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Fiscal transfers for biodiversity conservation: the Portuguese Local Finances Law

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Abstract

Biodiversity loss is a serious global environmental problem. Economic instruments in biodiversity policies can contribute towards reconciling the conservation costs encountered at local level with the benefits of biodiversity conservation at higher levels of governance, from regional and national levels up to the global level. This paper outlines the theoretical foundations of fiscal transfers in conservation policies and also offers a concise account of existing international experience and future prospects. The recently amended Portuguese Local Finances Law (LFL) of 2007, with its groundbreaking new article on the promotion of local sustainability, is analysed in terms of the significance of fiscal transfers for municipal budgets. It is compared with its predecessor law, highlighting changes in fiscal revenues for selected municipalities in the country in relation to their designated protected areas. The analysis shows that these ecological fiscal transfers can be significant for those

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municipalities with a large proportion of land under protected status. However, because it also introduces a considerable number of changes to the Portuguese fiscal transfer scheme, the ecological impact of the new LFL is difficult to assess due to the presence of several crossover effects. The results obtained offer significant insights both for improving the Portuguese LFL and for designing new ecological fiscal transfer schemes.

Keywords

Biodiversity conservation; Protected areas; Natura 2000; Intergovernmental fiscal transfers; Local Finances Law; Portugal

1 Introduction

Biodiversity loss associated with global environmental change is a serious phenomenon which has been addressed extensively over the past ten years. The Millennium Ecosystem Assessment (MA, 2005a) established a new framework in which the concept of ecosystem services is used to analyse and understand the effects of environmental change on ecosystems and human well-being. Building on the MA and other recent studies, the international TEEB initiative[1] extended its focus to address specifically the economics and policies related to conserving biodiversity and maintaining ecosystem services (TEEB, 2010, TEEB, 2011). The economic values of biodiversity, ecosystems and their services need to find their way into societal decision making if they are to help reduce and halt the loss of biodiversity. Since "global environmental change is best understood as processes that are manifest in localities, but with causes and consequences at multiple spatial, temporal and socio-political scales" (Adger et al., 2005), reconciling the global and local dimensions of biodiversity assessments (including related conservation costs and benefits) presents an opportunity for progress in integrating biodiversity conservation and human well-being (Faith, 2005). Where appropriate, the use of economic instruments in biodiversity policies are a powerful means of reconciling the conservation costs encountered at local level with the benefits of biodiversity conservation at higher levels of governance, from regional and national levels up to the global level (Perrings and Gadgil, 2003; TEEB, 2011; Ring et al., 2010).

Where economic instruments have been used in conservation policies, they have thus far focused largely on land users and thus on private local actors and their conservation costs. Conservation subsidies, agri-environmental programmes and, more recently, payments for environmental services have been

[1] TEEB - The Economics of Ecosystems and Biodiversity

implemented and studied in many countries, although much remains to be done (e.g., OECD, 1999; Wunder et al., 2008; TEEB, 2011). Yet municipal and district governments – the local public actors – also run into management and opportunity costs as a result of conservation policies. These costs are usually incurred in relation to protected areas, one of the essential regulatory instruments of biodiversity conservation (MA, 2005b; TEEB, 2011). In particular, the existence of large protected areas and those associated with significant land-use restrictions (such as national parks or Natura 2000 sites as defined by the EU Habitats Directive) may lead to a loss of development opportunities and therefore to a reduction in municipal budgets through forgone local taxes. Thus opposition to establishing new protected areas is encountered worldwide, as local communities often perceive them to be an obstacle to development (e.g. Stoll-Kleemann, 2001). Local communities comprise both private and public local actors, each requiring appropriate instruments to address the specific conservation costs incurred by them. With regard to local governments, intergovernmental fiscal transfers have been identified as a suitable instrument to internalise the spillover benefits (positive spatial externalities) associated with biodiversity conservation (SRU, 1996; Ring, 2002; Köllner et al., 2002; Ring, 2008a).

In this paper, we present the theoretical foundations of fiscal transfers in the context of conservation policies, followed by a concise account of existing international experience and future prospects. As the first Member State to recognise protected areas as an indicator for the redistribution of public revenues through fiscal transfers from national to local governmental level, Portugal is a pioneer within the European Union. We describe the recently amended Portuguese Local Finances Law (LFL) of 2007, focusing in particular on its groundbreaking new article promoting local sustainability. We then analyse this new Local Finances Law and compare it with its predecessor, highlighting changes in fiscal revenues for selected municipalities in the country in relation to their designated protected areas.

2 Intergovernmental fiscal transfers for biodiversity conservation

2.1 Theoretical background

Fiscal transfer schemes redistribute public revenues from national and regional governments to local governments. They serve several purposes. Intergovernmental fiscal transfers provide decentralised governments with the financial resources needed to discharge their local public functions while also helping to reduce fiscal imbalances across decentralised governments (Boadway and Shah, 2007). They also compensate local governments for expenses they

incur when providing spillover benefits to areas beyond their boundaries, for example for schools, theatres and hospitals. Fiscal transfer schemes have evolved over many years. They can be highly sophisticated and are generally the result of a (continuous) bargaining process among public actors at different levels of government over adequate financial resources. Usually, social and economic indicators are used to redistribute public revenues to lower levels of government, reflecting the acknowledged relevance of social and economic public functions. The number of inhabitants represents the most widely used indicator. Some countries also use GDP-related figures or the area of a jurisdiction as factors that influence the average provisioning costs of public goods and services.

By contrast, there is still some way to go before ecological public functions and indicators are recognised more widely within fiscal transfer systems – despite the fact that such components are a key prerequisite for sustainable development in a multi-level governance context (Ring, 2002). Although ecological public functions related to infrastructure and end-of-pipe issues may be considered[2], biodiversity conservation in particular tends to be widely neglected. Municipal budgets generally tend to lose out in relation to conservation activities and associated land-use restrictions, whereas they tend to grow with development activities which generate local land, business and income taxes. For this reason, municipalities are more interested in attracting new businesses or inhabitants rather than preserving nature and its services. Whereas the designation of protected areas is usually decided upon at higher levels of government, it is the local level which bears the costs of losing these areas for other income-generating or social developments (Perrings and Gadgil, 2003; Ring, 2008a). Whenever such a mismatch occurs between the costs and benefits of providing public goods, local actors have no incentive to engage in these activities. In terms of biodiversity conservation, paper parks and land degradation may be a consequence of this imbalance between local costs and spillover conservation benefits (Ring et al., 2010).

Intergovernmental fiscal transfers can be an effective instrument in supporting the local provision of ecological goods and services with spillover benefits if ecological indicators are used for redistributing finances from central to local levels (Ring, 2002; Köllner et al., 2002; May et al., 2002; Ring, 2008a, b). They can compensate for local expenditure on conservation activities and the opportunity costs resulting from land-use restrictions. Furthermore, intergovernmental fiscal transfer schemes are a core feature of social policies

[2] For example, most fiscal transfer schemes at state (or *Länder*) level in Germany mention the provision of drinking water, or sewage and waste disposal (Ring, 2002, 2008b).

and can be used to equalise public revenues across rich and poor jurisdictions. In this way, conservation policies can be combined with poverty alleviation objectives (OECD, 2005), an important characteristic for designing policies in developing countries.

