non-sustainable councils). Furthermore, this TFP formulation is decomposable into several terms, see Definitions 3 up to 6.

Definition 2 (TFP). *The total factor productivity (TFP) between two councils,* $(x_1, y_1|z_1) \in \Psi_A$ *and* $(x_2, y_2|z_2) \in \Psi_B$ *is defined by* $TFP(x_1, y_1; x_2, y_2) = \frac{\mathcal{M}(y_2)}{\mathcal{M}(y_1)} / \frac{\mathcal{L}(x_2)}{\mathcal{L}(x_1)}$*, with* $\mathcal{M} : \mathbb{R}^s \to \mathbb{R}$ *and* $\mathcal{L} : \mathbb{R}^m \to \mathbb{R}$.

Hypothesis 2(H2) (TFP). *If both* $\mathcal{M}$ *and* $\mathcal{L}$*functions are the geometric mean of their own arguments (vectors), then the previous measure of TFP is multiplicatively complete [25], i.e., it confirms the axioms of positivity,* *continuity, monotonicity, homogeneity, identity, commensurability, and reversal property. The TFP is then given by the following equation [43]:*

$$TFP(x_1, y_1; x_2, y_2) = \frac{\mathcal{M}(y_2)}{\mathcal{M}(y_1)} / \frac{\mathcal{L}(x_2)}{\mathcal{L}(x_1)} = (\prod_{r=1}^{s} \frac{y_{2,r}}{y_{1,r}})^{\frac{1}{s}} / (\prod_{i=1}^{m} \frac{x_{2,i}}{x_{1,i}})^{\frac{1}{m}}. \quad (4)$$

Now, let us define a function, $\wp_\ell(\vec{v})$, which aggregates the values of the ℓ-sized vector $\vec{v}$. If the vector $\vec{v}$ is, for instance, the ith vector of inputs targets of all the N_A councils from Ψ_A with respect to $\partial\Psi_A$, then its aggregation is simply $\wp_{N_A}\left(x^{\star A}_{j_A,i,\vec{d}}\right)$. Suppose that $\wp_\ell$ is the geometric mean. Then, $\wp_{N_A}\left(x^{\star A}_{j_A,i,\vec{d}}\right) = \prod_{j_A=1}^{N_A}\left(x^{\star A}_{j_A,i,\vec{d}}\right)^{1/N_A}$. TFP is decomposable into three main terms: efficiency spread, technology gap, and returns-to-scale. Their aggregated versions are defined as follows, which provides an overview of the relative performance of clusters.

Definition 3 (Efficiency spread, ES)**.** *Let us consider two directional vectors, $\vec{d_I} = (\vec{1}, \varepsilon\vec{1})$ and $\vec{d_O} = (\varepsilon\vec{1}, \vec{1})$, where ε is a positive non-Archimedean number (as small as possible, say $\varepsilon \sim 10^{-10}$). Using these vectors, we can employ Equations (1)–(3) for targets assessment. In view of that, Equation (5) is a measure of the efficiency spread of the two clusters. Particularly, the technical efficiency of councils from cluster B is, on average, higher than the one of councils from A (with respect to their own frontier) if and only if $ES_{AB} > 1$. No technical efficiency differences are expected whenever $ES_{AB} = 1$.*

$$ES_{AB} = \sqrt{\frac{\left(\prod_{r=1}^{s} \frac{\wp_{N_B}(y_{j_B,r})}{\wp_{N_A}(y_{j_A,r})}\right)^{\frac{2}{s}}}{\left(\prod_{i=1}^{m} \frac{\wp_{N_B}(x_{j_B,i})}{\wp_{N_A}(x_{j_A,i})}\right)^{\frac{2}{m}}} \cdot \frac{\left(\prod_{i=1}^{m} \frac{\wp_{N_B}\left(x^{\star B}_{j_B,i,\vec{d}_I}\right)}{\wp_{N_A}\left(x^{\star A}_{j_A,i,\vec{d}_I}\right)}\right)^{\frac{1}{m}}}{\left(\prod_{r=1}^{s} \frac{\wp_{N_B}\left(y^{\star B}_{j_B,r,\vec{d}_I}\right)}{\wp_{N_A}\left(y^{\star A}_{j_A,r,\vec{d}_I}\right)}\right)^{\frac{1}{s}}} \cdot \frac{\left(\prod_{i=1}^{m} \frac{\wp_{N_B}\left(x^{\star B}_{j_B,i,\vec{d}_O}\right)}{\wp_{N_A}\left(x^{\star A}_{j_A,i,\vec{d}_O}\right)}\right)^{\frac{1}{m}}}{\left(\prod_{r=1}^{s} \frac{\wp_{N_B}\left(y^{\star B}_{j_B,r,\vec{d}_O}\right)}{\wp_{N_A}\left(y^{\star A}_{j_A,r\vec{d}_O}\right)}\right)^{\frac{1}{s}}}} \quad (5)$$

