The New Spanish System of Intergovernmental Transfers

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Antoni Zabalza
Julio López-Laborda

Georgia State University
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International Studies Program
Andrew Young School of Policy Studies
Georgia State University
Atlanta, Georgia 30303
United States of America

Phone: (404) 651-1144
Fax: (404) 651-4449
Email: ispaysps@gsu.edu
Internet: http://isp-aysps.gsu.edu

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The new Spanish system of intergovernmental transfers[1]

Antoni Zabalza* and Julio López-Laborda**
** University of Valencia*
*** University of Zaragoza*

Abstract: This article analyses the workings of the new Spanish system of intergovernmental transfers, which has been in operation since 2009, and compares its expected effects with those of the model that was in force until 2008. The paper considers the effects of the new model at the base year of application and the growth over time of these effects. On the positive side, the reform has significantly reduced the dispersion of the distribution of resources per capita. On the negative side, the system has become very complex and obscure regarding the distribution criteria it uses; also, of the five (1987, 1992, 1997, 2002, 2009) major revisions of the system, this is the most expensive.

Key words: Spanish system of intergovernmental transfers, equalising transfers.
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* Department of Economic Analysis, University of Valencia, Campus dels Tarongers, 46022-Valencia, antonio.zabalza@uv.es
** Department of Public Economics, University of Zaragoza, Gran Via, 2, 50005-Zaragoza, julio.López@unizar.es

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1. Introduction

The purpose of this paper is to describe and evaluate the new Spanish system of intergovernmental transfers that has been in operation since 2009. The article draws heavily on Zabalza and López-Laborda (2010) and the approach followed is fundamentally descriptive: the objective is to understand how the new system works for the fifteen "common regime" autonomous communities to which it applies[2] and how it differs from previous arrangements.

Since they were established in 1980's, intergovernmental transfers in Spain have aimed at the equalisation of resources per unit of need, so that the same service level could be provided by all autonomous communities irrespective of their fiscal capacity.[3] The definition of expenditure needs and the identification of differences among communities regarding the cost of service provision have been the main areas of discussion between central and autonomous governments. The provisions regarding the growth of transfers have also come into scrutiny due to the lack of connexion between the variation of needs and that of resources.[4] The reform that we analyse here addresses these questions and leads to improvements in both respects that, although not complete, we deem significant.

The agreement on the new model (MEH, 2009b) was reached in July 2009 in the *Consejo de Politica Fiscal y Financiera* (Fiscal and Financial Policy Council), a multilateral organ of coordination between central government and autonomous

[2] That excludes the autonomous communities Pais Vasco and Navarra, whose regime is the "foral" ("cupo") system.

[3] More than the implementation of a specific set of legal provisions, this objective emerges from the practice adopted since the system was first established. Although imperfectly, its legal base is more clearly stated in the Constitution than in the LOFCA, *Ley Organica de Financiacion de las Comunidades Autonomas* (the specific basic law that regulates intergovernmental fiscal relations between central and autonomous jurisdictions). Article 139.1 of the Spanish Constitution (BOE, 1978) says that "All Spaniards have the same rights and obligations anywhere in the Spanish territory", and article 158.1 says that "The General State Budget may include an allocation to Autonomous Communities that will depend on the State's services and activities they have undertaken and on the guarantee of a minimum level of basic public services throughout the Spanish territory". More to the point, the recently reformed *Estatut d'Autonomia de Catalunya* (the basic law that regulates the institutional relationships between the autonomous community of Catalonia and the central administration of the Spanish State) (BOE, 2006) says in its article 206.1 that "The level of financial resources put at the disposal of the *Generalitat* [the government of the Catalan autonomous community] will be based on criteria of expenditure needs and will take into account, among other criteria, its fiscal capacity. To this effect, the *Generalitat*'s resources will be, among others, those generated by its tax revenue, plus/minus those obtained from, or required by, its participation in the equalizing and solidarity mechanisms." Similar statements are contained in basic laws of other autonomous communities.

[4] See López-Laborda and Monasterio (2007), Bosch and Durán (2008) and Ruiz-Huerta and Herrero (2008).

communities, which meets regularly to discuss issues concerning the regular operation of the system of intergovernmental fiscal relations. Subsequently, this agreement was given legal status through the modification of the LOFCA (BOE, 2009a) and the enactment of a national law setting the different provisions of the system (BOE, 2009b).[5] The Law makes a complex and unnecessarily circular presentation of the new model. The best way to untangle the effective workings of the system is to compare the basic structure of both new and old models, and go directly to the final distribution of resources that each of them generates. This approach allows us to distinguish elements that play an important role from those that are secondary.

We identify aspects of the reform that in our opinion could be improved, but we abstain from advancing normative proposals. For instance, we find unsatisfactory the way in which the index of needs enters into the model, but we leave out from this paper any suggestion of improvement on this particular aspect.[6] With this, we intend to avoid as much as possible controversial issues and, in a purely positive vein, concentrate on actual legal provisions.

In addition to identifying formally the workings of the model, the article quantifies empirically its different elements. Using empirical data from the period 2004-2007, the article presents an estimation not only of the starting position of the model, which we call year zero, but also of the growth that the system would undergo during the following five years of application.[7] The new model narrows significantly the dispersion of resources per capita between autonomous communities and takes into account the temporal variation of needs. On the other hand, its cost – an overall increase of resources of over 12 per cent – is by far the largest of the five major revisions undergone by the system. In terms of the overall increase of resources, we estimate that the costs of the other four reforms were as follows: 1987: 6.9 per cent; 1992: 6.1 per cent; 1997: 0 per cent; and 2002: 3.5 per cent.

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[5] In the rest of this article, the legal text that contains the model is called the "Law". This model is referred to interchangeably as the "present" or "new" model as opposed to the substituted system, which is referred to as the "previous" or "old" model.

[6] We do this in a separate paper: López-Laborda and Zabalza (2010).

[7] The Law states that the model should be reviewed every five years.

There are several articles in Spanish that cover approximately the same ground (De la Fuente, 2009; Bosch, 2010a;[8] López-Laborda, 2010; López-Laborda and Zabalza, 2010; Zabalza and López-Laborda, 2010) but we feel that an additional account in English will be useful for the international reader interested in this subject. In comparison with the first two papers noted above, this paper pays more attention to the growth of resources and differs from them in its interpretation of the distribution structure that the model implies.

The next section shows the extent of decentralization in Spain and in this context anticipates the overall effects of the model that will be described in subsequent sections. Section 3 presents the formal structure of the new model. Section 4 compares the distribution of resources it generates with that of the old model. Section 5 describes a particular element of the model, the guarantee fund for fundamental public services, that serves as the main base for the introduction of the index of needs, and to which the Law attaches special importance. We show that despite this emphasis, this fund plays no role in the distribution of resources in year zero. Section 6 describes the dynamics of the model and shows the way in which the temporal variation of needs is taken into account, while Section 7 empirically simulates the growth of the system over a five year period. Whereas the guarantee fund does not enter into the definition of year zero, it has an effect on how resources received by each autonomous community vary over time. This is discussed in Section 8. The paper ends with a section of conclusions.

2. The extent of decentralization in Spain

As Table 1 shows, in 1979, the year that the Spanish system of autonomous communities was put into operation, 91 per cent of total public expenditure was undertaken by the central government and the social security system, a negligible 0.1 per cent by all autonomous communities, and 8.9 per cent by provinces and municipalities. In 2007, the last year for which final compiled figures exist for the three jurisdictions, the percentages were: 50 per cent for central government and social security, 35.9 per cent for autonomous communities and 14.1 per cent for provinces and municipalities. In the 28 years elapsed, the share of regional public expenditure has increased by 35.8 percentage points. The degree of decentralization in resources is less

[8] A shortened version of this paper in English can be found in Bosch (2010b).

pronounced but still important: in 1979, 92.9 per cent of public resources were essentially national taxes and social security contributions, and the remaining 7.1 per cent municipal taxes, provinces having virtually no own taxes. In 2007, national taxes and social security contributions represented only 67.9 per cent of total resources, ceded and own regional taxes 21.9 per cent, and municipal taxes 10.2 per cent.

Table 1
Public expenditure and resource decentralization in Spain
(Percentages)

	Public expenditure		Public resources	
	1979	2007	1979	2007
General Government	91.0	50.0	92.9	67.9
(Central Government)	(47.6)	(21.7)	(53.5)	(38.5)
(Social Security)	(43.4)	(28.3)	(39.3)	(29.4)
Autonomous Communities[1]	0.1	35.9	0.0	21.9
Provinces and Municipalities	8.9	14.1	7.1	10.2
Total	100.0	100.0	100.0	100.0

1. Includes "common regime" and "foral regime" autonomous communities.
Source: IGAE (General Government Internal Auditor)

As will be shown in this paper, the new model changes the structure between tax revenue and overall cash transfer in favour of tax revenue, and increases significantly the total amount of resources received by the fifteen "common regime" autonomous communities". As Table 2 shows, in 2010 we estimate that in the old model assessed revenue from ceded taxes (i.e., regional tax capacity) would have represented 69.1 per cent of total resources and cash transfer 30.9 per cent. In the new model, on the other hand, we estimate that the share of assessed tax revenue rises to 78.7 per cent, while that of the transfer falls to 21.3 per cent. In the new model, therefore, assessed tax revenue increases its share in total resources by 9.6 percentages points.

We estimate that in 2010, the old model would have put at the disposal of autonomous communities a total amount of resources equivalent to 9.5 per cent of GDP. In the new model we estimate that this percentage will rise to 10.7. The new model thus adds resources to the system of regional finance to the tune of 1.2 per cent of GDP. These resources are all of them added by means of a significant enlargement of ceded

taxes, which, assessed at standard values,[9] will contribute fresh money to autonomous communities equivalent to 1.8 per cent of GDP. Cash transfers, on the other hand, will drop by 0.7 percent of GDP.

Table 2
Aggregate flows, old and new models[1]
Estimation for year 2010
(Percentages)

Structure

	Old Model 1	New Model 2	Variation 3=2–1
Tax revenue	69.1	78.7	9.6
Cash transfer	30.9	21.3	-9.6
Total resources	100.0	100.0	0.0

Percentages of GDP

	Old Model 1	New Model 2	Variation 3=2–1
Tax revenue	6.6	8.4	1.8
Cash transfer	3.0	2.3	-0.7
Total resources	9.5	10.7	1.2

1. Applying only to the fifteen "common regime" communities.
Source: Own calculations

The 1.2 per cent of GDP is a net increase in resources, to the extent that expenditure responsibilities of autonomous communities remain unchanged as compared with those they had under the old system. The outcome is the result of a protracted process of negotiations between central government and the fifteen regional governments, which took place during the initial phase of the most severe fall in real product that the Spanish economy has had to endure since the 1936 civil war. We do not have a satisfactory explanation of this outcome, nor is this explanation the purpose of this paper. Beyond the obvious fact that it represents a remarkable feat of regional governments, we can only point out that the increase in resources must have been, at least to some extent, the answer to the mounting difficulties that regional governments had to maintain service levels in the health and education systems, both under the responsibilities of autonomous communities.

[9] We explain below the way in which standard revenues from ceded taxes are assessed and the role that these assessed values play in the model of intergovernmental transfers.

3. The basic structure of the model

Since they were established in the early eighties, intergovernmental transfers in Spain have aimed at the equalisation of resources per unit of need, so that the same service level could be provided by all autonomous communities irrespective of their fiscal capacity. The total amount of resources that at the base year $(t=0)$ the system would effectively put under the command of a given community,[10] and therefore the expenditure that it could undergo, E_i^{P0}, was equal to the tax revenue actually obtained out of the transferred fiscal base (the "ceded taxes"), T_i^{P0}, plus the transfer it received from the central government, called initially State Revenue Share, and subsequently Sufficiency Fund, S_i^{P0}.

$$E_i^{P0} = T_i^{P0} + S_i^{P0}. \tag{1}$$

The transfer, S_i^{P0}, was defined as those resources that normatively the system would assign to the community, E_i^{*P0}, minus the revenue that for a given standard tax policy the system would assess that community *i* could obtain from the transferred fiscal base, T_i^{*P0}.[11] Thus,

$$S_i^{P0} = E_i^{*P0} - T_i^{*P0}. \tag{2}$$

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[10] In this article we consider only system-related resources. In addition to these resources, the community may obtain other resources from own taxes, debt and other commercial and economic operations. For a recent review of the Spanish regional finance system, see López-Laborda and Monasterio (2007). We index variables of the "previous model" with the superscript *P*.