2.2 International experience and future prospects

To date, only Brazil (Ecological ICMS at state level) and, more recently, Portugal (Local Finances Law of 2007) have implemented ecological fiscal transfers to compensate municipalities for the costs related to protected areas (Grieg-Gran, 2000; May et al., 2002; Loureiro, 2008; Ring, 2008a). Both countries use the size of protected areas (sometimes coupled with their quality) as an easily available biodiversity indicator for the distribution of intergovernmental fiscal transfers to local governments. In this section, we offer a brief account of the Brazilian experience and of developments in other countries. After this, we present the Portuguese case in greater detail.

The Brazilian ICMS tax[3] is similar to the value-added tax in other countries (Grieg-Gran, 2000; May et al., 2002) and constitutes an important source of public revenue at state level. As of 2010, 14 out of 26 states have introduced ecological indicators to redistribute part of this tax from the state level back to local governments (TNC, 2010). Due to the system of fiscal federalism in Brazil, different indicators are used by the various states, but all have one ecological indicator in common, based on conservation units. Conservation units represent designated protected areas for biodiversity conservation or restricted sustainable use areas, weighted by the degree of land-use restriction associated with the relevant conservation area category. Originally, the ecological ICMS was introduced as a means to compensate local governments for land-use restrictions imposed in relation to protected areas, but over the years it has also become an incentive to designate new protected areas (May et al., 2002).

The states of Paraná and Minas Gerais, which introduced the ecological ICMS in 1992 and 1996 respectively, have the longest standing experience with this instrument. By the year 2000, public and private protected areas in Paraná had increased by a total of 1,052,752 hectares (ha), or 165%. In Minas Gerais, a comparable increase of 1,005,214 ha, or 62% of protected areas, was witnessed between the introduction of the ICMS *Ecológico* and the year 2000 (May et al., 2002; Ring, 2008a). Ecological fiscal transfers have proved particularly successful for municipalities with large protected areas, because the indicator used relates the quantity of protected areas within municipal boundaries to the total area of the municipality. In this way, a municipality with 100% land-use

[3] ICMS - *Imposto sobre Circulação de Mercadorias e Serviços*

restrictions due to protected areas within its territory benefits more than one which has land-use restrictions on only 20% of its territory. In addition to the quantity of protected areas, a few states also include the quality of protected areas in the calculation of ecological fiscal transfers to the municipalities. However, Paraná is the only state to have successfully implemented a quality indicator early on, promoting the monitoring and active management of existing protected areas. As a result, there has been not only a quantitative but also a qualitative increase in relation to the protected areas (Loureiro, 2002, 2008).

In other countries, conservation-based indicators have been recommended by environmental expert commissions (e.g. in Germany: SRU, 1996) or proposed as an option in the scholarly literature, in some cases accompanied by modelled results of the potential fiscal consequences for local governments (for Switzerland: Köllner et al., 2002; for Germany: Ring, 2002; Perner and Thöne, 2005; Ring 2008b; for India: Kumar and Managi, 2009; for Indonesia: Irawan and Tacconi, 2009; Ring et al., 2010; Mumbunan et al., 2010). In Norway, the first official documents have appeared in which consideration is given to exploring fiscal instruments for biodiversity conservation (Norwegian Department of Finance, 2009).

In the near future, ecological fiscal transfers may also play a role in the implementation of international programmes on a nationwide scale, linking climate mitigation with biodiversity conservation policies (Ring et al., 2010). In Indonesia, for example, many local governments perceive forest exploitation and land-use change to be among the easiest ways to generate local public revenues (Barr et al., 2006), because local budgets benefit from logging activities within municipal boundaries. Forest conservation, by contrast, does not add to the budget. Therefore, REDD+ initiatives (Reducing Emissions from Deforestation and forest Degradation) will need to take into account fiscal transfer schemes to the local level as one important means of channelling international payments for biodiversity conservation and climate mitigation from the national down to lower levels of government, thereby contributing to the successful national implementation of international REDD+ schemes (Irawan and Tacconi, 2009; Ring et al., 2010).

2.3 Fiscal transfers as part of a wider policy mix

Ecological fiscal transfers have existed for almost twenty years in Brazil, developing into an incentive for municipalities to engage in the management of existing protected areas and to designate or support new ones (May et al., 2002; Loureiro, 2008; Ring, 2008a). This exemplifies the fact that protected area regulations on their own are not enough. Instead, a combination of regulation and economic instruments capable of offsetting the costs associated with protected areas is required; such a linkage creates synergies and enables the

spillover benefits generated to be internalised, at least to some extent. The increased supply of biodiversity conservation in the relevant Brazilian states through more and better managed protected areas could only feasibly be achieved at higher social cost by means of protected area regulations alone (Ring et al. 2010). Ecological fiscal transfers have the potential to turn the oft-encountered local opposition towards these areas into active support.

When it comes to considering a comprehensive policy mix for biodiversity conservation, there is a need to acknowledge the additional costs generated by biodiversity conservation for both public and private local actors. Brazil has so far focused its attention on local governments. The situation in Europe is just the opposite. Here, a number of state-led, public-private and private programmes exist to compensate landowners and businesses – predominantly private actors – for the extra costs they incur when providing ecological goods and services (Ring, 2008a). However, when the Natura 2000 network was established in the context of the European Union's Habitats Directive, substantial local opposition also came from local governments, not just from landowners. With the recent amendment of its Local Finances Law, Portugal has become the first European Member State to recognise Natura 2000 sites and other nationally protected areas as indicators for the redistribution of public revenues from central to local governments. This represents an innovative step forward in the European biodiversity policy landscape, one which will hopefully be followed by other countries.

3 Portuguese Local Finances Law

3.1 General description

In January 2007 a new scheme of fiscal transfers for biodiversity conservation was introduced in Portugal with the approval of a revised Local Finances Law (LFL – Law 2/2007, 15th January). The Local Finances Law establishes the general principles and rules for the transfer of funds from the state (national government) to the local level (municipalities) in Portugal. These intergovernmental fiscal transfers account for an average of around 60% of the budgets of Portuguese municipalities (the remainder is made up of local taxes on property and vehicles, tariffs and other sources of municipal revenue). In some municipalities with a low population density and a low level of economic activity, these flows may represent up to 97% of total revenue.

This law specifies three different funds through which the transfers from national to local level are disbursed:

- The Financial Equilibrium Fund (FEF – *Fundo de Equilíbrio Financeiro*), which is made up of 25.3% of the average revenue collected from personal income tax (IRS), corporate profits tax (IRC) and value-added tax (IVA);
- The Municipal Social Fund (FSM – *Fundo Social Municipal*), consisting of the expenditure associated with competencies devolved from central to local administration in connection with social public functions, specifically education, health and social welfare;
- A variable amount corresponding to up to 5% of the IRS (personal income tax) collected from individuals living in the municipality.