Definition 4. (Technological gap, TG)**.** *There is a technological gap (TG) between two technologies, $\partial\Psi_A$ and $\partial\Psi_B$, if one of them can produce more outputs with fewer resources than the other one. Considering the same directional vectors as in Definition 3, Ψ_B is more productive than Ψ_A if its benchmarks consume fewer resources than the ones in $\partial\Psi_A$, i.e., $RP_{AB} > 1$, and/or those benchmarks produce more goods/services than their counterparts from Ψ_A, i.e., $GP_{AB} > 1$. Additionally, $TG_{AB} = RP_{AB} \cdot GP_{AB}$. Thus, $TG_{AB} > 1$ when $\partial\Psi_B$ is more productive than $\partial\Psi_A$, being:*

$$\begin{cases} RP_{AB} = \sqrt[4\cdot m]{\prod_{i=1}^{m} \frac{\wp_{N_B}\left(x^{\star A}_{j_B,i,\vec{d}_I}\right)\cdot\wp_{N_A}\left(x^{\star A}_{j_A,i,\vec{d}_I}\right)\cdot\wp_{N_B}\left(x^{\star A}_{j_B,i,\vec{d}_O}\right)\cdot\wp_{N_A}\left(x^{\star A}_{j_A,i,\vec{d}_O}\right)}{\wp_{N_B}\left(x^{\star B}_{j_B,i,\vec{d}_I}\right)\cdot\wp_{N_A}\left(x^{\star B}_{j_A,i,\vec{d}_I}\right)\cdot\wp_{N_B}\left(x^{\star B}_{j_B,i,\vec{d}_O}\right)\cdot\wp_{N_A}\left(x^{\star B}_{j_A,i,\vec{d}_O}\right)}} \\ GP_{AB} = \sqrt[4\cdot s]{\prod_{i=1}^{s} \frac{\wp_{N_B}\left(x^{\star B}_{j_B,r,\vec{d}_I}\right)\cdot\wp_{N_A}\left(x^{\star B}_{j_A,r,\vec{d}_I}\right)\cdot\wp_{N_B}\left(x^{\star B}_{j_B,r,\vec{d}_O}\right)\cdot\wp_{N_A}\left(x^{\star B}_{j_A,r,\vec{d}_O}\right)}{\wp_{N_B}\left(x^{\star A}_{j_B,r,\vec{d}_I}\right)\cdot\wp_{N_A}\left(x^{\star A}_{j_A,r,\vec{d}_I}\right)\cdot\wp_{N_B}\left(x^{\star A}_{j_B,r,\vec{d}_O}\right)\cdot\wp_{N_A}\left(x^{\star A}_{j_A,r,\vec{d}_O}\right)}} \end{cases} \quad (6)$$

Definition 5 (Returns-to-scale, RTS)**.** *The returns-to-scale (RTS) index measures how close councils are from their own most productive scale size (MPSS), when compared to other councils from another cluster. Councils from B are closer to their own MPSS than councils in A if* $RTS_{AB} > 1$ *and:*

$$RTS_{AB} = \sqrt[4]{\left(\prod_{i=1}^{m} \frac{\wp N_A\left(x^{\star A}_{j_A,i,\vec{d_I}}\right)\cdot\wp N_A\left(x^{\star B}_{j_A,i,\vec{d_I}}\right)\cdot\wp N_A\left(x^{\star A}_{j_A,i,\vec{d_O}}\right)\cdot\wp N_A\left(x^{\star B}_{j_A,i,\vec{d_O}}\right)}{\wp N_B\left(x^{\star A}_{j_B,i,\vec{d_I}}\right)\cdot\wp N_B\left(x^{\star B}_{j_B,i,\vec{d_I}}\right)\cdot\wp N_B\left(x^{\star A}_{j_B,i,\vec{d_O}}\right)\cdot\wp N_B\left(x^{\star B}_{j_B,i,\vec{d_O}}\right)}\right)^{\frac{1}{m}} \cdot \left(\prod_{r=1}^{s} \frac{\wp N_B\left(x^{\star A}_{j_B,r,\vec{d_I}}\right)\cdot\wp N_B\left(x^{\star B}_{j_B,r,\vec{d_I}}\right)\cdot\wp N_B\left(x^{\star A}_{j_B,r,\vec{d_O}}\right)\cdot\wp N_B\left(x^{\star B}_{j_B,r,\vec{d_O}}\right)}{\wp N_A\left(x^{\star A}_{j_A,r,\vec{d_I}}\right)\cdot\wp N_A\left(x^{\star B}_{j_A,r,\vec{d_I}}\right)\cdot\wp N_A\left(x^{\star A}_{j_A,r,\vec{d_O}}\right)\cdot\wp N_A\left(x^{\star B}_{j_A,r,\vec{d_O}}\right)}\right)^{\frac{1}{s}}} \quad (7)$$

Hypothesis 3(H3) (Aggregating function)**.** *This paper adopts the geometric mean as the aggregating function, i.e.,* $\wp_\ell(\vec{v}) = \prod_{k=1}^{\ell} v_k^{1/\ell}$.