[11] The transfer is defined in terms of assessed rather than actual revenue to introduce an incentive for communities to manage diligently their ceded tax basis. Otherwise, whatever the amount of tax revenue obtained by the community, the system would always cover the gap between actual tax revenue and normative resources. Regarding the main ceded taxes (Personal Income Tax – PIT –, VAT and Excises), plus Vehicle Excises, Hydrocarbon Retail Sales Tax and Electricity Tax, standard revenue is the same as actual revenue in each community excluding the rise or fall in revenues originated by normative changes in national tax rates enacted by each community by virtue of its legal powers (autonomous communities have practically no powers concerning the definition of tax basis). Regarding traditional ceded taxes (Inheritance and Gift Tax, Capital Transfer Tax, Stamp Duties and Gaming Taxes), in the year in which the tax is ceded standard revenue is the same as actual revenue in that year. Subsequently, this initial standard revenue is updated according to a common rate of growth for all communities, related to the variation of revenue from State taxes, called ITE and which we describe in more detail below. In the last reform (2009), the updating rate applied to the Capital Transfer Tax is no longer the common ITE rate, but a sort of community specific ITE related to the variation of regional revenue from PIT, VAT and Excises.

Substituting 2 into 1, we obtain the expression that shows the essential nature of the previous model:

$$E_i^{P0} = E_i^{*P0} + \left(T_i^{P0} - T_i^{*P0}\right). \tag{3}$$

The resources that the system would effectively put under the command of community *i*, E_i^{P0}, were those normatively assigned to it, E_i^{*P0}, plus/minus a quantity that would depend on the extent to which revenue effectively obtained from the transferred fiscal base, T_i^{P0}, was larger/smaller than assessed tax revenue, T_i^{*P0}. Alternatively, rewriting 3 as

$$E_i^{P0} = T_i^{P0} + \left(E_i^{*P0} - T_i^{*P0}\right), \tag{4}$$

we can see that in the old system total resources were the sum of actual tax revenue obtained from the ceded tax base, T_i^{P0}, plus/minus the equalising cash transfer $\left(E_i^{*P0} - T_i^{*P0}\right)$.[12]

For a tax policy equal to the standard, $\left(T_i^{P0} = T_i^{*P0}\right)$, effective resources for this community would be the same as normatively assessed resources. That is,

$$E_i^{P0} = E_i^{*P0}, \tag{5}$$

and, to the extent that normative resources are distributed among communities according to needs, the system would equalise resources per unit of need for all communities.

We show in this paper that the basic structure of the new model is exactly the same as that of the old model.[13] As with the previous model, actual resources, E_i^0, come from actual tax revenue obtained from ceded taxes, T_i^0, plus the cash transfer, S_i^0.

$$E_i^0 = T_i^0 + S_i^0, \tag{6}$$

where

[12] Literally, this is the way article 206.1 of the *Estatut d'Autonomia de Catalunya* defines the Spanish system of intergovernmental transfers. See note 2 below.

[13] To distinguish them from those of the previous model, the variables of the new model do not carry the superscript *P*.

$$S_i^0 = E_i^{*0} - T_i^{*0}. \tag{7}$$

The new model significantly enlarges the fiscal capacity transferred to communities, in terms of both their sharing in the main national taxes – PIT, VAT and Excises – and their power to alter the corresponding tax rates and bases. However, the main changes occur in the definition of the transfer, which is now formed by four elements: the Guarantee Fund Transfer, GFT_i^0; the Sufficiency Fund, SF_i^0; the Competitiveness Fund, CF_i^0; and the Cooperation Fund, COF_i^0.[14] Thus,

$$S_i^0 = GFT_i^0 + SF_i^0 + CF_i^0 + COF_i^0. \tag{8}$$

We discuss below how these four elements are distributed among communities and what the eligibility criteria are in order to benefit from the convergence funds. Here we want to concentrate on the structure of the new model, and for this purpose it is useful to distinguish between the first two elements of expression 8 and the rest. The Competitiveness and Cooperation Funds may be called *primary* elements, in the sense that they are not derived from any other element in the system. The Guarantee Fund Transfer and the Sufficiency Fund, on the other hand, are *derived* elements, as they are obtained from other primary elements of the model.

The Guarantee Fund Transfer is defined as the Guarantee Fund, GF_i^0, minus 75 per cent of assessed tax revenue. That is,

$$GFT_i^0 = GF_i^0 - 0.75T_i^{*0}, \tag{9}$$

where assessed tax revenue is a primary element and the guarantee fund a derived element[15]. The text of the Law puts a lot of emphasis on the guarantee fund. The Law refers to this fund as the source of resources that should cover the cost of fundamental services (health, education and social services), and distributes it among communities by means of an index of needs – Adjusted Population – so that resources per unit of need (according to this index) are the same for all communities. We return to the guarantee fund in Section 5, below.

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[14] The complete names of the first two elements are: the "Guarantee Fund for Fundamental Public Services Transfer" and the "Global Sufficiency Fund". In what follows we will use the shortened version of both names. For the Competitiveness and Cooperation Funds, the Law also uses the generic term "Convergence Funds"; occasionally, we shall make use of this generic form..

[15] The total amount of the guarantee fund is defined as 75 per cent of total assessed tax revenue plus a given quantity called by the Law "State Contribution". See Section 5 below.

The Sufficiency Fund is defined as the difference between, on the one hand, the sum of resources of the previous system, which the model calls Status Quo, SQ_i^0, and a given amount of fresh resources, called Additional Resources AR_i^0, that the central government contributes to the system and, on the other hand, the sum of assessed revenue, T_i^{*0}, and the Guaranty Fund Transfer defined above. That is,

$$SF_i^0 = \left(SQ_i^0 + AR_i^0\right) - \left(T_i^{*0} + GFT_i^0\right), \tag{10}$$

where SQ_i^0, AR_i^0 and T_i^{*0} are all primary elements. The status quo element provides the link between old and new models since $SQ_i^0 = E_i^{*P0}$.

Substituting 10 into 8, we obtain the definition of the overall transfer of the new model, exclusively in terms of primary elements,

$$S_i^0 = \left(SQ_i^0 + AR_i^0 + CF_i^0 + COF_i^0\right) - T_i^{*0}. \tag{11}$$

From expression 11 two interesting results follow: First, the guarantee fund transfer, and with it the guarantee fund, cancel out of the system. Despite the emphasis put by the Law, the guarantee fund plays no role in determining the overall transfer in year zero, nor in its distribution among communities. Second, the basic structure of the new model is essentially the same as that of the old model. This can be seen by comparing expression 11 with 7 and 2. They have exactly the same structure and the only difference refers to the definition of the resources that the system normatively assigns to each community, which in the new model is

$$E_i^{*0} = SQ_i^0 + AR_i^0 + CF_i^0 + COF_i^0. \tag{12}$$

Also, substituting 12 into 6, we obtain

$$E_i^0 = \left(SQ_i^0 + AR_i^0 + CF_i^0 + COF_i^0\right) + \left(T_i^0 - T_i^{*0}\right). \tag{13}$$

As in the old model, community *i* commands a given amount of resources normatively assigned by the system (the four terms enclosed in the first parenthesis of the expression), plus/minus an amount of resources that depend on whether the community applies a tax policy which generates more or less tax revenue than that assessed for the standard tax policy. If the community tax policy is the standard, the last parenthesis cancels out; if the community applies a more strict tax policy than the standard, it

benefits from the resulting increase in revenues and the transfer is not reduced; finally, if the tax policy applied by the community is more lax than the standard, the transfer remains the same but the community bears the resulting fall in tax revenues.

Alternatively, rewriting 13 as

$$E_i^0 = T_i^0 + \left[\left(SQ_i^0 + AR_i^0 + CF_i^0 + COF_i^0 \right) - T_i^{*0} \right], \tag{14}$$

we have the equivalent to expression 4 in the previous model. Actual resources are equal to actual tax revenue plus/minus the equalising cash transfer, which in the new model is given by the expression in square brackets.

In all cases, for a tax policy equal to the standard, $T_i^0 = T_i^{*0}$, which is the assumption we follow in the rest of the paper, the resources the system puts into the hands of community *i*, E_i^{*0}, are given by expression 12. Again, in year zero the guarantee fund plays no role in the determination of resources or in its distribution among communities.

The way in which needs are introduced into the system is the same as that of the old model. In the old model, the relative structure of needs and differences in the cost of providing services among communities was taken into account through the term E_i^{*P0} in expression 2. The procedure was to determine a total quantity of resources E^{*P0}, and to distribute this total according to some linear combination of need criteria. Let α_i be the share of resources of community *i* that results from such procedure, $\left(\sum \alpha_i = 1\right)$, then $E_i^{*P0} = \alpha_i E^{*P0}$.[16]

Something very similar is done in the new model, but applied to each of the four elements of expression 12. The statistical material attached to the agreed final document of the *Consejo de Politica Fiscal y Financiera* MEH (2009b), gives the total and individual community values of the status quo for 2007. Concerning the other three elements, the Law itself, BOE (2009), gives first, the total quantity of each of the other three elements in nominal terms and for specified years; and second, the criteria of distribution of these total quantities among communities. The different criteria of

[16] Normally, α_i, despite being a share, is loosely referred to in the Spanish literature as an index of needs. It is straightforward to transform α_i into an index of relative needs φ_i with mean equal to 1, by defining $\varphi_i = n\alpha_i$, where *n* is the number of communities. Then, of course, $E_i^{*P0} = \varphi_i \overline{E^{*P0}}$, where $\overline{E^{*P0}} = E^{*P0}/n$.

distribution, together with the eligibility rules for the convergence funds, are the equivalent to the α_i index of needs of the old model.

While in the old model the only index of needs is the one used to define the distribution of resources in year zero (that is, α_i), the new model, in addition to the indices of needs used to define the distribution in year zero of the four elements of 12, introduces another index (the Adjusted Population index referred to above), which although not in the initial distribution, does play a role in the variation of resources over time, as will be seen in Section 6 below.

It is important to point out from the outset that despite the different labels attached to each of the four elements of expression 12, all resources are unconditional and their budgetary allocation on various expenditures depends exclusively on the autonomous community, providing basic national regulations on public service standards are fulfilled. The particular labels attached to the four terms of 12 must be seen simply as a way to motivate the different distribution rules of each of them. In the next section we evaluate empirically expression 12 over the whole set of communities to gain an idea of the extent to which fresh resources have been added into the system and how they have been distributed.

4. Old and new models

Table 3 shows the estimated values of the four elements of expression 12 at year zero, which under the assumptions used in the simulation corresponds to 2010. We take 2010 as the starting point of the model, as this is the year in which all fresh resources will have accrued and, thus, the year that best measures the complete effect of the reform.[17]

[17] The basic data to define the starting point of the model is given for year 2007 (the last year for which, at the moment of the political agreement reached between the two jurisdictions, final compiled data for all communities existed). The first year in which the model enters into operation is 2009, and fresh resources contributed by the central administration are added to the system in two instalments: 2009 and 2010. Thus, the year in which all fresh resources have accrued is 2010, which is the year we use in the simulation as the starting point (year zero) of the model.