3.2 Nature conservation in LFL

A newly introduced Article 6 of LFL, dedicated to the promotion of local sustainability, establishes that 'the financial regime of municipalities shall contribute to the promotion of economic development, environmental protection and social welfare'. This general objective is supported by several mechanisms, including positive discrimination for those municipalities with land designated as Natura 2000 network or other national protected areas. In this way, conservation areas affect the allocation of funds from the General Municipal Fund (FGM – Fundo Geral Municipal) and this mechanism effectively constitutes an ecological fiscal transfer.

The FGM, in which positive ecological discrimination is introduced, is equal to 50% of the Financial Equilibrium Fund (FEF); the remaining 50% of the FEF is allocated to the Municipal Cohesion Fund (FCM), whose aim is to balance out levels of development and opportunities among municipalities. FGM moneys are allocated to municipalities according to the following criteria:

- 5% is distributed equally to all municipalities;
- 65% is allocated as a function of population (weighted in order to benefit mainly municipalities with a lower population density[4]) and of the average number of stays in hotels and on campsites;
- 25% is allocated in proportion to the area, weighted by elevation levels, and 5% in proportion to land designated as Natura 2000 or other protected areas (see Table 1 for a list of areas included in the Portuguese system of

[4] Marginal weighting factors for population are defined as follows:
- first 5,000 inhabitants: 3
- from 5,001 to 10,000 inhabitants: 1
- from 10,101 to 20,000 inhabitants: 0.25
- from 20,101 to 40,000 inhabitants: 0.5
- from 40,101 to 80,000 inhabitants: 0.75
- more than 80,000 inhabitants: 1

Population from the Autonomous Regions of Azores and Madeira is weighted by a factor of 1.3.

designated conservation areas) in municipalities with less than 70% of their territory under Natura 2000 or protected areas regimes; or

- 20% is allocated in proportion to the area, weighted by elevation levels, and 10% in proportion to land designated as Natura 2000 or other protected areas in municipalities with more than 70% of their territory under Natura 2000 or protected areas regimes.

Table 1 – Portuguese System of Designated Conservation Areas

Natura 2000 Network	Special Area of Conservation (SAC), Habitats Directive Special Protection Area (SPA), Birds Directive
National Protected Areas Network	National Park Nature Park Nature Reserve Protected Landscape Area Nature Monument

The total area under protection and the percentage of municipal land taken up by protected areas are the only conservation criteria involved in the ecological fiscal transfer component of this law. The quality of protected areas is not taken into account.

Non-earmarking is the general principle adopted for intergovernmental fiscal transfers to the local level. This means that all transfers are received as lump-sum transfers, with municipalities free to decide upon their use. Exemptions to this principle are provided for only in the case of transfers from EU funds and from the Municipal Social Fund (FSM), which are earmarked.

3.3 Changes introduced through the new LFL

This new law introduced a series of significant changes to the previous Local Finances Law (Law 42/98, modified by Law 94/2001). Under the former regime, municipalities received 30.5% of the average revenue collected from income, profit and sales taxes (IRS, IRC and IVA): 4.5% constituted the Municipal Base Fund (FBM), which was shared equally among all the municipalities; 20.5% constituted the General Municipal Fund (FGM), and 5.5% the Municipal Cohesion Fund (FCM). FGM was broken down into three territorial units, namely, mainland Portugal, the Azores Autonomous Region, and the Madeira Autonomous Region. Allocation of the FGM was based on the following criteria:

- 50% based on population, with the population of the Autonomous Regions weighted by a factor of 1.3;

- 30% based on the number of municipalities;
- 20% based on land area.

Within each of the three territorial units, the allocation of FGM among municipalities was conducted according to the following criteria:

- 40% as a function of population and of the average number of stays in hotels and on campsites;
- 5% in proportion to the population aged under 15;
- 30% in proportion to land area, weighted by elevation levels;
- 15% according to the number of parishes;
- 10% as a function of the IRS (personal income tax) collected from individuals living in the municipality.

The most significant changes contained in the revised law compared to the former regime are as follows: The rules for allocating the Municipal Cohesion Fund have been altered, leading to a system of horizontal fiscal equalisation between municipalities. With the new law, some well-off municipalities may be net contributors to this fund while others are beneficiaries; the previous law provided only for vertical transfers for municipalities with fiscal capacities below the national average. In addition, the marginal weighting of population in the allocation of FGM is a novel element of the new law, aimed at benefiting less densely populated municipalities. From the point of view of biodiversity conservation, however, the most significant change is the implementation of the ecological fiscal transfer scheme in the context of the FGM. This scheme provides for the compensation of municipalities whose economic development options have been limited by the land-use constraints imposed as a result of the designation of protected areas or Natura 2000 sites. It thus provides a financial incentive to local authorities, creating a mind-set more favourably disposed towards biodiversity conservation. In the following section we present an analysis of the implications of the new scheme for a selected sample of municipalities in Portugal, highlighting the fiscal impacts of the introduction of the ecological fiscal transfer scheme.

4 Results and discussion

4.1 Scope

Portugal is divided into 18 districts and two autonomous regions, the Azores and Madeira archipelagos. The districts and autonomous regions are subdivided into 308 municipalities (278 on the mainland and 30 on the Azores and Madeira). In this study a representative sample of 26 municipalities is used to assess the effects of the ecological fiscal transfer scheme. This sample includes:

- A balanced number of municipalities with both more and less than 70% of their total area covered by conservation status (national protected areas and Natura 2000), in order to assess the impact of the scheme on the two groups of municipalities differentiated in the law for purposes of allocating the FGM;
- Municipalities with a mix of conservation areas, namely, those with only Natura 2000 areas, those with only national protected areas (PA), and those with the two types of area, as well as those with no conservation areas;
- A balanced proportion of coastal and inland municipalities (Figure 1 shows the spatial distribution of the municipalities included in the sample);
- A wide range of municipalities in terms of land area and population, the latter reflecting the ranges introduced by the new LFL for the allocation of the FGM.

Figure 1 - Geographical distribution of the selected sample

Table 2 summarises the main characteristics of the municipalities included in the sample for the year 2008. In some of the municipalities a very high proportion of land area is subject to ecological constraints, such as Barrancos or Campo Maior, 99.9% of whose territory is under conservation status.