Definition 6 (HMI)**.** *Based on Hypothesis 3, the HMI [44] is a true measure of TFP, can be computed by means of Equation (4), and it is multiplicatively decomposable into the terms* ES_{AB}, RP_{AB}, GP_{AB}, *and* RTS_{AB} *[38]. In other words, the product of Equations (5)–(7) returns the aggregated version of Equation (1).*

4. Empirical Evidence on Impact of EU Programs on Portuguese Councils

4.1. Portuguese Local Government

Portuguese local government is composed of administrative regions, local councils, and civil parishes, with local authorities responsible for delivering local public services to residents. Council responsibilities are regulated (Law 75/2013 of 12 September 2013) and are diverse: rural and urban infrastructure, energy, transport and communication, education, local assets, culture and science, leisure and sports, health, social welfare, housing, civil protection, water supply, wastewater and urban waste, consumer protection, development promotion, planning, local police and, finally, intergovernmental relations [45]. Councils can cooperate with each other through various institutional arrangements and are free to choose governance structures for local public service production and provision [46].

As we can see from Figure 3, most of the Portuguese councils are small (185) and medium size (99) in terms of population and thus size may be an important determinant of council administration and technical capacity. The average size is 34,500 inhabitants—aligned with the European Union average—and councils are located unevenly by region [4].

Table 3 presents weighting of local functions in Portugal and EU average. Most of municipal expenditure is spent on General Functions (36%), Other (26%), and Economic Activity (22%), as opposed to EU Average at 24%, 15%, and 12%, respectively.

Table 3. Weight of local functions in Portugal relative to European Union (EU) average.

Expenditure by Function		
	Portugal (%)	**EU Average (%)**
Economic activity	22	12
Education	9	23
Health	4	11
Social protection	3	15
General functions	36	24
Other	26	15

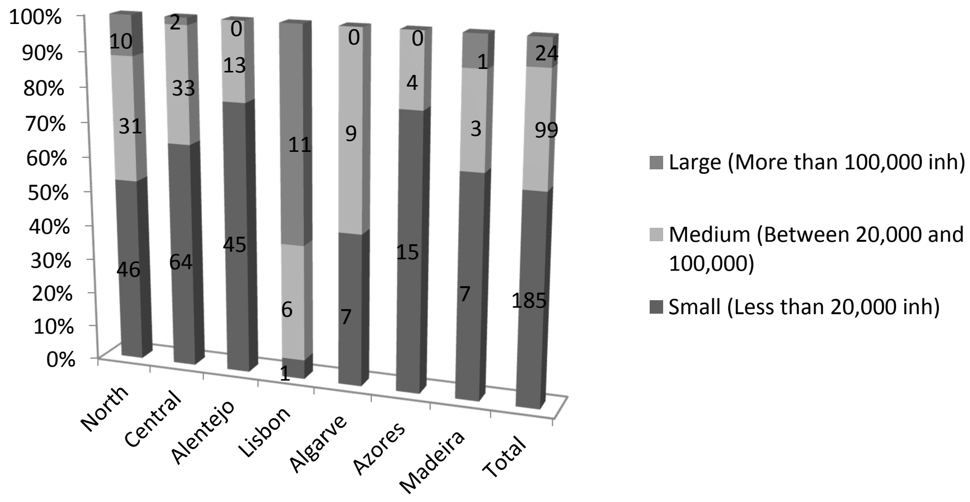

Figure 3. Portuguese councils' size by population and region.

4.2. Does High Sustainability Means High EU Investments Performance?

Our main hypothesis holds that the impact of ESIF, ESIF III (2000–2006), and NSRF (2007–2013) on key performance and sustainability indicators for Portuguese sustainable councils and non-sustainable councils was varied. The research period was between 2000 and 2014 (i.e., 15 years) and covered the most sustainable and the least sustainable Portuguese councils.

Council investment and funds data for each year of the research period were collected from the National Agency for Development and Cohesion (NADC), which is the entity responsible for the management and evaluation of the Portuguese execution of EU cohesion funds. Moreover, council key performance and sustainability indicators data for each year of the research period were collected from the National Institute of Statistics.

The analysis considered the variables presented in Table 4, in view of the type of investment/funds and the three main thematic objectives of EU programs: competitiveness factors, territory development, and human potential.

Clusters. This paper used the following clusters:

A—Non-sustainable councils, ESIF III
B—Sustainable councils, ESIF III
C—Non-sustainable councils, NSRF
D—Sustainable councils, NSRF

The clusters result from the application of the CSI to the 308 Portuguese councils and the specific councils that integrate each cluster—which are provided in Tables A2 and A3 in the Appendix A—distinguishing between sustainable councils (best 10% performers) and non-sustainable councils (worst 10% performers).

Research hypotheses. We considered the following research hypotheses:

H_1: *Sustainable councils are more efficient than non-sustainable councils.*
H_2: *Sustainable councils are more productive than non-sustainable councils.*
H_3: *Worst/best performers in NSRF are more efficient than the worst/best ones under ESIF III.*
H_4: *Worst/best performers in NSRF are more productive than the worst/best ones under ESIF III.*
H_5: *Worst/best performers in NSRF are more efficient than the best/worst ones under ESIF III.*
H_6: *Worst/best performers in NSRF are more productive than the best/worst ones under ESIF III.*

By testing differentiated efficiency and productivity, these hypotheses' cover councils' higher/lower sustainability level is based on four specific broad dimensions—governance, government effectiveness, economic and social development, and financial sustainability—as well as including the ESIF III and NSRF characteristics considered earlier. This allows for differential council behaviour in each period.