Table 3
Resources of the new model of intergovernmental transfers. Year zero
(€ Million)

	SQ_i^0	AR_i^0	CF_i^0	COF_i^0	E_i^{*0}
Autonomous Community	1	2	3	4	$5=\sum_1^4$
Catalunya	15,353	1,365	845	0	17,563
Galicia	6,520	356	0	255	7,131
Andalucia	17,876	1,318	0	335	19,530
Asturias	2,556	106	0	95	2,757
Cantabria	1,543	94	0	18	1,654
La Rioja	805	73	0	0	878
Murcia	2,801	316	37	55	3,210
Valencia	9,585	902	723	0	11,210
Aragon	3,144	220	0	35	3,399
Castilla-La Mancha	4,516	366	0	81	4,963
Canarias	4,156	427	317	0	4,900
Extremadura	2,723	123	0	108	2,954
Baleares	1,974	234	221	0	2,429
Madrid	12,367	1,213	494	0	14,074
Castilla y Leon	6,105	287	0	218	6,610
Total	92,024	7,400	2,638	1,200	103,262
Relative weight (%)	89.1	7.2	2.6	1.2	100

Source: Zabalza and López-Laborda (2010)

The first column gives the status quo, SQ_i^0, which amounts to a total of €92,024 million. This corresponds to the resources that the communities would have had with the old model and serves therefore as the reference to measure the effects of the reform. The data come from MEH (2009b).[18] The figures given in the document refer to 2007, the last year for which officially settled figures of the previous model exist, and have been updated to 2010. On the basis of empirical information on tax revenue for the years 2007 and 2008, and budget figures for 2009 and 2010 (MEH, 2009c), we assume assessed tax revenue for 2010 to be 20 per cent below than that of 2007 and that this fall is uniform for all communities. These assumptions are also used to update the status quo. The simulation exercise presented here is largely illustrative and numerical results should be seen under the light of these assumptions.

[18] Strictly, the resources of the old model would be slightly less (0.4 per cent less than SQ^0) due to the incidence in the status quo of the compensation for the elimination of the Wealth Tax. The difference is very small and its effect on the distribution negligible; so we take SQ_i^0 as representative of the resources that the old model would have generated in 2010 (see Zabalza and López-Laborda, 2010).

Column 2 shows the value of AR_i^0, which amounts to a total of €7,400 million. This figure comes from the Law, which specifies that €5,000 million will be first contributed in 2009 and €2,400 million added in 2010. We assume that inflation between these two years is nil, and therefore use the *nominal* figures given in the Law.[19] These resources are distributed amongst communities according to, among other criteria, adjusted population and its average annual growth over the period 1999 to 2009. Due to data availability, we estimate the annualized grow rate of adjusted population using data for the period 1999 to 2004 and apply it to the 1999-2009 period.

Columns 3 and 4 show the value of CF_i^0 and COF_i^0, which amount respectively to totals of €2,638 million and €1,200 million, and are distributed among two different subsets of communities with the exception of Murcia. Although eligibility to each fund is determined by means of a complex set of rules,[20] the outcome (and indeed the objective aimed at by the new model) is that approximately the first fund benefits relatively rich communities, which in general are also the communities that were less well treated by the old model, while the second is directed to relatively poor communities. The competitiveness fund is distributed according to adjusted population, although subject to specific caps and complements, and the cooperation fund is distributed according to relative poverty. The total amounts of these two funds are given by the Law in nominal Euros of 2009. The actual total amount for the competitiveness fund is €2,573 million, to which €65 million are added due to the operation of the Third Additional Provision of the Law. According to this provision, those communities with resources (before convergence funds) per adjusted inhabitant below the mean, and with negative values of both the guaranty fund transfer and the sufficiency fund, are entitled to a special complement. Baleares is the only community that fits these conditions, and the complement received is €65 million.

At year zero, and for a tax policy equal to the standard, the new system adds €11,238 million over and above the resources that the fifteen communities would have

[19] Notice that these figures, as well as those of the convergence funds, are given by the Law in nominal terms (that is, in Euros of the specified years). These nominal values were agreed before the full extent of the 2008-2010 shock was really known, a circumstance which clearly inflates the relative importance of the amount of fresh resources that the new model adds to the system.

[20] The communities eligible to the competitiveness fund are those with resources (excluding convergence funds) per adjusted inhabitant (the unit of the Adjusted Population index of needs) below the mean or below an index of fiscal capacity. The communities eligible to the cooperation fund are those which are relatively poor, or have low demographic density or low population growth.

obtained with the old system; a 12.2 per cent increase. Although 89.1 per cent of total resources are driven by the old model, fresh resources are not distributed as the status quo. This is the case with the convergence funds, whose rules of eligibility are clearly income oriented, but to some extent it also happens with the so called additional resources, *AR*. Lastly, the bias of the competitiveness fund in favour of relatively rich communities is only partially compensated by the bias of the cooperation fund in favour of relatively poor communities, as the first fund distributes 2.6 per cent of all resources versus 1.2 per cent the second fund.

Table 4
Comparison between old and new models. Resources per capita

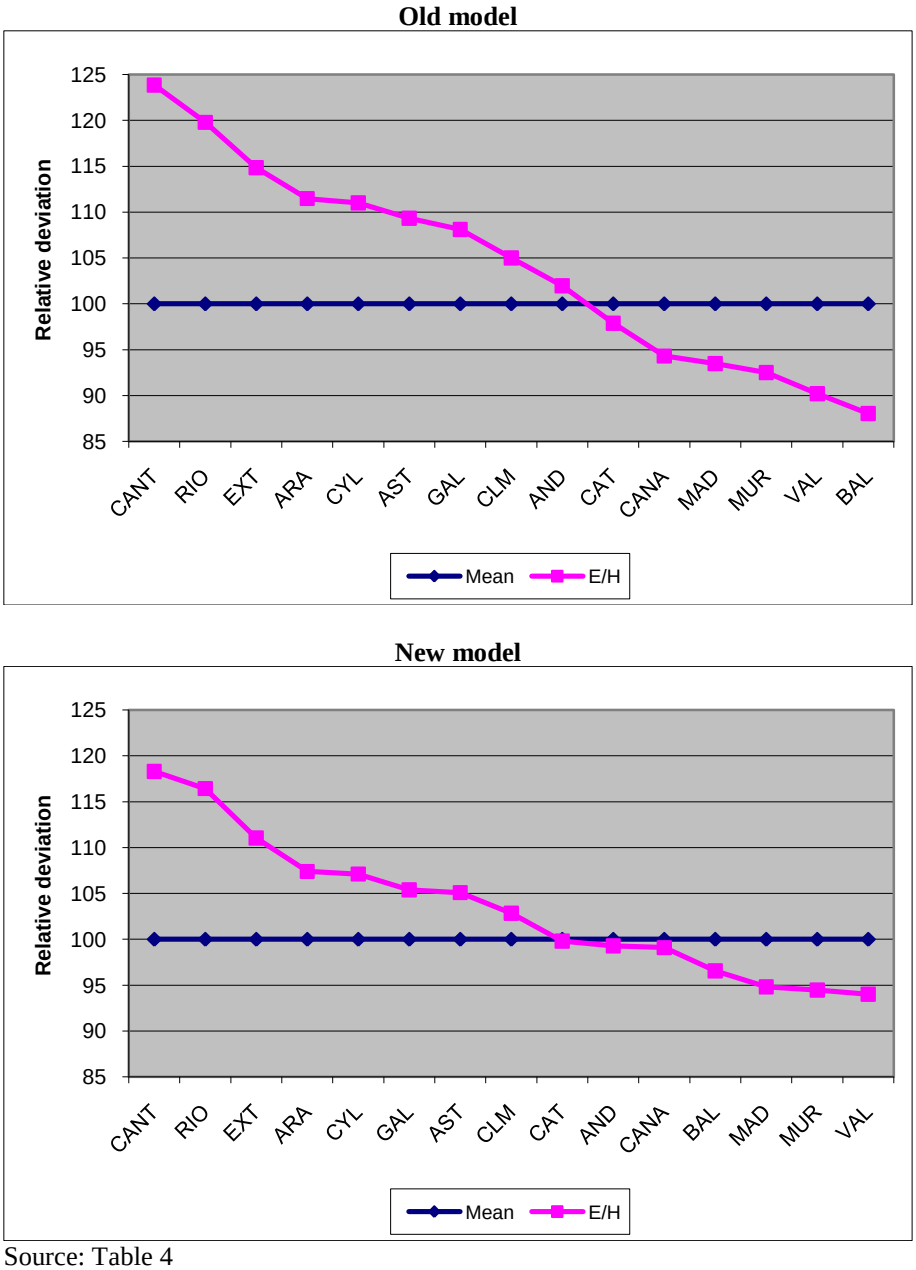
	€ per capita		Relative deviation (%)		Relative
Autonomuos	SQ_i^0/H_i^0	E_i^{*0}/H_i^0	SQ_i^0/H_i^0	E_i^{*0}/H_i^0	gain (%)
Community	1	2	3	4	5=4-3
Catalunya	2,129	2,436	97.9	99.8	1.9
Galicia	2,352	2,572	108.1	105.4	-2.7
Andalucia	2,218	2,423	102.0	99.3	-2.7
Asturias	2,378	2,565	109.3	105.1	-4.2
Cantabria	2,694	2,887	123.8	118.3	-5.5
La Rioja	2,605	2,842	119.8	116.4	-3.4
Murcia	2,012	2,306	92.5	94.5	2.0
Valencia	1,962	2,295	90.2	94.0	3.8
Aragon	2,425	2,621	111.5	107.4	-4.1
Castilla-La Mancha	2,284	2,510	105.0	102.8	-2.2
Canarias	2,051	2,419	94.3	99.1	4.8
Extremadura	2,498	2,710	114.9	111.0	-3.8
Baleares	1,915	2,357	88.1	96.6	8.5
Madrid	2,033	2,314	93.5	94.8	1.3
Castilla y Leon	2,415	2,614	111.0	107.1	-3.9
Total	2,175	2,441	100.0	100.0	0,0
CV (%)	11.1	7.7			

Source: Zabalza and López-Laborda (2010) and own calculations

Due to the different size of communities, the comparison between old and new models is best done in terms of resources standardized by some normalizing factor. Table 4 shows in columns 1 and 2 resources per capita of respectively the old and new models.[21] The old model distributes on average €2,175 per capita, with a coefficient of variation (CV) around this mean of 11.1 per cent, while the new model distributes more money, €2,441 per capita, and much more uniformly – a CV of 7.7 per cent.

[21] The autonomous community inhabitants, H_i^0, used in Table 4 correspond to 2007 and are taken from the agreed final document of the *Consejo de Politica Fiscal y Financiera* (MEH, 2009b). The data are shown in Table 6 (column 1) below.

Figure 1
Comparison between the old and new models
Relative deviation of resources per capita. Year zero



Source: Table 4

The new model, therefore, significantly flattens the distribution of resources per capita around the mean. In the old model the distribution ranges from Cantabria that gets 23.8 per cent more resources per capita than the mean, to Baleares that gets 11.9 per cent less – a difference of 35.7 percentage points. In the new model the two

extremes of the distribution are Cantabria that gets 18.3 per cent more resources, and Valencia that gets 6.0 per cent less resources – a difference of 24.3 percentage points.

The effect of the new model on each community can also be seen in Figure 1, where relative deviations are presented in an ordered fashion. The new model changes somewhat the ordering of communities and, as pointed out above, flattens significantly the distribution of relative deviations. The first five communities in terms of relative gain are Baleares (8.5 percentage points), Canarias (4.8), Valencia (3.8), Murcia (2.0) and Catalunya (1.9).[22] The first five communities in terms of relative loss are Cantabria (-5.5 percentage points), Asturias (-4.2), Aragon (-4.1), Castilla y Leon (-3.9) and Extremadura (-3.8). We show in Appendix Tables A1 and A2 that approximately the same qualitative results would be obtained if instead of resources per capita we used resources per adjusted inhabitant (the normalizing factor obtained from the adjusted population index of needs).