Table 2 – Selected sample of municipalities

	District	Municipality	Coastal / inland	% of CA (1) (2)	Population (inhab.) (3)	Area (km^2) (1)	Pop. density (inhab./km^2)
Municipalities with ***more*** **than 70%** conservation area (CA)	**FARO**	VILA BISPO	C	97%	5,423	179	30
	MADEIRA	P. MONIZ	C	85%	2,706	83	33
	AVEIRO	MURTOSA	C	81%	9,804	73	134
	LEIRIA	PORTO MÓS	C	76%	25,022	262	96
	MADEIRA	RIB. BRAVA	C	77%	5,349	324	17
	FARO	ALJEZUR	C	73%	12,565	65	193
	BEJA	BARRANCOS	I	100%	1,767	168	11
	PORTALEGRE	C. MAIOR	I	100%	8,342	247	34
	BRAGA	T. BOURO	I	95%	7,765	277	28
	BRAGANÇA	FREIXO CINTA	I	91%	3,931	244	16
	BEJA	CAST. VERDE	I	76%	7,772	569	14
Municipalities with ***less*** **than 70%** conservation area (CA)	**LISBOA**	LISBOA	C	0%	509,751	85	5,997
	AÇORES	LAGOA	C	2%	15,139	46	329
	SETÚBAL	GRÂNDOLA	C	9%	14,214	808	18
	LISBOA	SINTRA	C	36%	428,470	319	1,343
	V. CASTELO	V. CASTELO	C	24%	73,559	197	373
	PORTO	AMARANTE	C	26%	91,238	319	286
	SETÚBAL	SESIMBRA	C	34%	61,471	301	204
	AVEIRO	AVEIRO	C	49%	48,110	195	247
	SANTARÉM	ALMEIRIM	I	0%	22,766	222	103
	GUARDA	AGUIAR BEIRA	I	0%	6,262	207	30
	VILA REAL	PESO RÉGUA	I	12%	17,492	95	184
	VISEU	LAMEGO	I	33%	26,484	165	161
	ÉVORA	ÉVORA	I	16%	55,420	482	10
	C. BRANCO	COVILHÃ	I	12%	52,946	1,307	42
	BRAGANÇA	VIMIOSO	I	38%	4,975	556	95

(1) Data from ICNB – *Instituto da Conservação da Natureza e da Biodiversidade*, all figures for 2008
(2) Ratio of total designated conservation areas (CA=national protected areas + Natura 2000) to total municipal area
(3) Data from DGAL – *Direcção Geral das Autarquias Locais*, all figures for 2008

4.2 The role of fiscal transfers

Direct fiscal transfers from central government are an important source of revenue for the Portuguese municipalities (see Figure 2). Other municipal revenues come from different sources, such as direct taxes (e.g. property taxes - *Imposto Municipal sobre Imóveis* (IMI)) or indirect taxes/tariffs (e.g. water and sanitation), but overall, fiscal transfers accounted for 60% of total municipal revenue in Portugal in 2008, and this figure had not changed much over the preceding years. Between 2004 and 2008 the average level of fiscal transfers as a proportion of total municipal revenue has always been more than 52%, revealing that the municipalities depend to a significant extent on national funding. The introduction of the new LFL in 2007 did not significantly change the total value of fiscal transfers, despite the changed criteria introduced to calculate them. However, the allocation of the total transfers to the different funds did change, and this is revealed in the variation in the share of FGM and FCM (Figure 2, on the right).

The level of fiscal transfers as a proportion of municipal revenue differs significantly between the municipalities in the selected sample (Table 3). In 2008, for example, it varied from 25% in Lisbon to 97% in Barrancos. In 7 of the 26 municipalities, fiscal transfers represent over 90% of total municipal revenue.

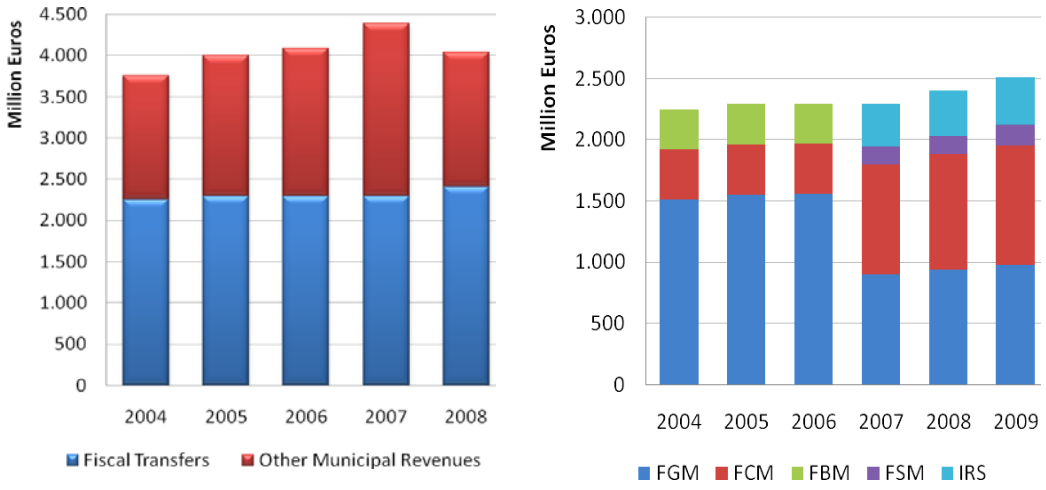

Figure 2 - The level of fiscal transfers as a proportion of total municipal revenues in Portugal (left), and the amounts of fiscal transfers allocated to each fund (right).

The average percentage of direct fiscal transfers as a proportion of total municipal revenue is 45% for the selected sample. The figures did not vary much in each individual municipality during the period 2004 to 2008.

Any significant changes in the LFL allocation criteria are a very important matter in terms of funding and, consequently, the development strategy of municipalities with a high dependency on fiscal transfers. Amendments to the LFL undertaken in 2007 relate to various funds and allocation criteria. For this reason, there are several crossover effects that have significant implications for the final allocation of funding to each municipality. In addition to providing an analysis of the overall financial and incentive impact of the new law, we have analysed its effects in terms of its ecological component by considering two different simulations: 1) the new law as it stands compared with the estimated fiscal transfers for 2008 applying the old LFL criteria (considering two variants) and 2) the new law as it stands vis-à-vis the new law without the ecological component. These aspects were analysed on the basis of data from 2008.

4.3 Comparison of the new LFL and the previous law

To assess the effects of implementing the new LFL in the selected municipalities, the real values of the 2008 fiscal transfers were compared to the estimated fiscal transfers for the same year applying the old LFL criteria (including the criteria for calculating the total value for 2008) and the criteria for allocation among the municipalities (Table 4). This analysis makes it possible to identify which municipalities win and which ones lose out as a result of the changes in the law.