Table 4. Variables description and references (2010—ESIF III and 2015—NSRF).

Variable	Description	Units
Input—Investment per inhabitant [47]	EU investments allocated and applied in each council divided by number of residents.	1000 €
Input—Funds per inhabitant [47]	EU funds allocated and applied in each council divided by number of residents.	1000 €
Output—Purchasing power per capita PPP [12,48–50]	This composite indicator is intended to translate the purchasing power in per capita terms.	It is an index number with the value 100 in the country average, which compares the purchasing power, in per capita terms, in different councils or regions.
Output—Companies gross value added per capita [18–20,51]	The company gross added value (GAV) is the wealth per resident generated in the production, discounting the value of goods and services consumed to achieve it, for example, the raw materials. The values are gross when the consumption of fixed capital is not assumed.	1000 €
Output—(Education) high school conclusion rate [14,52,53]	Success rate meaning the number of students that concluded high school divided by the total number of students.	%
Output—(Health) doctors per 1000 inhabitants [14,54]	Number of doctors divided by a thousand residents.	No
Output—(Indebtedness) debt service ratio [55,56]	Sum of interest paid plus capital debt amortization divided by total expenses.	%

4.3. Results

Table 5 is provided to assist readers in the following discussion of the study findings. Table 6 provides the comparison between sustainable and non-sustainable councils covering both EU Programs (ESIF III and NSRF). From these results, we can observe that sustainable councils are indeed more efficient than councils that have been considered as non-sustainable on the CSI. Given this outcome, Hypothesis H1 cannot be rejected at the 95% confidence level. It is important to note that differences in terms of technical efficiency are clearer in ESIF III than in the NSRF. Nevertheless, in none of these scenarios were productivity gaps statistically meaningful, as predicted by the Hicks-Moorsteen index, which is a measure of total factor productivity (see Definition 6). In other words, Hypothesis H2 is rejected. This results from the non-existence of significant technology gaps between clusters. In other words, benchmarks from both worst and best council clusters (in terms of the CSI-related sustainability) can produce similar amounts of outputs accounting for comparable levels of inputs. As to the returns to scale, the best councils with respect to sustainability seem to be closer to their optimal (most productive) scale size than the worst ones under the ESIF III program. It is no longer true under NSRF that both best and worst councils share similar positions regarding their own most productive scale size. It seems there was a convergence of councils through time regarding their scale efficiency.

Table 5. Definitions of the productivity indexes.

Index	<1	=1	>1
ES_{AB}	Councils of cluster A have a higher average technical efficiency than councils of B	Councils of both clusters A and B have similar technical efficiency levels	Councils of cluster A have a lower average technical efficiency than councils of B.
RP_{AB}	Benchmarks of cluster A consume fewer resources than benchmarks of B	The consumption profile of benchmarks of both clusters is similar	Benchmarks of cluster A consume more resources than benchmarks of B.
GP_{AB}	Benchmarks of cluster A deliver more services than benchmarks of B	The production profile of benchmarks of both clusters is similar	Benchmarks of cluster A delivery less services than benchmarks of B.
TG_{AB}	Overall, the productivity of A is higher than the productivity of B	Overall, the productivity levels of A and B are identical	Overall, the productivity of A is lower than the productivity of B.
RTS_{AB}	Councils of cluster A are closer to their optimal scale than councils of B	Councils of clusters A and B are "at the same distance" to their optimal scale	Councils of cluster B are closer to their optimal scale than councils of A.
HMI_{AB}	Overall, total factor productivity of A is higher than B	Overall, both clusters share identical total factor productivity levels	Overall, total factor productivity of B is higher than A

Table 7 compares the efficiency and productivity results for the ESIF III and NSRF clusters. The transition from ESIF III to NSRF has promoted a slight decrease (2–3%) of technical efficiency in both the worst and best councils. This can be seen in the confidence intervals of ES ** in the second and the fifth columns of Table 5. The interval upper bound is lower than 1; thus, clusters A and B exhibit lower efficiency spreads (higher consistency) than C and D, respectively. Put differently, Hypothesis H3 is rejected at the 95% confidence level. This transition has also seen a poorer utilization of resources for comparable levels of produced goods/services. According to the values of both RP_{AC} and RP_{BD}, on average, benchmarks from NSRF-based clusters consume about 4–6% more resources than their counterparts in ESIF III-based groups, for the same amounts of outputs. Since no differences on the output-based index, GP_{AC} and GP_{BD}, have been detected (i.e., the corresponding confidence intervals), no technological gaps, TG_{AC} and TG_{BD}, were detected. However, there was a substantial withdrawal from the optimal scale due to the transition of ESIF III-NSRF, as observed by the reduced values of RTS_{AC} and RTS_{BD}. This means that the overall productivity of both best and worst councils concerning sustainability has decreased over time (HMI_{AC}, $HMI_{BD} < 1$). Since these councils have become less productive, Hypothesis H4 is rejected at the 95% level. Similar and consistent conclusions arise by comparing cluster A with D and B with C. On the one hand, the best councils in NSRF are considerably less productive than the worst councils in ESIF III. On the other hand, the best councils in ESIF III are more productive than the worst councils in the NSRF, which is an expected outcome and discards Hypothesis H6. Accordingly, a circular condition can be observed, in line with both Hypothesis 2 and Definition 6. This condition is illustrated in Figure 4, which encompasses the results shown in Tables 6 and 7, highlighting in both periods which council group (sustainable and non-sustainable) is more productive.