5. The Guarantee Fund

We now return to the guarantee fund. Substituting 9 into 8, and the resulting expression into 7, we obtain another expression of normative resources, this time as a function of the guarantee fund:

$$E_i^{*0} = 0.25T_i^{*0} + GF_i^0 + SF_i^0 + CF_i^0 + COF_i^0. \qquad (15)$$

Table 5 evaluates empirically expression 15. The new elements that appear in this decomposition are those shown in columns 1 to 3, while columns 4 to 6 are the same as the corresponding ones in Table 3. For all communities, the fourth part of assessed tax revenue, as column 1 shows, equals €20,307 million, which implies that total assessed tax revenue is €81,228 million. The new model significantly enlarges the share of communities into the main tax bases. In terms of assessed revenue, the shares go from 33 to 50 per cent in PIT; from 35 to 50 per cent in VAT; and from 40 to 58 per cent in Excises. A key difference between the PIT and the VAT is that the autonomous

[22] The big gain experienced by Baleares is in part a consequence of the Third Additional Provision of the Law discussed above, which gives this community a complement of €65 million. This represents a 39.4 per cent increase of the resources this community would be entitled to without such complement (€156 million). It should also be noted that Canarias, due to its particular geographical situation, has a special economic and fiscal regime that yields resources additional to those obtained from the system described here.

communities must each set their rate for their 50% of PIT as of 2011 but have no say with respect to the VAT. As a result, in the new model assessed tax revenue, T^{*0}, represents 78.7 per cent of total resources and the overall transfer, S^0, 21.3 per cent. In the old model these percentages would have been 69.1 and 30.9 respectively. Tax revenue, therefore, gains 9.6 percentage points in the structure of resources (see Table 2 above).

Table 5
Another decomposition of resources. Year zero
(€ Million)

	$0.25T_i^{*0}$	GF_i^0	SF_i^0	CF_i^0	COF_i^0	E_i^{*0}
Autonomous Community	1	2	3	4	5	$6=\sum_1^5$
Catalunya	4,226	11,582	910	845	0	17,563
Galicia	1,082	4,768	1,026	0	255	7,131
Andalucia	3,174	12,919	3,101	0	335	19,530
Asturias	503	1,808	351	0	95	2,757
Cantabria	288	928	420	0	18	1,654
La Rioja	151	509	217	0	0	878
Murcia	553	2,223	342	37	55	3,210
Valencia	2,330	7,783	373	723	0	11,210
Aragon	684	2,227	453	0	35	3,399
Castilla-La Mancha	777	3,434	671	0	81	4,963
Canarias	395	3,406	783	317	0	4,900
Extremadura	348	1,886	613	0	108	2,954
Baleares	640	1,682	-115	221	0	2,429
Madrid	4,037	9,281	262	494	0	14,074
Castilla y Leon	1,119	4,409	865	0	218	6,610
Total	20,307	68,845	10,272	2,638	1,200	103,262
Relative weight (%)	19.7	66.7	9.9	2.6	1.2	100.0

Source: Zabalza and López-Laborda (2010)

The aggregate figure for the guarantee fund is defined as 75 per cent of total assessed tax revenue, $0.75T^{*0}$, plus a quantity called by the Law "State Contribution", SC^0

$$GF^0 = 0.75T^{*0} + SC^0, \tag{16}$$

where SC^0, in its turn, is the sum of additional resources, AR^0, and an allocation of €524 million on account of health complementary assistance and insularity. At year zero, the guarantee fund turns out to be equal to €68,845 million, equivalent to approximately two thirds of total resources. This total is then distributed among

communities according to a new index of needs called Adjusted Population, *AP*, which is explicitly defined by the Law.

The *AP* index is formed by the sum of seven empirical indicators of need, which together with their corresponding weights are: population (which distributes 30 per cent of the total amount of the fund), area (1.8), dispersion (0.6), insularity (0.6), health assisted population (38), population older than sixty five (8.5) and population younger than seventeen (20.5). Area is measured as the number of square kilometres taken up by the community; dispersion is the number of single municipal entities,[23] and insularity the minimum distance in kilometres between the islands and the mainland territory. The number of health assisted people depends on criteria laid down in national legislation. Table 6 shows, in columns 2 and 3, the value of this index expressed in population (column 2) and relative (column 3) terms. For comparison purposes, column 1 shows unadjusted population for 2007.

Table 6
Adjusted Population index of needs

	Population H_i^0	Adjusted Population N_i^0	Relative *AP* Index θ_i^0
Autonomous Community	1	2	3
Catalunya	7,210,508	7,117,437	0.1682
Galicia	2,772,533	2,929,898	0.0693
Andalucia	8,059,461	7,939,242	0.1877
Asturias	1,074,862	1,111,259	0.0263
Cantabria	572,824	570,318	0.0135
La Rioja	308,968	313,070	0.0074
Murcia	1,392,117	1,365,915	0.0323
Valencia	4,885,029	4,783,008	0.1131
Aragon	1,296,655	1,368,284	0.0323
Castilla-La Mancha	1,977,304	2,110,248	0.0499
Canarias	2,025,951	2,093,063	0.0495
Extremadura	1,089,990	1,158,764	0.0274
Baleares	1,030,650	1,033,742	0.0244
Madrid	6,081,689	5,703,404	0.1348
Castilla y Leon	2,528,417	2,709,305	0.0640
Total	42,306,958	42,306,958	1.0000

Sources: MEH (2009b) and Zabalza and López-Laborda (2010)

[23] Despite being called "dispersion", this variable (the number of single municipal entities) is not standardized with respect to any measure of area.

Column 2 of Table 5 shows the result of distributing among communities the total amount of the guarantee fund according to the *AP* index of needs shown in Table 6. Thus,

$$GF_i^0 = \theta_i^0 GF^0. \tag{17}$$

GF_i^0 could be seen as a measure of what the new model considers the expenditure needs for fundamental services. However, it must be kept in mind that all resources, those needed to finance fundamental services and those needed to finance the rest of services, are unconditional. The fact that the model assigns, say, €17,563 million to Catalunya, of which €11,582 million are in principle provided for fundamental services, is a choice that does not generate any practical obligation for the Catalan government. Nor does the model contain any mechanism that will insure that the Catalan government will use these €11,582 million on fundamental services, nor would the Catalan government agree with such mechanism as it would seriously impair the legally granted expenditure autonomy it enjoys.[24]

This is an important point in order to understand the distribution structure of the new model in year zero, and it is therefore convenient to elaborate further on the role played by the guarantee fund. From the description so far, we have two ways of representing the amount of resources that, for a standard tax policy, the system puts under the command of communities: expressions 12 and 15, which for convenience we repeat here.

$$E_i^{*0} = SQ_i^0 + AR_i^0 + CF_i^0 + COF_i^0. \tag{12}$$

$$E_i^{*0} = 0.25T_i^{*0} + GF_i^0 + SF_i^0 + CF_i^0 + COF_i^0. \tag{15}$$

It is tempting to conclude from expression 15 that assessed tax revenue and the guarantee fund play a role in the distribution of resources of the new model, but this would be a mistake. Assessed tax revenue and the guarantee fund appear in 15 due only to the fact that this expression still contains the sufficiency fund SF_i^0 which is an equalising transfer.

[24] This is clearly an instance of what Laurent and Vaillancourt (2004) call "labelling" in systems of intergovernmental transfers. In this case, a part of total resources are given a name by the Law with nothing being done to ensure that those resources are spent on the labelled items.

If in 15, expression 10 is substituted for SF_i^0, then we go back to expression 12, where neither assessed tax revenue nor the guarantee fund play any role. The distribution structure of the new model emerges from the criteria that guide the distribution of the four primary elements in 12. As far as the status quo is concerned, the distribution is guided by the indicators of need of the previous model; and the other three terms – additional resources and the two convergence funds – are distributed according to three different sets of variables and rules of eligibility that are explicitly defined by the Law.

We may state, as the Law seems keen to pretend, that a part of total resources, namely the guarantee fund, is distributed according to the index *AP*. But then, the rest must be distributed in such a way that all resources respect the distribution implicit in expression 12. This can be seen perhaps more clearly, adding and subtracting GF_i^0 to expression 12,

$$E_i^{*0} = GF_i^0 + \left(SQ_i^0 + AR_i^0 + CF_i^0 + COF_i^0 - GF_i^0\right). \tag{18}$$

The fact that the Law identifies a portion of resources, calls it guarantee fund and distributes it according to the *AP* index, does not alter the overall distribution of resources. The guarantee fund will effectively be distributed according to *AP*, but the parenthesis in expression 18 will be distributed so that the effect of *AP* in the system is neutralized and the joint distribution of the four primary elements in 12 emerges again.[25]

After year zero, however, the guarantee fund has an influence on resources because, according to the rules that determine the growth of the system, the distribution of the sufficiency fund gets fixed in year zero and ceases to act as an equalising mechanism in subsequent years; it simply grows according to the ITE rate of growth that we define in the next section, which is common to all communities. Thus, the way in which in year zero resources (net of the two convergence funds) are partitioned between (25 per cent of) assessed tax revenue, guarantee fund and sufficiency fund matters for the distribution of resources among communities in subsequent years. In the following two sections we turn to the issue of how the system grows over time and evaluate how much

[25] López-Laborda and Zabalza (2010) use this argument to define a global index of needs for all the resources of the system.

the size of the guarantee fund matters for the variation of the distribution of resources over time.

6. Growth of resources

In the previous model, the growth of resources between years 0 and *t* followed a very simple set of rules: assessed tax revenue, T_i^{*P0}, grew at its own rate of growth τ_i, and the transfer, S_i^{P0}, grew at the common rate for all communities τ^I – called the ITE (*Ingresos Tributarios del Estado*) rate of growth. The ITE rate of growth τ^I measures the growth between years 0 and *t* of the central government revenue from Personal Income Tax, VAT and Excises. For a tax policy equal to the standard, equation 1 above reads

$$E_i^{*P0} = T_i^{*P0} + S_i^{P0}$$

Then, according to the above growth rules, resources at year *t* in the previous model were:

$$E_i^{*Pt} = T_i^{*P0}\left(1+\tau_i\right) + S_i^{P0}\left(1+\tau^I\right),$$

which can be rewritten as:

$$E_i^{*Pt} = E_i^{*P0}\left[\lambda_i\left(1+\tau_i\right) + \left(1-\lambda_i\right)\left(1+\tau^I\right)\right], \tag{19}$$

where $\lambda_i = T_i^{*P0} / E_i^{*P0}$. That is, in the previous model, the factor of growth of resources (the expression in brackets) was a weighted average of $1+\tau_i$ and $1+\tau^I$, where the respective weights were the shares for each community of assessed tax revenue and transfer in total resources.

In the new model things are somewhat more complicated. The rules of growth are given by the Law with reference to the elements of expression 15 above. The temporal variation of the first term, $0.25T_i^{*0}$, is driven by the rate of growth of the community *i* assessed tax revenue, τ_i. Regarding the guaranty fund, GF_i^0, the model proceeds in two steps: First, the variation of the total amount of the fund is driven by the rate of growth of aggregate assessed tax revenue τ as far as the component $0.75T^{*0}$ of its definition is

concerned (see expression 16 above), and by the ITE rate τ^I regarding the state contribution component SC^0. Second, the *AP* index for year *t* is applied to this total to obtain the amount for each community.

The growth of the sufficiency fund, SF_i^0, is driven by the rate τ^I, common to all communities. The two convergence funds follow a two step procedure similar to that of the guarantee fund. The total amount of the competitiveness fund, CF^0, is driven by τ^I if the Third Additional Provision of the Law referred to above does not enter into operation, and by a rate of growth greater than τ^I if it does; let us call the resulting rate of growth τ^c. This total amount for year *t* is then distributed among eligible communities according to the index of needs *AP* for that year. However, the corresponding allocations are subject to a series of caps and floors with the consequence that the rates of variation of the individual allocations of this fund end up being specific to each eligible community and variable over time. We call these rates τ_i^c. Finally, the total amount of the cooperation fund is driven again by τ^I, and this total amount for year *t* is distributed among eligible communities according to the value of the index of relative poverty referred to above for that year. We call the resulting rates τ_i^{co}.