Table 3 - Direct fiscal transfers as a proportion of total municipal revenue

	Municipa-lities	2004		2005		2006		2007		2008	
		Fiscal transfers (euros)	Share of LFL (%)	Fiscal transfers (euros)	Share of LFL (%)	Fiscal transfers (euros)	Share of LFL (%)	Fiscal transfers (euros)	Share of LFL (%)	Fiscal transfers (euros)	Share of LFL (%)
Municipalities with ***more*** **than 70%** CA	VILA BISPO	3,675,306	**54%**	3,767,189	**54%**	3,767,189	**50%**	3,767,189	**40%**	3,767,189	**55%**
	POR. MONIZ	3,447,671	**98%**	3,533,863	**95%**	3,533,863	**97%**	3,533,863	**97%**	3,710,556	**96%**
	MURTOSA	3,431,638	**79%**	3,517,429	**75%**	3,517,429	**75%**	3,517,429	**71%**	3,693,300	**78%**
	PORTO MÓS	6,248,270	**78%**	6,373,235	**76%**	6,373,235	**71%**	6,521,068	**71%**	6,847,121	**75%**
	RIB. BRAVA	4,307,983	**85%**	4,394,143	**83%**	4,394,143	**80%**	4,496,069	**84%**	4,720,872	**84%**
	ALJEZUR	5,040,704	**76%**	5,166,722	**75%**	5,166,722	**69%**	5,166,722	**62%**	5,166,722	**70%**
	BARRANCOS	2,976,760	**99%**	3,051,179	**98%**	3,051,179	**98%**	3,051,179	**96%**	3,203,738	**97%**
	C. MAIOR	4,090,883	**90%**	4,193,155	**87%**	4,193,155	**88%**	4,479,604	**83%**	4,402,813	**89%**
	T. BOURO	5,255,404	**94%**	5,386,789	**94%**	5,386,789	**91%**	5,386,789	**92%**	5,656,128	**94%**
	FREIXO E. C.	4,463,391	**98%**	4,574,976	**97%**	4,574,976	**93%**	4,574,976	**95%**	4,803,725	**93%**
	CAS. VERDE	5,274,999	**92%**	5,406,874	**92%**	5,406,874	**88%**	5,406,874	**88%**	5,677,218	**90%**
Municipalities with ***less*** **than 70%** CA	LISBOA	61,506,463	**27%**	62,736,592	**22%**	62,736,592	**24%**	59,599,762	**20%**	62,579,750	**25%**
	LAGOA	4,391,769	**79%**	4,479,604	**80%**	4,479,604	**75%**	4,193,155	**67%**	4,703,584	**79%**
	GRÂNDOLA	6,447,010	**67%**	6,575,950	**67%**	6,575,950	**69%**	6,411,551	**60%**	6,732,129	**71%**
	SINTRA	32,426,676	**38%**	33,075,210	**34%**	33,075,210	**33%**	33,399,148	**31%**	35,069,105	**43%**
	V. CASTELO	13,856,636	**61%**	14,133,769	**59%**	14,133,769	**55%**	14,461,616	**50%**	15,184,697	**60%**
	AMARANTE	13,117,655	**80%**	13,380,008	**76%**	13,380,008	**76%**	13,690,371	**73%**	14,374,890	**78%**
	SESIMBRA	4,838,905	**30%**	4,935,683	**30%**	4,935,683	**27%**	4,935,683	**24%**	5,128,655	**30%**
	AVEIRO	8,801,647	**41%**	8,977,680	**38%**	8,977,680	**38%**	8,753,238	**34%**	9,190,900	**41%**
	ALMEIRIM	5,091,721	**72%**	5,193,555	**69%**	5,193,555	**61%**	5,314,025	**59%**	5,579,726	**62%**
	AGUIAR BEIRA	4,809,008	**95%**	4,929,233	**94%**	4,929,233	**94%**	4,929,233	**93%**	5,175,695	**94%**
	PESO RÉGUA	5,652,208	**85%**	5,765,252	**82%**	5,765,252	**83%**	5,885,516	**77%**	6,179,792	**87%**
	LAMEGO	7,590,576	**77%**	7,742,388	**78%**	7,742,388	**76%**	7,742,388	**72%**	8,129,507	**80%**
	ÉVORA	13,214,599	**64%**	13,478,891	**61%**	13,478,891	**59%**	13,141,919	**54%**	13,799,015	**62%**
	COVILHÃ	11,481,655	**62%**	11,711,288	**62%**	11,711,288	**59%**	11,982,943	**56%**	12,582,090	**64%**
	VIMIOSO	5,648,335	**98%**	5,789,543	**98%**	5,789,543	**98%**	5,789,543	**97%**	6,079,020	**96%**
Total fiscal transfers to all Portuguese municipalities (million euros)		2,251	60%	2,298	57%	2,298	56%	2,298	52%	2,407	60%

Total fiscal transfers in 2008 calculated according to the new LFL amounted to 2,406,532,953 euros. When the criteria from the old LFL are applied, the estimated total amount for 2008 is 2,538,311,667 euros. So total fiscal transfers would be 5.5% higher if the old law was still applied, showing that the changes introduced by the new LFL reduced the total amount transferred from the national to the local level. The value for the new LFL includes the Social Municipal Fund (FSM), which was created to compensate municipalities for new roles and responsibilities transferred from central government by the new law. If FSM is excluded then the difference compared with the old law is even larger.

All the municipalities included in the sample lose out as a result of the changes in the law. However, this difference is more significant for some municipalities than for others. For example, under the new LFL, Vila do Bispo and Aljezur lose 13.1%, while Peso da Régua loses only 3.0%. One unexpected outcome is that municipalities belonging to the group with more than 70% of land with conservation status lose more with the new law on average (7.9%)

than municipalities belonging to the other group (5.6%). It should be noted, however, that both groups of sampled municipalities experience a greater reduction in fiscal transfers in percentage terms than the total national average (5.5%).

In order to eliminate the effect associated with the differences in the amount of total fiscal transfers (resulting from the different criteria assumed in the old and new laws to calculate these figures), an alternative scenario was developed which assumed an equal total amount in the application of both laws (the real value for 2008 resulting from the new law) (Table 5). This approach makes it possible to separate the effects resulting from differences in the allocation criteria for the funds.

A comparison of this new scenario for the old law with the new LFL (Table 5) shows that only 62% of municipalities lose out under the new law (16 out of 26), whereas in the previous case they were all losers (Table 4). The losses are also less significant (5.9% at most in the case of Vila do Bispo and Aljezur). Ten municipalities win with the new LFL funds allocation criteria, eight of them belonging to the group with less than 70% conservation status area.

This result indicates that the introduction of the ecological component was not sufficient to counterbalance other effects and provide a greater incentive to those municipalities with a larger proportion of protected areas. Future research is needed to understand in depth the influence of the different crossover effects resulting from the various changes in the allocation criteria.

4.4 Comparison of 2008 FGM with and without the ecological component

In this section, we analyse in more detail the ecological component introduced with the new LFL. As previously described, the ecological criterion is one of the criteria listed for the allocation of the General Municipal Fund (FGM). As described above, the FGM is allocated to municipalities mainly according to population, area (weighted by elevation levels) and land area designated as Natura 2000 or other national protected areas.