Table 6. Comparison between sustainable and non-sustainable councils, in both ESIF III and NSRF scenarios. (Expected values, 95% confidence intervals, and comments).

	Index	Results	Comments
A vs. B (Non- sustainable vs sustainable councils, ESIF III)	ES_{AB} (efficiency spread)	1.0327 * [1.0081; 1.2142]$_{95\%}$	The technical efficiency of sustainable councils (ESIF III) is higher than the efficiency of non-sustainable ones. This is because the former are closer to their efficient frontier than the latter. On average, the efficiency of sustainable councils is ~3% higher than that of non-sustainable municipalities. Such a gap can reach ~21%. Differences are statistically significant since the 95% confidence interval's lower bound is larger than 1.
	RP_{AB} (resources productivity)	1.0580 * [1.0368; 1.0504]$_{95\%}$	Sustainable and technically efficient councils (ESIF III) consume 4–5% less resources than benchmarks in the non-sustainable councils' cluster, for equivalent levels of produced goods/services. Differences are statistically significant at the 95% confidence level.
	GP_{AB} (outputs productivity)	0.8200 ** [0.7846; 1.1298]$_{95\%}$	Non-sustainable and technically efficient councils (ESIF III) produce, on average, 18% more goods and/or services than the best practices in B. Nevertheless, differences are not meaningful from the statistical point of view.
	TG_{AB} (technology gap)	0.8199 ** [0.7813; 1.1013]$_{95\%}$	Both technologies are similar because $\{1\} \in [0.7813; 1.1013]_{95\%}$. That is, benchmarks from A and B produce similar amounts of outputs with equivalent levels of resources. This suggests that both groups of councils are equally productive.
	RTS_{AB} (returns to scale)	1.6038 * [1.0910; 5.3457]$_{95\%}$	Sustainable councils (ESIF III) are closer to their MPSS than non-sustainable councils. Differences are significant at the 95% confidence level.
	HMI_{AB} (total factor productivity)	0.9625 ** [0.8860; 3.7402]$_{95\%}$	Although on average the productivity (TFP) of A is about 4% higher than the one in B, there is no statistical evidence of a considerable productivity gap between these two technologies. That is, both sustainable and non-sustainable councils in the ESIF III program can reach equivalent productivity levels.
C vs. D (Non- sustainable vs sustainable councils, NSRF)	ES_{CD} (efficiency spread)	1.0096 * [1.0032; 1.1567]$_{95\%}$	Sustainable councils (NSRF) are, in general, more efficient than non-sustainable units. Gaps in efficiency spread can hit 15%. Gaps are significant at the 95% level.
	RP_{CD} (resources productivity)	0.9782 * [0.9038; 0.9792]$_{95\%}$	Keeping the outputs unchanged, the efficient technology of cluster C consumes 2–10% less resources than the one of cluster D.
	GP_{CD} (outputs productivity)	0.8446 ** [0.8452; 1.1199]$_{95\%}$	For equivalent resources consumption's levels, benchmarks from cluster C can produce 15% more outputs than cluster D. Yet, differences are not statistically meaningful.
	TG_{CD} (technology gap)	0.8199 ** [0.8248; 1.0844]$_{95\%}$	No significant technological gap has been found between these two clusters, thus they are equally productive.
	RTS_{CD} (returns to scale)	1.4561 ** [0.3040; 1.8396]$_{95\%}$	Sustainable and non-sustainable councils exhibit comparable scale efficiencies. That is, they are at the same distance (on average) to their own MPSS.
	HMI_{CD} (total factor productivity)	0.9936 ** [0.2010; 4.3975]$_{95\%}$	No statistically significant differences between these two clusters were found in terms of productivity. The expected value of HMI is close to 1, a value belonging to the 95% confidence interval.

* The index is statistically different from 1, at the 5% significance level (or lower); ** The index is not statistically different from 1, at the 5% significance level (or lower).

Table 7. ESIF III vs. NSRF comparison results (Expected values and 95% confidence intervals).

Index	***A* vs. *C***	***A* vs. *D***	***B* vs. *C***	***B* vs. *D***
ES_{**}	0.9765 [0.9491; 0.9932]$_{95\%}$	0.9958 [0.9963; 1.1383]$_{95\%}$	0.9534 [0.8082; 0.9852]$_{95\%}$	0.9756 [0.9575; 0.9884]$_{95\%}$
RP_{**}	0.9566 [0.7295; 0.9597]$_{95\%}$	1.0453 [1.0049; 1.0428]$_{95\%}$	1.0027 [0.9059; 1.0061]$_{95\%}$	0.9405 [0.9351; 0.9606]$_{95\%}$
GP_{**}	1.1350 [0.9466; 1.4419]$_{95\%}$	0.6800 [0.6033; 0.9370]$_{95\%}$	1.0924 [0.7021; 1.2173]$_{95\%}$	0.9568 [0.9221; 1.1338]$_{95\%}$
TG_{**}	1.0523 [0.9101; 1.2811]$_{95\%}$	0.7454 [0.6555; 0.9746]$_{95\%}$	1.1947 [0.7188; 1.0464]$_{95\%}$	0.9654 [0.9282; 1.0582]$_{95\%}$
RTS_{**}	0.5698 [0.5248; 0.6637]$_{95\%}$	0.8257 [0.2849; 4.0920]$_{95\%}$	0.4465 [0.3645; 0.7393]$_{95\%}$	0.6825 [0.2558; 0.7118]$_{95\%}$
HMI_{**}	0.5816 [0.5635; 0.6156]$_{95\%}$	0.5199 [0.1348; 2.4906]$_{95\%}$	0.5429 [0.0832; 0.8757]$_{95\%}$	0.5802 [0.1922; 0.6482]$_{95\%}$