To clarify how these rules enter into the model it is useful to rewrite 15 as follows:

$$E_i^{*0} = 0.25T_i^{*0} + \theta_i^0\left(0.75T^{*0} + SC^0\right) + SF_i^0 + CF_i^0 + COF_i^0, \tag{20}$$

where 16 and 17 have been used. According to the above growth rules, resources for community *i* at year t are:

$$\begin{aligned} E_i^{*t} = {} & 0.25T_i^{*0}\left(1+\tau_i\right) + \theta_i^t\left[0.75T^{*0}\left(1+\tau\right) + SC^0\left(1+\tau^I\right)\right] + \\ & SF_i^0\left(1+\tau^I\right) + CF_i^0\left(1+\tau_i^c\right) + COF_i^0\left(1+\tau_i^{co}\right), \end{aligned} \tag{21}$$

and resources for all communities:

$$\begin{aligned} E^{*t} = {} & 0.25T^{*0}\left(1+\tau\right) + \left[0.75T^{*0}\left(1+\tau\right) + SC^0\left(1+\tau^I\right)\right] + \\ & SF^0\left(1+\tau^I\right) + CF^0\left(1+\tau^c\right) + COF^0\left(1+\tau^I\right). \end{aligned} \tag{22}$$

The resulting growth pattern is obviously different from that of the previous model, but it can easily be expressed in terms of the framework given by 19 above. In the new model we have from 7 that

$$E_i^{*0} = T_i^{*0} + S_i^0.$$

Writing 20 in terms of assessed tax revenue plus the cash transfer, we have:

$$E_i^{*0} = T_i^{*0} + \left[\theta_i^0 \left(0.75T^{*0} + SC^0 \right) - 0.75T_i^{*0} + SF_i^0 + CF_i^0 + COF_i^0 \right], \qquad (23)$$

where the cash transfer is the block of terms contained in the square brackets.

The outcome of the above growth rules is that, for the new model, the rate of growth of total resources is a weighted average of τ_i and the rate of growth of the terms contained in the square brackets of 23, which itself is a composite result from applying these rules to each of its six elements. That is,

$$E_i^{*t} = T_i^{*0}\left(1+\tau_i\right) + \left\{ \left[\begin{array}{l} \theta_i^t \left[0.75T^{*0}\left(1+\tau\right) + SC^0\left(1+\tau^I\right) \right] - 0.75T_i^{*0}\left(1+\tau_i\right) + \\ SF_i^0\left(1+\tau^I\right) + CF_i^0\left(1+\tau_i^c\right) + COF_i^0\left(1+\tau_i^{co}\right) \end{array} \right] \right\}. \qquad (24)$$

If we call the growth factor associated to the cash transfer $1+\tau_i^s$, we have:

$$E_i^{*t} = E_i^{*0}\left[\phi_i\left(1+\tau_i\right) + \left(1-\phi_i\right)\left(1+\tau_i^s\right) \right], \qquad (25)$$

where $\phi_i = T_i^{*0} / E_i^{*0}$. Assessed tax revenue grows as in the old model, but the new cash transfer grows at a rate that is specific for each community and, among other things, incorporates the change in needs.[26]

7. Empirical simulation

Methodology and data

The simulation methodology can be described as follows: First, empirical data for the growth rates of assessed tax revenue, ITE, need variables and GDP are used. Annual growth rates of assessed tax revenue and ITE are estimated as the average of observed growth rates of these items from 2004 to 2007, and are taken from MEH (2006 and 2009a). The growth rates of each of the need indicators and GDP (used in the eligibility rule of the cooperation fund and its distribution) correspond also to the average of period 2004 to 2007 and are taken from the National Statistics Institute. Only one rate

[26] For an expression that formally shows how the growth factor of the cash transfer $\left(1+\tau_i^s\right)$ is related to the growth of needs and to τ^I, τ_i^c and τ_i^{co}, see López-Laborda and Zabalza (2010).

of growth for each concept is estimated, and this rate is used as the average annual rate over the whole simulated quinquennium. The years 2004 to 2007 correspond to a period of cyclical expansion and this explains, despite the averaging, the relatively high growth rates used in the estimation. However, it is considered preferable to work with empirical rather than with hypothetical data. This choice may influence absolute effects but, as with the estimates of year zero, should make little difference to relative effects, which are the main object of the exercise.

Second, despite working with average annual rates, the five years of the quinquennium are simulated.[27] This is done to obtain a more realistic profile of the annual growth of the convergence funds. Because of the eligibility rules, this profile turns out to be specific to each community and subject to potential discontinuities. Had the simulation restricted the period of interest to only one year (or equivalently to the whole of the quinquennium), these particularities would have gone unnoticed.

Table 7 repeats for year one the information of Table 6 and shows the average annual rates of growth of adjusted population. Although the new model uses each year the relative structure of needs, θ_i, in order to see how needs change over time, it is more informative to use the growth of adjusted population, τ_i^n.

Table 7
Growth of needs

Autonomous Community	Population H_i^1	Adjusted Population N_i^1	θ_i^1	$1+\tau_i^n$
	1	2	3	4
Catalunya	7.347.985	7.257.699	0,1689	1,020
Galicia	2.779.753	2.943.242	0,0685	1,005
Andalucia	8.187.399	8.055.204	0,1874	1,015
Asturias	1.075.229	1.113.916	0,0259	1,002
Cantabria	578.967	576.663	0,0134	1,011
La Rioja	314.284	318.679	0,0074	1,018
Murcia	1.426.194	1.397.263	0,0325	1,023
Valencia	5.004.556	4.902.312	0,1141	1,025
Aragon	1.312.736	1.383.908	0,0322	1,011
Castilla-La Mancha	2.022.064	2.147.754	0,0500	1,018
Canarias	2.064.151	2.130.479	0,0496	1,018
Extremadura	1.094.936	1.162.030	0,0270	1,003
Baleares	1.057.159	1.058.695	0,0246	1,024
Madrid	6.176.880	5.810.546	0,1352	1,019

[27] This article only shows the simulation results corresponding to the last year of the quinquennium, but the intervening years are available upon request.

Castilla y Leon	2.540.022	2.723.926	0,0634	1,005
Total	42.982.316	42.982.316	1,0000	1,016

Sources: MEH(2009b) and Zabalza and López-Laborda (2010)

As can be seen in column 4, total needs are assumed to grow at an annual average rate of 1.6 per cent. Valencia, Baleares and Murcia are the three communities with the largest growth of needs, and Asturias, Extremadura and Galicia the three communities with the smallest growth. Of the seven need indicators, all of them vary over time except area, dispersion and insularity.[28]

The ITE annual growth rate is 10.9 per cent, $\left(1+\tau^{I}\right)=1.109$, and Table 8 shows the annual average growth rate of assessed tax revenue. Tax capacity for all communities grows 9.7 per cent per year. Madrid, Canarias and Castilla-La Mancha are the three communities where assessed tax revenue grows most, and at the other end we find Baleares, Asturias and Galicia. Notice that the ITE annual growth rate differs from the growth rate of aggregate assessed tax revenue (10.9 per cent versus 9.7 per cent). This is because the shares of Personal Income Tax, VAT and Excises are different for central and autonomous jurisdictions, and also because assessed tax revenue includes other fully ceded taxes, such as Inheritance and Gift Tax, Capital Transfer Tax, Stamp Duties, Gaming Taxes, Vehicles Excises, Hydrocarbon Retail Sales Tax and Electricity Tax.

Table 8
Growth of assessed tax revenue

	Assessed Tax Revenue $1+\tau_i$
Catalunya	1.095
Galicia	1.087
Andalucia	1.096
Asturias	1.086
Cantabria	1.093
La Rioja	1.093
Murcia	1.103
Valencia	1.097
Aragon	1.097
Castilla-La Mancha	1.105
Canarias	1.106
Extremadura	1.089

[28] Observe that if an autonomous community merged municipalities in order to obtain economies of scale, it would loose under this criterion. In practice this is not likely to happen, as the tendency in the past has been towards division rather than merger of municipalities.

Baleares	1.078
Madrid	1.109
Castilla y Leon	1.090
Total	1.097

Sources: MEH (2006 and 2009a)

Results

The growth of the system is obtained by applying these rates of growth to the procedure described in Section 6 above. Table 9 shows the figures for the last year of the quinquennium. Assessed tax capacity grows at an average annual rate of 9.7 per cent. The guarantee fund grows at a rate of 9.9 per cent, which is a weighted average of the rate of growth of assessed tax revenue (9.7 per cent) and the ITE growth rate (10.9 per cent). The sufficiency and cooperation funds both grow at the ITE rate (10.9 per cent) and the competitiveness fund somewhat less, 10.4 per cent, due to fact that in the last year of the quinquennium Baleares is no longer eligible for the Third Additional Provision. The overall result is that total resources grow 9.9 per cent per year.

Table 9
Resources of the new model. Year five[1]
(€ Million)

	$0,25T_i^{*5}$	GF_i^5	SF_i^5	CF_i^5	COF_i^5	E_i^{*5}
Autonomous Communitiy	1	2	3	4	5	$6=\sum_1^5$
Catalunya	6,657	18,892	1,321	1,566	0	28,435
Galicia	1,642	7,217	1,692	0	396	10,946
Andalucia	5,013	20,550	5,146	0	517	31,226
Asturias	759	2,707	573	0	148	4,188
Cantabria	448	1,451	690	0	29	2,618
La Rioja	236	824	355	0	0	1,415
Murcia	904	3,683	558	73	94	5,311
Valencia	3,695	13,022	544	1,080	0	18,341
Aragon	1,089	3,487	732	0	56	5,364
Castilla-La Mancha	1,279	5,548	1,110	0	136	8,073
Canarias	653	5,509	1,296	366	121	7,945
Extremadura	533	2,830	1,025	0	171	4,559
Baleares	932	2,804	-215	232	0	3,753
Madrid	6,768	15,070	196	1,003	0	23,037
Castilla y Leon	1,720	6,700	1,421	0	348	10,189
Total	32,329	110,294	16,443	4,320	2,015	165,401
Relative weights	19.5	66.7	9.9	2.6	1.2	100.0
Annual average growth	9.7	9.9	10.9	10.4	10.9	9.9

Source: Zabalza and López-Laborda (2010)
1. Simulation obtained with assumed growth rates corresponding to the period 2004-2007.

Regarding individual results, the set of communities that benefits from the competitiveness fund remains stable during the whole quinquennium, while that of the cooperation fund experiences the addition of Canarias, which becomes eligible in the second year. The complex rules of eligibility, thus, generate a very particular and variable pattern of distribution. The economic logic of the eligibility rules of the competitiveness fund is not apparent from the text of the Law, but the final outcome suggests that this instrument somewhat compensates those (mostly rich) communities that were worst treated by the old model. The logic of the cooperation fund is more familiar, but a doubt remains whether this fund is an instrument of regional policy rather than an element of an equalising system of intergovernmental grants. Overall, judging from the way these funds work, they seem designed to satisfy particular demands of communities.