Table 4 - Comparison of 2008 transfers based in the new and previous LFL criteria

	Districts	Municipalities	Real transfers, new LFL 2008 TOTAL real 2008 (euros) (1)	Estimated transfers if the old LFL was applied in 2008 TOTAL estimated (euros) (2)	Differences (euros) (1-2)	Difference (%)	Win/Lose
Municipalities with ***more*** **than 70%** conservation area	FARO	VILA DO BISPO	**3,767,189**	**4,260,887**	**-493,698**	-13.1%	**Loser**
	MADEIRA	PORTO MONIZ	**3,710,556**	**3,996,983**	**-286,427**	-7.7%	**Loser**
	AVEIRO	MURTOSA	**3,693,300**	**3,978,395**	**-285,095**	-7.7%	**Loser**
	LEIRIA	PORTO DE MÓS	**6,847,121**	**7,067,271**	**-220,150**	-3.2%	**Loser**
	MADEIRA	RIBEIRA BRAVA	**4,720,872**	**4,892,259**	**-171,387**	-3.6%	**Loser**
	FARO	ALJEZUR	**5,166,722**	**5,843,832**	**-677,110**	-13.1%	**Loser**
	BEJA	BARRANCOS	**3,203,738**	**3,451,042**	**-247,304**	-7.7%	**Loser**
	PORTALEGRE	CAMPO MAIOR	**4,402,813**	**4,742,677**	**-339,864**	-7.7%	**Loser**
	BRAGA	TERRAS DE BOURO	**5,656,128**	**6,092,739**	**-436,611**	-7.7%	**Loser**
	BRAGANÇA	FREIXO DE ESPADA À CINTA	**4,803,725**	**5,174,536**	**-370,811**	-7.7%	**Loser**
	BEJA	CASTRO VERDE	**5,677,218**	**6,115,456**	**-438,238**	-7.7%	**Loser**
Municipalities with ***less*** **than 70%** conservation area	LISBOA	LISBOA	**62,579,750**	**67,984,255**	**-5,404,505**	-8.6%	**Loser**
	AÇORES	LAGOA	**4,703,584**	**4,987,408**	**-283,824**	-6.0%	**Loser**
	SETÚBAL	GRÂNDOLA	**6,732,129**	**7,262,302**	**-530,173**	-7.9%	**Loser**
	LISBOA	SINTRA	**35,069,105**	**36,461,645**	**-1,392,540**	-4.0%	**Loser**
	VIANA DO CASTELO	VIANA DO CASTELO	**15,184,697**	**15,707,646**	**-522,949**	-3.4%	**Loser**
	PORTO	AMARANTE	**14,374,890**	**14,869,950**	**-495,060**	-3.4%	**Loser**
	SETÚBAL	SESIMBRA	**5,128,655**	**5,485,300**	**-356,645**	-7.0%	**Loser**
	AVEIRO	AVEIRO	**9,190,900**	**9,750,659**	**-559,759**	-6.1%	**Loser**
	SANTARÉM	ALMEIRIM	**5,579,726**	**5,771,888**	**-192,162**	-3.4%	**Loser**
	GUARDA	AGUIAR DA BEIRA	**5,175,695**	**5,575,219**	**-399,524**	-7.7%	**Loser**
	VILA REAL	PESO DA RÉGUA	**6,179,792**	**6,366,989**	**-187,197**	-3.0%	**Loser**
	VISEU	LAMEGO	**8,129,507**	**8,402,514**	**-273,007**	-3.4%	**Loser**
	ÉVORA	ÉVORA	**13,799,015**	**14,940,192**	**-1,141,177**	-8.3%	**Loser**
	CASTELO BRANCO	COVILHÃ	**12,582,090**	**13,015,408**	**-433,318**	-3.4%	**Loser**
	BRAGANÇA	VIMIOSO	**6,079,020**	**6,548,275**	**-469,255**	-7.7%	**Loser**
	Total fiscal transfers to all Portuguese municipalities		**2,406,532,953**	**2,538,311,667**	**-131,778,714**		

Table 5 - Comparison of real 2008 transfers allocation based on the new and previous LFL criteria

	Districts	Municipalities	Real transfers, new LFL 2008 TOTAL real 2008 (euros) (1)	Applying the old LFL using the new LFL national total transfers TOTAL estimated (euros) (2)	Difference (euros) (1-2)	Difference %	Comparison with real transfers, new LFL 2008
Municipalities with ***more*** **than 70%** conservation area	FARO	VILA DO BISPO	**3,767,189**	**3,989,329**	-222,140	-5.9%	**Loser**
	MADEIRA	PORTO MONIZ	**3,710,556**	**3,742,244**	-31,688	-0.9%	**Loser**
	AVEIRO	MURTOSA	**3,693,300**	**3,724,841**	-31,541	-0.9%	**Loser**
	LEIRIA	PORTO DE MÓS	**6,847,121**	**6,650,111**	197,010	2.9%	**Winner**
	MADEIRA	RIBEIRA BRAVA	**4,720,872**	**4,600,837**	120,035	2.5%	**Winner**
	FARO	ALJEZUR	**5,166,722**	**5,471,388**	-304,666	-5.9%	**Loser**
	BEJA	BARRANCOS	**3,203,738**	**3,231,098**	-27,360	-0.9%	**Loser**
	PORTALEGRE	CAMPO MAIOR	**4,402,813**	**4,440,413**	-37,600	-0.9%	**Loser**
	BRAGA	TERRAS BOURO	**5,656,128**	**5,704,432**	-48,304	-0.9%	**Loser**
	BRAGANÇA	FREIXO DE ESPADA À CINTA	**4,803,725**	**4,844,749**	-41,024	-0.9%	**Loser**
	BEJA	CASTRO VERDE	**5,677,218**	**5,725,701**	-48,483	-0.9%	**Loser**
Municipalities with ***less*** **than 70%** conservation area	LISBOA	LISBOA	**62,579,750**	**65,399,196**	-2,819,446	-4.5%	**Loser**
	AÇORES	LAGOA	**4,703,584**	**4,690,318**	13,266	0.3%	**Winner**
	SETÚBAL	GRÂNDOLA	**6,732,129**	**6,885,273**	-153,144	-2.3%	**Loser**
	LISBOA	SINTRA	**35,069,105**	**34,512,116**	556,989	1.6%	**Winner**
	VIANA DO CASTELO	VIANA DO CASTELO	**15,184,697**	**14,747,791**	436,906	2.9%	**Winner**
	PORTO	AMARANTE	**14,374,890**	**13,961,284**	413,606	2.9%	**Winner**
	SETÚBAL	SESIMBRA	**5,128,655**	**5,150,107**	-21,452	-0.4%	**Loser**
	AVEIRO	AVEIRO	**9,190,900**	**9,367,703**	-176,803	-1.9%	**Loser**
	SANTARÉM	ALMEIRIM	**5,579,726**	**5,419,182**	160,544	2.9%	**Winner**
	GUARDA	AGUIAR DA BEIRA	**5,175,695**	**5,219,895**	-44,200	-0.9%	**Loser**
	VILA REAL	PESO DA RÉGUA	**6,179,792**	**6,036,441**	143,351	2.3%	**Winner**
	VISEU	LAMEGO	**8,129,507**	**8,070,983**	58,524	0.7%	**Winner**
	ÉVORA	ÉVORA	**13,799,015**	**14,064,463**	-265,448	-1.9%	**Loser**
	CASTELO BRANCO	COVILHÃ	**12,582,090**	**12,220,069**	362,021	2.9%	**Winner**
	BRAGANÇA	VIMIOSO	**6,079,020**	**6,130,935**	-51,915	-0.9%	**Loser**
	Total fiscal transfers to all Portuguese municipalities		**2,406,532,953**	**2,406,532,953**			