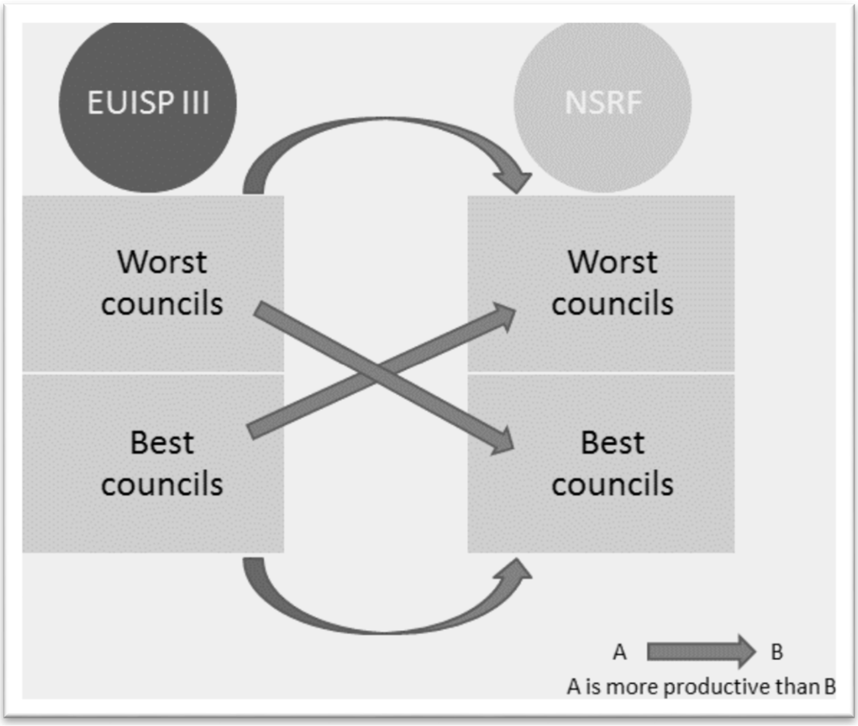

Figure 4. Productivity relationships between councils' groups.

5. Concluding Remarks

Established in 1986, the ESIF played a crucial role in the economic and social development of Portugal, especially on the finance provided at the local level. This paper has focused on the differential impact of EU investments and funds programs by applying the CSI, a new local government evaluation model developed by Caldas et al. [23].

The empirical analysis conducted in this paper allows us to draw four major conclusions. In the first place, we found that sustainable councils are more efficient due to sound levels of governance, government effectiveness, economic and social development, and/or financial sustainability. However, they are not more productive than councils which were determined to be non-sustainable under the CSI. In sum, for both EU programs, the difference in investment impact was not significant regardless of whether a council exhibited higher or lower levels of sustainability.

Secondly, the importance of EU programs to the structural adjustment of the Portuguese economy is recognised and continuity of EU cohesion policies seems imperative to guarantee sustainable development.

Finally, we found that both efficiency and productivity are higher on ESIF III (2000–2006) than under NSRF (2007–2013)—for sustainable and non-sustainable councils alike—because of the stronger effects of ESIF III on the economic and social circumstances of residents, including increased competitiveness, spatial development, and the human potential of individual councils and specific regions.

From a policy perspective, our findings suggest that ESIF should continue fostering economic and social development at the local level regardless of council size or regional location since overall development will flow from this economic and social structural adjustment strategy. More generally, we conclude that ESIF strategies have made a positive contribution to Portuguese development contribution whilst respecting the principle of subsidiarity [5].

Further empirical investigation is required on the specific investment impact under the ESIF using different output indicators. In addition, the CSI could be fruitfully applied to council performance and sustainability throughout Europe. Importantly, a new CSI including environmental dimensions should be constructed, a benchmarking exercise should be carried out, and its outcomes should be compared with the ones achieved in the current research.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Please consider Tables A1 and A2. The former details the European structural and investment funds within the period 1986 and 2013. The latter presents the 10% best and 10% worst performers (councils) according to the CSI Sustainability Index.

Table A1. European Structural and Investment Funds (1986–2013).