The implementation and management of the new model will not be easy. To take into account the temporal variation of needs adds an evident complication to the model, but this is amply compensated by the closer response of resources to changes in communities' socio-demographic characteristics. Given the structural nature of needs and the gradual way in which they change, we should not expect great differences between provisional and final transfers, although the period in which provisional transfers become final will inevitably lengthen. The biggest management problem will be that of the two convergence funds and, particularly, that of the competitiveness fund. The eligibility conditions and the adjustments contemplated by the model depend on the variation of economic and demographic variables, the evolution of which is sometimes measured with significant delays. The potential exit of some community after having received provisional transfers during perhaps several years, may pose non negligible difficulties.[29]

Table 10 compares, in per capita terms, base and last year of the quinquennium and Figure 2 presents the relative gain of each community over this period in an ordered fashion. The most noticeable feature is the widening of the distribution: the coefficient

[29] Although not considered in the Law, a subsequent public statement from the Spanish Economics and Finance Minister, Ms. Salgado, seems to suggest that the usual procedure consisting of provisional advances followed by final payments will not be available in the case of convergence funds, and that the corresponding transfers will be made only when the final figures can be assessed. As compared with expectations held by communities and based on the text of the Law, this would impose a severe delay in the perception of resources. However, it remains to be seen what will be the practical consequences of this statement.

of variation goes from 7.7 per cent in year zero to 9.1 per cent in year five. In part, this is due to the loss in year five of the special complement received by Baleares during the previous four years as a result of the Third Additional Provision (see note 21 above), but even without Baleares the coefficient of variation would increase from 7.9 per cent to 8.7 per cent.

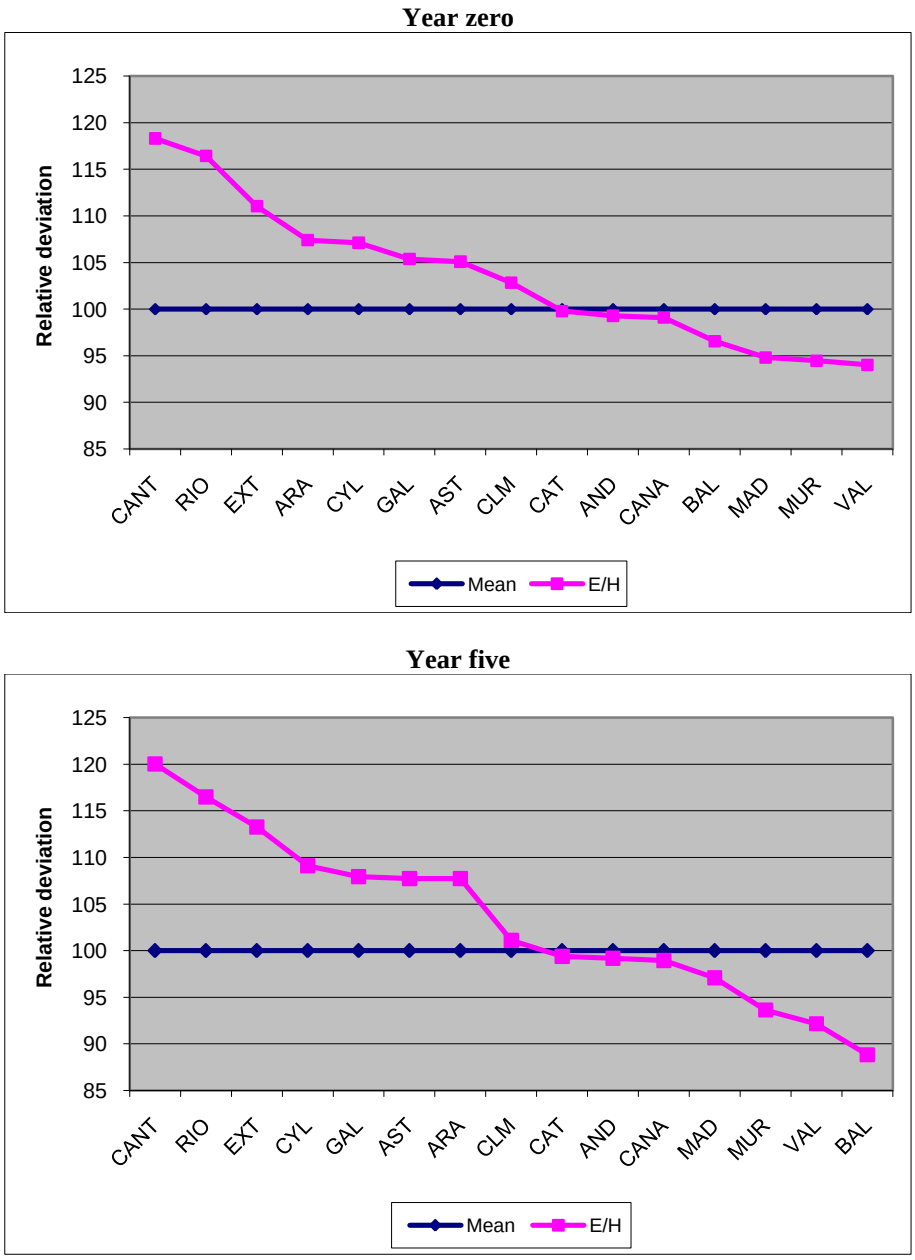
Table 10
Growth of resources per capita (t5 vs t0)

	€ per capita		Relative deviation (%)		Relative
Autonomous Communtiy	E_i^{*0}/H_i^0	E_i^{*5}/H_i^5	E_i^{*0}/H_i^0	E_i^{*5}/H_i^5	gain (%)
	1	2	3	4	5=4-3
Catalunya	2,436	3,588	99.8	99.4	-0.4
Galicia	2,572	3,897	105.4	107.9	2.6
Andalucia	2,423	3,581	99.3	99.2	-0.1
Asturias	2,565	3,890	105.1	107.7	2.7
Cantabria	2,887	4,333	118.3	120.0	1.7
La Rioja	2,842	4,205	116.4	116.5	0.1
Murcia	2,306	3,381	94.5	93.6	-0.8
Valencia	2,295	3,327	94.0	92.2	-1.9
Aragon	2,621	3,890	107.4	107.7	0.3
Castilla-La Mancha	2,510	3,651	102.8	101.1	-1.7
Canarias	2,419	3,572	99.1	98.9	-0.2
Extremadura	2,710	4,089	111.0	113.3	2.2
Baleares	2,357	3,207	96.6	88.8	-7.7
Madrid	2,314	3,505	94.8	97.1	2.3
Castilla y Leon	2,614	3,939	107.1	109.1	2.0
Total	2,441	3,610	100.0	100.0	0.0
CV (%)	7.7	9.1			

Sources: Zabalza and López-Laborda (2010) and own calculations

Communities than gain with the new model are the ones that tend to loose with the passing of time and vice versa. The pattern of growth, therefore, eliminates in part the gains in uniformity obtained with the new model. Uniformity may not be a sufficiently strong criterion on which to judge the adequacy of the rules of growth of the system, but the new model comes out with results that in principle seem to go against its purported objective to take into account the temporal change of needs. Asturias and Galicia, the two communities whose increase in resources per capita over time is the largest, are also the ones whose needs grow the least; while Baleares and Valencia, the two communities in which resources grow the least, are both of them the ones with the highest growth of needs.

Figure 2
New model; comparison between year zero and year five
Relative deviation of resources per capita



Source: Table 10

Given that needs and population are positively correlated, however, the negative association between the growth of resources per capita and the growth of needs may to some extent be expected, and have little to do with the model. A better way to look at this question is to compare directly the growth of resources with the growth of needs. Table 11 and Figure 3 do precisely this, using relative shares in order to facilitate the comparison. There is a positive association between the growth of relative resources and the growth of relative needs (a correlation coefficient of 0.78), mainly due to the fact that the guarantee fund, and to some extent the competitiveness fund, are distributed according to the adjusted population index of needs. However, the relationship is far from perfect, which is what we would require to ensure that horizontal equity is maintained over time.[30] In general, for communities whose needs (relative to the overall level of needs) have grown, the growth of resources (relative to the overall amount of resources) is less than the growth of relative needs, and vice versa. The growth of relative resources is less than the growth of relative needs in Baleares (-1.52 percentage points), Valencia (-0.45), Catalunya (-0.15), La Rioja (-0.06) and Murcia (-0.02), while the opposite is true for the rest of communities. The five communities for which the difference between the growth of relative resources and the growth of relative needs is largest are: Extremadura (0.55 percentage points), Asturias (0.29), Castilla y Leon (0.28), Galicia (0.28) and Cantabria (0.25).

Table 11
Growth of relative resources and growth of relative needs[1]
Average annual rates
(Percentages)

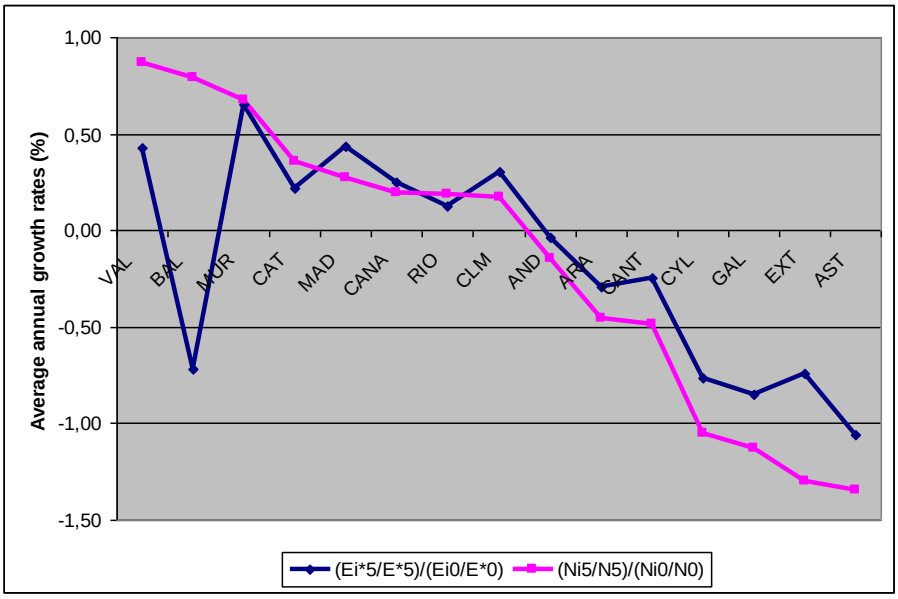
	$\frac{E_i^{*5}/E^{*5}}{E_i^{*0}/E^{*0}}$	$\frac{N_i^5/N^5}{N_i^0/N^0}$
Valencia	0,43	0,87
Baleares	-0,72	0,79
Murcia	0,65	0,68
Catalunya	0,22	0,36
Madrid	0,44	0,27
Canarias	0,25	0,19
La Rioja	0,12	0,19
Castilla-La Mancha	0,31	0,17
Andalucia	-0,04	-0,14
Aragon	-0,30	-0,46
Cantabria	-0,24	-0,49

[30] See López-Laborda and Zabalza (2010). Based on the equality of these two rates of growth for all communities, these authors propose a growth mechanism that maintains horizontal equity over time.

Castilla y Leon	-0,77	-1,05
Galicia	-0,85	-1,13
Extremadura	-0,74	-1,30
Asturias	-1,06	-1,34
Total	0,00	0,00

1.As measured by adjusted population.
Source: Own calculations

Figure 3
Growth of relative resources and growth of relative needs



Source: Table 11

8. Influence of the guarantee fund on resources after year zero

In Section 5 above we show that, in year zero, the guarantee fund has no influence on total resources or in the distribution of these resources among communities. We point out as well that, due to the growth mechanism posited by the model, the size of the guarantee fund does have an influence on the distribution of resources in subsequent years. Here we address the question of evaluating empirically the extent of this influence. This is an interesting question on its own, and it is also useful to understand further the growth mechanism and the results obtained in Table 9.