A new scenario was developed to illustrate the situation that arises when the criterion "area" does not include the proportion of the municipality's land that has conservation status. Thus it is assumed that 30% of the FGM is assigned to each municipality according to area (weighted by elevation levels). The remaining 70% of the FGM continues to be allocated without any changes (5% equally and 65% according to the "population"), and the total value of the Fund is also not changed. This simulation isolates the effect achieved by introducing the ecological criterion in Portuguese fiscal transfers.

The results presented in Table 6 show that all municipalities with more than 70% of their territory under Natura 2000 or protected areas regimes would lose out if the new LFL was applied without the ecological criterion. In the group of municipalities with less than 70% of their territory under Natura 2000 or other protected areas regimes, there are 9 winners and 6 losers, but those that lose out have a relative loss lower than that for the other group of municipalities. In the first group the average loss is -15.2%, while in the second group the average loss is only -1.4%.

Figure 3 shows that the spatial distribution of the municipalities in the sample has no significant effect. When the ecological component is removed, losing municipalities are found in both coastal and inland districts.

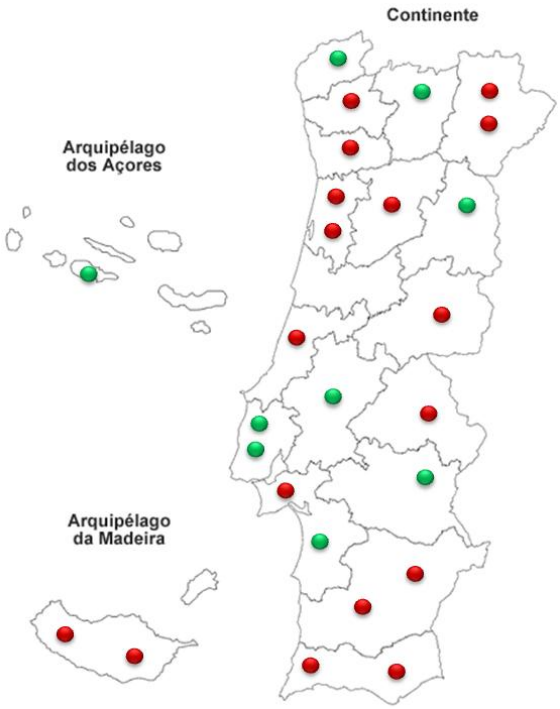

Figure 3 – Spatial distribution of losing (red dots) and winning (green dots) municipalities if the ecological criterion is abandoned for the selected sample of municipalities.

Table 6 – Comparison of FGM-based transfers in 2008 with and without the ecological component

			Real transfers, new LFL 2008			Transfers, new LFL without ecological component 2008				
	Districts	**Municipalities**	**FGM (euros)**	**FEF=FGM+FCM (euros)**	**TOTAL real 2008 (euros)**	**FGM no ecological component (euros)**	**Differences to FGM (euros)**	**Differences to FGM (%)**	**Effect on the Total real (%)**	**Win/Lose**
Municipalities with ***more*** **than 70%** CA	FARO	VILA BISPO	**2,268,729**	3,594,263	3,767,189	**1,574,000**	-694,729	-30.6%	-18.4%	**Loser**
	MADEIRA	PORTO MONIZ	**1,307,800**	3,621,416	3,710,556	**1,056,420**	-251,380	-19.2%	-6.8%	**Loser**
	AVEIRO	MURTOSA	**1,715,879**	3,325,589	3,693,300	**1,493,042**	-222,837	-13.0%	-6.0%	**Loser**
	LEIRIA	PORTO DE MÓS	**3,177,573**	6,039,372	6,847,121	**2,490,821**	-686,753	-21.6%	-10.0%	**Loser**
	MADEIRA	RIBEIRA BRAVA	**1,799,003**	4,232,707	4,720,872	**1,633,418**	-165,585	-9.2%	-3.5%	**Loser**
	FARO	ALJEZUR	**2,918,667**	4,990,430	5,166,722	**2,091,501**	-827,166	-28.3%	-16.0%	**Loser**
	BEJA	BARRANCOS	**1,646,411**	3,155,694	3,203,738	**986,277**	-660,133	-40.1%	-20.6%	**Loser**
	PORTALEG.	CAMPO MAIOR	**2,900,775**	4,039,350	4,402,813	**1,911,053**	-989,722	-34.1%	-22.5%	**Loser**
	BRAGA	TERRAS D. BOURO	**3,133,364**	5,439,072	5,656,128	**2,148,285**	-985,080	-31.4%	-17.4%	**Loser**
	BRAGANÇA	FREIXO E. CINTA	**2,488,972**	4,702,939	4,803,725	**1,670,031**	-818,940	-32.9%	-17.0%	**Loser**
	BEJA	CASTRO VERDE	**4,380,527**	5,397,422	5,677,218	**2,766,919**	-1,613,608	-36.8%	-28.4%	**Loser**
Municipalities with ***less*** **than 70%** CA	LISBOA	LISBOA	**29,462,536**	1,757,871	62,579,750	**29,686,321**	223,784	0.8%	0.4%	**Winner**
	AÇORES	LAGOA	**1,584,042**	4,103,447	4,703,584	**1,616,933**	32,891	2.1%	0.7%	**Winner**
	SETÚBAL	GRÂNDOLA	**3,684,789**	6,227,125	6,732,129	**3,958,834**	274,044	7.4%	4.1%	**Winner**
	LISBOA	SINTRA	**24,904,359**	14,713,395	35,069,105	**24,952,755**	48,396	0.2%	0.1%	**Winner**
	V. CASTELO	VIANA D. CASTELO	**5,448,727**	11,381,099	15,184,697	**5,542,457**	93,730	1.7%	0.6%	**Winner**
	PORTO	AMARANTE	**4,002,500**	12,635,007	14,374,890	**3,991,956**	-10,544	-0.3%	-0.1%	**Loser**
	SETÚBAL	SESIMBRA	**3,197,252**	2,728,126	5,128,655	**3,062,440**	-134,813	-4.2%	-2.6%	**Loser**
	AVEIRO	AVEIRO	**4,141,379**	4,210,092	9,190,900	**4,009,073**	-132,306	-3.2%	-1.4%	**Loser**
	SANTARÉM	ALMEIRIM	**2,041,666**	4,743,037	5,579,726	**2,157,519**	115,854	5.7%	2.1%	**Winner**
	GUARDA	AGUIAR DA BEIRA	**1,673,334**	5,013,569	5,175,695	**1,800,706**	127,372	7.6%	2.5%	**Winner**
	VILA REAL	PESO DA RÉGUA	**1,715,636**	5,516,868	6,179,792	**1,751,558**	35,922	2.1%	0.6%	**Winner**
	VISEU	LAMEGO	**2,241,609**	6,957,703	8,129,507	**2,212,578**	-29,031	-1.3%	-0.4%	**Loser**
	ÉVORA	ÉVORA	**6,273,406**	10,426,857	13,799,015	**6,794,807**	521,401	8.3%	3.8%	**Winner**
	C. BRANCO	COVILHÃ	**4,546,231**	10,509,632	12,582,090	**4,499,461**	-46,770	-1.0%	-0.4%	**Loser**
	BRAGANÇA	VIMIOSO	**2,889,251**	5,953,670	6,079,020	**2,657,339**	-231,912	-8.0%	-3.8%	**Loser**
	Total fiscal transfers to all Portuguese municipalities		**995,805,175**	**1,880,879,608**	**2,406,532,953**	**995,805,175**				