	Previous Regulation 1986–1988 (Exclusive Funding of Public Infrastructures)	European Structural and Investment Funds I (1989–1993)	European Structural and Investment Funds II (1994–1999)	European Structural and Investment Funds III (2000–2006)	National Strategic Reference Program—NSRF (2007–2013)
Total Investment	1185 million euros	4600 million euros	14,589 million euros	20,528 million euros	21,500 million euros
Programs—Strategic Axes and Projects	Four Specific Programs—National Program of community interest of incentives to productive activity; specific program for telecommunications (STAR) and energy (VALOREN); integrated operation of the northern development Alentejo Region.	Several territorial and sectorial specific projects.	Axes of intervention: qualify human resources and employment; strengthen the factors of competitiveness of the economy; promote the quality of life and social cohesion; and strengthen the regional economic base. There was also a diversity of programs by sector and region assigned operational interventions.	Four strategic Axes: raise the level of qualification of the Portuguese, promote the employment and social cohesion (about 24% of the public expenditure); change the profile productive towards the activities of the future (20% of public expenditure); affirm the value of the territory and of the geo position of the economic country (10% of the public expenditure); and promote the sustainable development of the regions and the national cohesion (46% of public expenditure).	Three Thematic Programs—operational program of territorial development OPTD; operational program of human potential OPHP; and the program CFOP—competitiveness factors operational Program. Seven Regional Programs, corresponding to each of the regions as part of the mainland and Regions.
Major Contributions	Innovative principles of the 1988 Reform: concentration (in a limited number objectives and application to regions whose development is lagging behind), the additionality (community expenditure complemented by national expenditure), the partnership (involvement of all levels of national and community administration and social partners in the preparation and implementation of programs) and programming (refusal of financing of individual projects and their pluri-annual programs and pluri-sectorial framework and, preferably, interregional). The word evaluation appears for the first time.	Notwithstanding the efforts, it was not possible to efficiently mobilize and achieve the corporate sector, in terms of its management and competitiveness.	It fulfilled the objectives of output growth, the employment, real convergence with the other countries of the community, and of convergence between internal regions. High performance and adaptation of the programs to the operating context and social evolution—the increasing economic effectiveness of the structural funds.	Based on the National Plan for Economic and Social Development, the Program outlined the purlins of the medium- and long-term development of Portugal: Atlantic economy border of Europe; privilege of activities, competitiveness factors and technologies more structural dynamic of the global economy; a National Strategy for nature conservation and biodiversity, protection and enhancement of the natural heritage, and enhancement of solidarity and cohesion as regards the social development model.	It surpassed the multiplicity of existing sectorial programs in the EU Investment and Funds Program III and the fact that management should be made through the centralized level of Operational Programs instead of being made, as in the past, at the project level.

Source: Elaborated by the authors, based on EU Structural Funds Execution Reports.

Table A2. CSI sustainability results (Top 10% best performers).

Sustainable Councils—Best 10% Performers														
Regions	**Size**	**Councils**	**Global Ranking**	**Council Position**	**Governance Ranking**	**Council Position**	**Government Effectiveness Ranking**	**Council Position**	**Economic and Social Development Ranking**	**Council Position**	**Financial Sustainability Ranking**	**Council Position**
Lisbon	L	Lisboa	235.86	1	5.41	173	29.54	93	179.50	1	21.41	*241*
Lisbon	L	Oeiras	221.98	2	6.06	146	42.80	47	134.34	2	38.78	*117*
Algarve	M	Loulé	177.85	3	6.61	126	56.64	25	20.00	62	94.60	*8*
North	M	São João da Madeira	171.22	4	0.64	301	56.16	26	69.77	4	44.64	*82*
Azores	S	Corvo	166.12	5	1.30	293	21.96	134	−8.00	244	150.85	*1*
Central	M	Entroncamento	162.71	6	6.47	134	97.23	2	24.22	39	34.80	*148*
Central	M	Águeda	160.14	7	8.69	56	86.24	5	26.82	31	38.38	*119*
Central	S	Constância	158.64	8	8.36	73	85.46	7	23.85	40	40.96	*98*
Alentejo	S	Sines	150.09	9	6.34	139	32.75	82	65.93	5	45.07	*76*
Central	S	Figueira de Castelo Rodrigo	145.27	10	6.57	130	9.12	212	−0.70	196	130.28	*2*
Lisbon	L	Vila Franca de Xira	141.74	11	2.82	260	85.85	6	25.58	34	27.49	*199*
North	L	Maia	140.45	12	4.70	206	70.91	14	36.85	14	27.98	*192*
North	M	Vale de Cambra	140.26	13	8.24	75	52.86	29	27.78	28	51.38	*53*
North	M	Bragança	139.39	14	2.36	275	91.58	4	12.30	98	33.14	*154*
Azores	S	Lajes das Flores	138.27	15	10.82	19	17.85	166	−9.20	249	118.80	*4*
Central	M	Torres Vedras	138.23	16	6.38	136	95.80	3	22.72	45	13.33	*278*
North	L	Porto	136.44	17	5.88	156	39.80	54	58.68	6	32.09	*162*
Alentejo	S	Vendas Novas	133.99	18	3.86	236	99.67	1	17.42	70	13.04	*280*
Central	M	Pombal	132.74	19	8.60	61	39.20	56	18.15	66	66.80	*23*
Alentejo	S	Ourique	129.98	20	8.98	46	26.14	108	−4.42	222	99.27	*6*
North	S	Valença	127.61	21	7.81	84	80.92	9	8.58	120	30.30	*175*
Central	S	Oliveira de Frades	127.30	22	7.49	88	19.60	152	35.68	18	64.53	*29*
Alentejo	S	Grândola	127.29	23	6.21	141	75.61	11	14.41	81	31.06	*172*
North	S	Melgaço	127.22	24	5.61	166	47.43	36	17.10	72	57.08	*40*
Algarve	M	Albufeira	125.33	25	1.69	288	38.87	58	7.06	126	77.71	*11*
Central	S	Vila Velha de Ródão	124.03	26	8.91	50	36.74	67	34.89	19	43.48	*89*
Central	L	Leiria	123.82	27	8.91	49	38.97	57	34.26	21	41.67	94
Central	M	Viseu	122.53	28	8.06	79	71.46	13	15.85	75	27.16	201
Central	S	Vouzela	121.62	29	8.64	58	50.74	32	0.84	175	61.39	34
Alentejo	M	Azambuja	118.55	30	6.91	109	46.76	37	35.78	16	29.10	185
Central	M	Aveiro	117.65	31	5.02	193	74.93	12	40.99	9	−3.29	293