Given that assessed tax revenue, the guarantee fund transfer and the sufficiency fund do not depend on the two convergence funds,[31] we concentrate on resources net of these two funds; we call this concept "resources before funds", *RBF*. Subtracting the two convergence funds from 8 and using 7, the definition of RBF_i^0 is:

$$RBF_i^0 = T_i^{*0} + GFT_i^0 + SF_i^0. \tag{26}$$

Subtracting the two convergence funds from 12, we find that, in terms of primary variables, resources before funds is also the sum of the status quo and additional resources,

$$RBF_i^0 = SQ_i^0 + AR_i^0. \tag{27}$$

Expressions 26 and 27 show the basic identity of the new model: resources before funds are the status quo plus additional resources (expression 27), which, in terms of the channels trough which communities receive funds, can also be expressed as the sum of assessed tax revenue, guarantee fund transfer and sufficiency fund (expression 26). The right hand side of both expressions must always be equal. Therefore, given that the status quo and additional resources are exogenous (primary) variables, the partition of resources between tax revenue, guarantee fund transfer and sufficiency fund cannot be independent of each other. We may *label* a part of resources as *guarantee fund transfer*, and indeed this part may be anything we want. But then tax revenue and the sufficiency fund will adjust themselves so that the basic identity

$$T_i^{*0} + GFT_i^0 + SF_i^0 \equiv SQ_i^0 + AR_i^0 \tag{28}$$

continues to hold.

Using 10, expression 26 can be rewritten as:

$$RBF_i^0 = T_i^{*0} + GFT_i^0 + \left(SQ_i^0 + AR_i^0 - T_i^{*0} - GFT_i^0\right).$$

To see what influence labelling has on the resources of community *i*, let us introduce a partition parameter k $(k \geq 0)$,[32] such that

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[31] Although the opposite is not true, since the two convergence funds do depend on the sum of tax revenue, guarantee fund transfer and sufficiency fund.

[32] In the text we only consider two cases: $k = 0$ and $k = 1$. The argument however is completely general and allows for any value of *k* smaller or greater than 1.These would correspond respectively to amounts

$$RBF_i^0 = T_i^{*0} + kGFT_i^0 + \left(SQ_i^0 + AR_i^0 - T_i^{*0} - kGFT_i^0\right),$$

and using 9

$$RBF_i^0 = T_i^{*0} + kGF_i^0 - k0.75T_i^{*0} + \left(SQ_i^0 + AR_i^0 - T_i^{*0} - kGF_i^0 + k0.75T_i^{*0}\right),$$

or

$$RBF_i^0 = \left(1-k0.75\right)T_i^{*0} + kGF_i^0 + \left[SQ_i^0 + AR_i^0 - \left(1-k0.75\right)T_i^{*0} - kGF_i^0\right]. \qquad (29)$$

Expression 29 is valid for any *k* and shows that if the guarantee fund increases (*k* rises), both assessed tax revenue and the sufficiency fund (the expression in square brackets) must decrease so that identity 28 is maintained. Two special cases of interest are when $k=0$ (there is no labelling) and when $k=1$ (the amount of resources labelled as *guarantee fund* is the one given by the new model). If $k=0$,

$$RBF_i^0\Big|_{k=0} = T_i^{*0} + \left(SQ_i^0 + AR_i^0 - T_i^{*0}\right). \qquad (30)$$

If $k=1$,

$$RBF_i^0\Big|_{k=1} = 0.25T_i^{*0} + GF_i^0 + \left(SQ_i^0 + AR_i^0 - 0.25T_i^{*0} - GF_i^0\right). \qquad (31)$$

Comparing 30 and 31 we see again that the guarantee fund is completely neutral regarding resources in year zero: whatever the value of *k*, resources before funds will always be equal to the sum of status quo and additional resources.

However, given the growth rules described above, this is not the case for subsequent years. Consider how expression 29 varies over time. At time *t*,

$$\begin{aligned} RBF_i^t = {} & \left(1-k0.75\right)T_i^{*0}\left(1+\tau_i\right) + k\theta_i^t GF^t + \\ & \left[SQ_i^0 + AR_i^0 - \left(1-k0.75\right)T_i^{*0} - k\theta_i^0 GF^0\right]\left(1+\tau^I\right), \end{aligned} \qquad (32)$$

where

$$GF^t = 0.75T^{*0}\left(1+\tau\right) + SC^0\left(1+\tau^I\right).$$

If $k=0$,

$$RBF_i^t\Big|_{k=0} = T_i^{*0}\left(1+\tau_i\right) + \left[SQ_i^0 + AR_i^0 - T_i^{*0}\right]\left(1+\tau^I\right). \qquad (33)$$

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of the guarantee fund transfer (and therefore of the guarantee fund) respectively smaller and greater than the particular amount specified in the Law.

If $k=1$,

$$RBF_i^t\Big|_{k=1} = 0.25T_i^{*0}\left(1+\tau_i\right)+\theta_i^t GF^t+\left[SQ_i^0+AR_i^0-0.25T_i^{*0}-\theta_i^0 GF^0\right]\left(1+\tau^I\right). \quad (34)$$

The effect of introducing the guarantee fund can be calculated subtracting 33 from 34.

$$RBF_i^t\Big|_{k=1} - RBF_i^t\Big|_{k=0} = 0.75T_i^{*0}\left(\tau^I-\tau_i\right)+\left[\theta_i^t GF^t-\theta_i^0 GF^0\left(1+\tau^I\right)\right]. \quad (35)$$

The introduction of the guarantee fund decreases both assessed tax revenue and the sufficiency fund. The first element of 35 measures the effect of displacing resources away from assessed tax revenue, and the second that of displacing resources away from the sufficiency fund. The first effect depends on the weighted differential between the ITE and the tax revenue rates of growth. The second effect is generated by the variation over time of the *AP* index of needs.

Summing up 32 over all communities, we obtain:

$$RBF^t = \left(SQ^0+AR^0\right)\left(1+\tau^I\right)+T^{*0}\left(\tau-\tau^I\right). \quad (36)$$

The growth of total resources is the same irrespective of the amount of labelling. Whatever the size of the guarantee fund (that is, whatever *k*), total resources grow according to 36.

In Table 12 we evaluate expression 35 in millions of euros and in elasticity terms. Not all communities gain from the introduction of the guarantee fund: Baleares, Valencia, Catalunya, Rioja and Murcia gain, but the rest loose. With the exception of Baleares, effects are relatively small. For instance, in Catalunya the introduction of the guarantee fund increases resources before funds in the first year of the quinquennium by 104 €million; an implied elasticity of 0.0057. Elasticities differ between communities, but for each community, if evaluated at the same point, are constant with respect to the change in the size of the guarantee fund. Also, measured at the last year of the quinquennium, elasticities are in absolute terms about five times as large as those measured at the first year.

The introduction of the guarantee fund favours communities with relative high rates of growth of needs, whereas the opposite is the case for communities with relatively low growth of needs. The correlation coefficient between one year elasticities and need

growth rates is 0.64. The guarantee fund also favours communities with a relatively high weighted difference between the ITE and revenue growth rates. The association in this case is not as strong as in the case of needs; the correlation coefficient between one year elasticities and the weighted difference ITE minus tax revenue growth rates is 0.31.

Table 12
Introduction of the guarantee fund. Effect on resources

	$t=1$		$t=5$	
	€million	Elasticities	€million	Elasticities
Catalunya	104.0	0.0057	762.6	0.0284
Galicia	-36.4	-0.0049	-262.0	-0.0248
Andalucia	-26.4	-0.0013	-197.4	-0.0064
Asturias	-10.4	-0.0036	-74.3	-0.0184
Cantabria	-0.3	-0.0002	-2.4	-0.0009
La Rioja	3.1	0.0032	22.3	0.0158
Murcia	3.4	0.0010	24.8	0.0048
Valencia	81.9	0.0071	604.6	0.0350
Aragon	-10.1	-0.0027	-72.6	-0.0137
Castilla-La Mancha	-18.8	-0.0035	-139.0	-0.0175
Canarias	-24.8	-0.0049	-180.9	-0.0243
Extremadura	-25.7	-0.0083	-183.4	-0.0418
Baleares	57.4	0.0237	409.5	0.1163
Madrid	-65.0	-0.0044	-483.4	-0.0219
Castilla y Leon	-31.8	-0.0046	-228.5	-0.0232
Total	0.0	0.0000	0.0	0.0000

Source: Table A4

9. Final remarks

The reform of the Spanish system of intergovernmental transfers takes as its starting point the resources distributed by the old model (the Status Quo), and adds to this point fresh resources by means of the so called additional resources and the two convergence funds. The status quo represents 89.1 per cent of total resources. Despite that, the distribution is significantly different from that of the old model: it is much less dispersed and there are important changes in the effects upon particular communities.

That is, the distribution of fresh resources contributed to the system is not neutral with respect the distribution of the status quo.

In the distribution of the so called additional resources, adjusted population and its growth play an important role and this benefits communities such as Murcia, Baleares, Canarias, Madrid, Valencia and Catalunya, which in the old model were not particularly well treated. These are also the communities that benefit from the competitiveness fund, which in that sense reinforces the distributive effect of additional resources. Finally, the cooperation fund, although it counteracts somewhat these two effects, is not big enough to cancel them completely. The final result is a significant flattening of the distribution of resources per capita (a reduction of the coefficient of variation from 11.1 to 7.7 per cent) and a relative improvement of the financial position of these richer communities.

The new model is rather obscure concerning the distribution structure it implies. The model gives a great deal of importance to the guarantee fund and to the adjusted population index of needs that distributes this fund among communities. But given the unconditional nature of resources, it is difficult to see why this importance is granted and what purpose it serves. The guarantee fund and its distribution play no role in the definition of year zero. In year zero, total resources and their distribution are completely determined by the status quo, the so called additional resources and the two convergence funds.

The paper also examines the growth structure of resources that the new model implies. The variation of total resources over time is essentially driven by a combination of the rate of growth of total tax revenue and the ITE growth rate. Concerning individual communities, the variation of about 20 per cent of resources (those corresponding to 25 per cent of assessed tax revenue) is driven by the growth of the community's assessed tax revenue; that of 69 per cent of resources (guarantee plus competitiveness funds) is again driven by a combination of total tax revenue and ITE growth rates, but takes also into account the variation of needs; and finally, the variation of the remaining 11 per cent (sufficiency plus cooperation funds) is driven by the ITE growth rate. Although the labelling of a part of total resources as *guarantee fund* does not matter as far as the definition of year zero, it plays a role in the temporal variation of the distribution of resources. It favours, in particular, communities with high rates of growth of needs, and vice versa. The effect, however, is relatively small.

The main objectives of this paper are descriptive and methodological in nature. The empirical simulation should largely be seen as an illustrative exercise. The gradual contribution of new resources, the particular way in which some of these resources are measured in the Law (in nominal values of future years), and the severe disruption that the 2008-2010 cyclical economic downturn has meant for the predictability of most economic series, are all circumstances that render difficult an exercise such as this. Despite that, we believe that to gain a proper understanding of the workings of the model, of the relative weight of each of its variables and of the potential problems that the rules of eligibility of the two convergence funds may pose, it is important to empirically quantify the system. The numerical results of the simulation are naturally subject to the assumptions we have made regarding the fall in tax revenue up to 2010 – which will determine the initial values of the model at that year – and the annualized rates of growth of revenue and needs used to simulate the rest of quinquennium.

Of the five major revisions of the system, this reform is the most expensive. It is not clear that the return per euro invested is particularly high. On the positive side we have a significant reduction in the dispersion of the distribution of resources per capita. On the negative side: the system has become complex and obscure regarding the distribution criteria it uses; its growth mechanism opens the possibility that relative positions change over time, and this that may be contested by communities; and, finally, it may pose significant management problems, particularly regarding potential discontinuities in the membership of the convergence funds. The main technical shortcomings of the model are, on the one hand, an explicit index of needs applicable to all resources and, on the other, a growth mechanism that, subject to the change of needs, keeps the year zero distribution unchanged. To practically overcome these shortcomings we will have to wait until the next reform, but the analysis of normative proposals on these issues opens an interesting agenda of future work for the academic community.