4.5 Ecological component of FGM

Certain specific unit indicators were calculated in order to better understand the significance of the ecological component for the municipalities. Table 7 presents the share of this component in municipalities' total revenues and fiscal transfers, as well as the values per unit of area (hectare) and population (inhabitant).

Table 7 - Ecological component indicators

		Share of the ecological component						Ecological component per unit		
	Municipalities	Total revenues	Fiscal transfers	Estimated ecological component (euros)	Population (inhabitants)	Total municipal area (ha)	Designated conserva-tion area (ha)	€/in-habitant	€/ha of total municipal area	€/ha of CA
Municipa-lities with *more* than 70% CA	VILA DO BISPO	13%	22%	873,332	5,423	17,900	17,423	161	49	50
	PORTO MONIZ	9%	9%	353,343	2,706	8,300	7,049	131	43	50
	MURTOSA	6%	8%	294,729	9,804	7,300	5,880	30	40	50
	PORTO DE MÓS	11%	15%	1,002,546	25,022	26,200	20,000	40	38	50
	RIBEIRA BRAVA	4%	5%	250,733	5,349	6,500	5,002	47	39	50
	ALJEZUR	16%	22%	1,191,281	12,565	32,400	23,765	95	37	50
	BARRANCOS	26%	26%	843,298	1,767	16,825	16,823	477	50	50
	CAMPO MAIOR	25%	28%	1,238,105	8,342	24,700	24,700	148	50	50
	TERRAS BOURO	22%	23%	1,318,523	7,765	27,700	26,304	170	48	50
	FREIXO E. CINTA	21%	23%	1,110,681	3,931	24,400	22,157	283	46	50
	CASTRO VERDE	34%	38%	2,167,498	7,772	56,900	43,240	279	38	50
Municipa-lities with *less* than 70% CA	LISBOA	0%	0%	0	509,751	8,500	0	0	0	0
	LAGOA	0.1%	0,1%	2,698	15,139	4,600	108	0.2	1	25
	GRÂNDOLA	2%	3%	173,582	14,214	80,800	6,926	12	2	25
	SINTRA	0.3%	1%	286,077	428,470	31,900	11,414	1	9	25
	VIANA CASTELO	0.5%	1%	120,256	73,559	19,700	4,798	2	6	25
	AMARANTE	1%	1%	205,889	91,238	31,900	8,215	2	6	25
	SESIMBRA	2%	5%	259,978	61,471	30,100	10,373	4	9	25
	AVEIRO	1%	3%	240,676	48,110	19,500	9,603	5	12	25
	ALMEIRIM	0%	0%	0	22,766	22,200	0	0	0	0
	AGUIAR BEIRA	0%	0%	0	6,262	20,700	0			
	PESO DA RÉGUA	0.4%	0,5%	28,369	17,492	9,500	1,132	2	3	25
	LAMEGO	1%	2%	136,491	26,484	16,500	5,446	5	8	25
	ÉVORA	1%	1%	192,472	55,420	48,200	7,679	3	4	25
	COVILHÃ	2%	3%	389,338	52,946	130,704	15,534	7	3	25
	VIMIOSO	8%	8%	522,381	4,975	55,600	20,842	105	9	25

The unit value of the ecological component is 50 euros per ha protected area for municipalities with more than 70% of their territory under conservation status and 25 euros/ha for the remainder. The percentage share of the ecological component as a proportion of total revenues and fiscal transfers is significant for

the municipalities in the group with more than 70% of designated area (between 4% and 38%) and much higher on average than in the other group (less than 8%). At either extreme along this scale are Castro Verde, where the ecological component is 38% of total fiscal transfers and 34% of total municipal revenue, and Lisbon, Almeirim and Aguiar da Beira, where the ecological component is zero.

The distribution of funds through the ecological transfer scheme per inhabitant varies significantly in the municipalities of the sample, even between municipalities belonging to the same group. Even though the ecological component is not very powerful overall, it is still significant for the inhabitants of some municipalities with problematic socio-economic contexts and whose land is almost completely under conservation status, as in the case of Barrancos.

5 Conclusion

The new Portuguese LFL introduces a new scheme whose aim is to compensate municipalities for land-use constraints imposed by the designation of protected areas or Natura 2000 sites, thus providing a financial incentive to local authorities, creating a mind-set more favourably disposed towards biodiversity conservation. This objective is in line with theoretical work arguing that intergovernmental fiscal transfers can be an effective instrument in supporting the local provision of ecological goods and services with spillover benefits if ecological indicators are used to redistribute finances from central to local levels (Ring, 2002; Köllner et al., 2002; May et al., 2002; Ring, 2008a, b).

The analysis presented above has shown that these ecological fiscal transfers can be significant for some municipalities in which the amount of land granted conservation status constitutes a large part of their overall territory.

By simultaneously introducing a significant number of changes in the Portuguese intergovernmental fiscal transfer scheme, however, the ecological component of the new LFL is difficult to grasp by the stakeholders affected (namely municipal authorities) due to the presence of many crossover effects. The overall reduction in the global value of fiscal transfers (when compared with the amounts that would have been transferred if the law had not been changed), combined with these crossover effects, has contributed to lessening the financial incentive offered to municipalities. The significance of the ecological fiscal transfer for municipalities with a high proportion of conservation areas is clear, however, as shown in the scenario in which the new LFL is simulated without the ecological component.

The current exercise has shown that several options exist for improving the Portuguese LFL in order to strengthen the incentive to maintain existing conservation areas and to create new ones. The introduction of a "quality" criterion for the allocation of ecological fiscal transfers is an approach which complements the existing criteria, providing an additional incentive at the level of conservation management.

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