Table A3. CSI sustainability results (Top 10% worst performers).

Non-Sustainable Councils—Worst 10% Performers												
Regions	**Size**	**Councils**	**Global Ranking**	**Council Position**	**Governance Ranking**	**Council Position**	**Government Effectiveness Ranking**	**Council Position**	**Economic and Social Development Ranking**	**Council Position**	**Financial Sustainability Ranking**	**Council Position**
Algarve	S	Vila Real de Santo António	−898.68	308	6.36	138	45.41	41	4.00	155	−954.45	308
North	S	Alijó	−289.57	307	4.05	227	−42.28	297	−6.76	238	−244.59	307
Alentejo	S	Mourão	−131.47	306	5.10	190	−61.12	304	−39.06	305	−36.40	298
Central	S	Góis	−103.42	305	6.66	125	−147.61	308	−2.94	215	40.47	104
North	S	Freixo de Espada à Cinta	−76.70	304	5.78	160	−5.16	264	−20.70	290	−56.62	301
North	S	Santa Marta de Penaguião	−76.38	303	10.02	27	−100.17	305	−27.52	299	41.29	95
Central	S	Ferreira do Zêzere	−75.78	302	8.68	57	−134.41	307	11.11	106	38.84	116
Madeira	M	Santa Cruz	−66.80	301	6.79	118	29.69	92	−0.09	188	−103.18	306
North	M	Chaves	−44.63	300	5.43	172	33.48	79	−2.58	213	−80.97	304
Central	S	Celorico da Beira	−43.30	299	3.81	240	−112.24	306	−1.86	204	66.99	22
North	S	Alfândega da Fé	−40.46	298	15.41	1	11.03	203	−26.55	295	−40.35	299
Alentejo	S	Gavião	−27.92	297	4.88	197	−59.80	302	−15.42	278	42.42	92
Azores	S	Nordeste	−27.29	296	9.47	38	6.06	226	−7.99	243	−34.84	296
Central	S	Idanha-a-Nova	−26.72	295	4.55	210	−36.58	294	−17.30	283	22.62	234
Lisbon	L	Seixal	−24.90	294	1.15	297	17.49	169	13.17	90	−56.71	302
Central	S	Cadaval	−24.87	293	1.58	290	−51.80	301	9.07	119	16.28	265
Madeira	S	Santana	−19.69	292	3.82	238	−60.78	303	−14.01	271	51.28	55
North	S	Vinhais	−19.02	291	8.69	55	−33.34	292	−24.16	294	29.79	179
Madeira	S	Ponta do Sol	−16.50	290	0.68	300	−40.37	296	−13.30	268	36.48	132
Central	S	Pedrógão Grande	−13.57	289	4.83	203	−47.10	299	−6.64	234	35.33	141
Algarve	S	Alcoutim	−13.13	288	8.54	65	−16.07	280	−6.79	239	1.18	292
North	M	Vizela	−12.61	287	11.07	16	39.92	53	10.60	110	−74.19	303
Central	S	Santa Comba Dão	−12.31	286	4.34	218	17.77	167	1.83	167	−36.25	297
North	S	Terras de Bouro	−10.51	285	3.99	230	−17.47	281	−28.48	300	31.45	170
North	S	Baião	−6.88	284	11.48	13	−3.86	261	−40.57	306	26.07	214
North	S	Cinfães	−5.73	283	5.52	170	6.69	222	−44.10	307	26.16	213
Central	S	Vila Nova de Poiares	−3.35	282	9.76	31	−14.32	279	7.02	128	−5.80	294
Algarve	M	Faro	−3.01	281	1.79	285	57.72	24	35.74	17	−98.26	305
Alentejo	S	Alandroal	−2.66	280	9.71	34	−11.48	275	−17.94	284	17.05	263
Central	S	Mação	1.51	279	9.22	42	−32.86	291	0.72	176	24.44	221
Alentejo	S	Viana do Alentejo	5.07	278	7.56	87	−25.33	285	1.98	165	20.86	246

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