Appendix Tables and Figures

Table A1
Comparison between the old and new models. Resources per adjusted population

Autonomuos Community	€ per adjusted population SQ_i^0/N_i^0	E_i^{*0}/N_i^0	Relative deviation (%) SQ_i^0/N_i^0	E_i^{*0}/N_i^0	Relative gain (%)
	1	2	3	4	5=4-3
Catalunya	2,157	2,468	99.2	101.1	1.9
Galicia	2,225	2,434	102.3	99.7	-2.6
Andalucia	2,252	2,460	103.5	100.8	-2.7
Asturias	2,300	2,481	105.7	101.6	-4.1
Cantabria	2,706	2,901	124.4	118.8	-5.6
La Rioja	2,571	2,804	118.2	114.9	-3.3
Murcia	2,051	2,350	94.3	96.3	2.0
Valencia	2,004	2,344	92.1	96.0	3.9
Aragon	2,298	2,484	105.6	101.8	-3.9
Castilla-La Mancha	2,140	2,352	98,4	96.4	-2.0
Canarias	1,986	2,341	91.3	95.9	4.6
Extremadura	2,350	2,549	108.0	104.5	-3.6
Baleares	1,910	2,350	87.8	96.3	8.5
Madrid	2,168	2,468	99.7	101.1	1.4
Castilla y Leon	2,253	2,440	103.6	100.0	-3.6
Total	2,175	2,441	100.0	100.0	0.0
CV (%)	9.8	6.7			

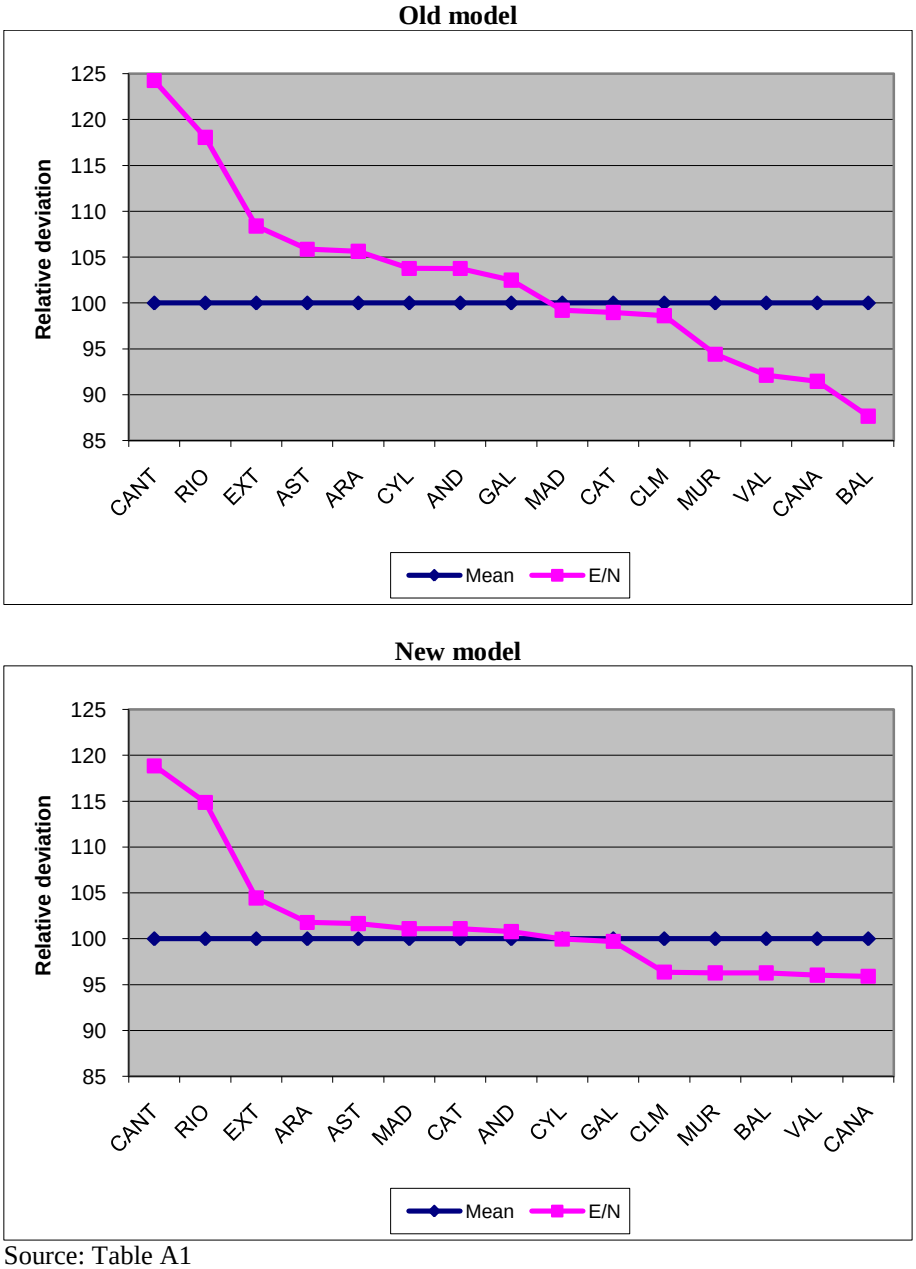
Source: Zabalza and López-Laborda (2010)

Table A2
Growth of resources per adjusted population (t5 vs t0)

Autonomous Communtiy	€ per adjusted population E_i^{*0}/N_i^0	E_i^{*5}/N_i^5	Relative deviation (%) E_i^{*0}/N_i^0	E_i^{*5}/N_i^5	Relative gain (%)
	1	2	3	4	5=4-3
Catalunya	2,468	3,624	101.1	100.4	-0.7
Galicia	2,434	3,651	99.7	101.1	1.4
Andalucia	2,460	3,658	100.8	101.3	0.5
Asturias	2,481	3,724	101.6	103.1	1.5
Cantabria	2,901	4,344	118.8	120.3	1.5
La Rioja	2,804	4,134	114.9	114.5	-0.4
Murcia	2,350	3,472	96.3	96.2	-0.1
Valencia	2,344	3,391	96.0	93.9	-2.1
Aragon	2,484	3,704	101.8	102.6	0.8
Castilla-La Mancha	2,352	3,503	96.4	97.0	0.7
Canarias	2,341	3,472	95.9	96.2	0.3
Extremadura	2,549	3,878	104.5	107.4	3.0
Baleares	2,350	3,223	96.3	89.3	-7.0
Madrid	2.468	3,680	101.1	101.9	0.8
Castilla y Leon	2,440	3,661	100.0	101.4	1.4
Total	2,441	3,610	100.0	100.0	0.0
CV (%)	6.7	7.8			

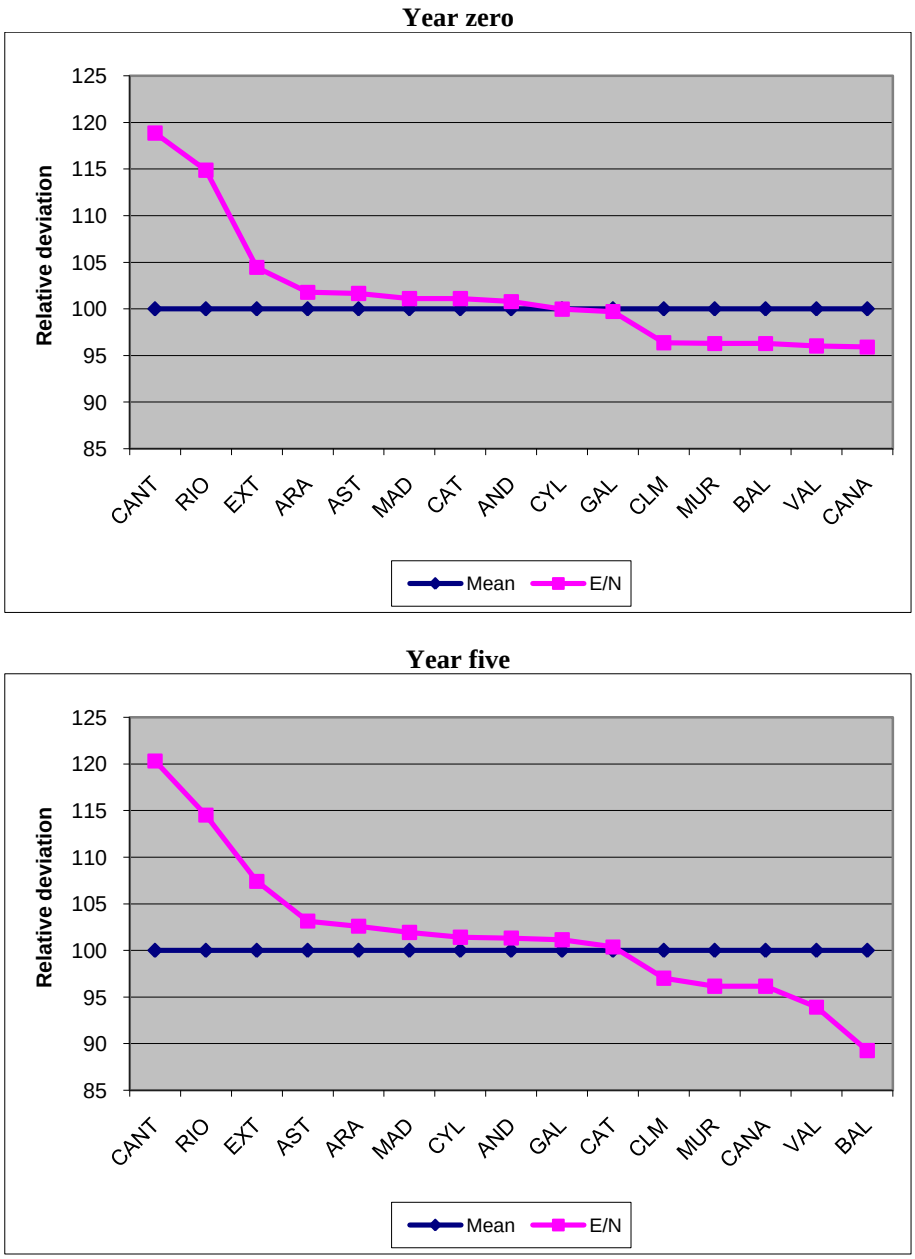
Sources: Zabalza and López-Laborda (2010)

Figure A1
Comparison between the old and new models
Relative deviation of resources per adjusted population. Year zero



Source: Table A1

Figure A2
New model; comparison between year zero and year five
Relative deviation of resources per adjusted population



Source: Table A2

Table A4
Effect of labelling on resources before funds

		€million			
Autonomous	$t=0$	$t=1$		$t=5$	
Community		$k=0$	$k=1$	$k=0$	$k=1$
Catalunya	16,718	18,255	18,359	26,107	26,869
Galicia	6,876	7,523	7,486	10,812	10,550
Andalucia	19,194	21,105	21,078	30,906	30,708
Asturias	2,662	2,902	2,892	4,114	4,040
Cantabria	1,636	1,792	1,792	2,591	2,589
La Rioja	878	961	965	1,392	1,415
Murcia	3,117	3,441	3,444	5,120	5,145
Valencia	10,487	11,494	11,576	16,657	17,262
Aragon	3,364	3,692	3,682	5,381	5,308
Castilla-La Mancha	4,882	5,397	5,378	8,076	7,937
Canarias	4,583	5,074	5,049	7,639	7,458
Extremadura	2,846	3,128	3,102	4,571	4,388
Baleares	2,208	2,363	2,421	3,111	3,521
Madrid	13,580	14,998	14,933	22,518	22,034
Castilla y Leon	6,393	6,997	6,965	10,070	9,842
Total	99,424	109,123	109,123	159,065	159,065

		Shares			
Autonomous	$t=0$	$t=1$		$t=5$	
Community		$k=0$	$k=1$	$k=0$	$k=1$
Catalunya	0.1681	0.1673	0.1682	0.1641	0.1689
Galicia	0.0692	0.0689	0.0686	0.0680	0.0663
Andalucia	0.1931	0.1934	0.1932	0.1943	0.1931
Asturias	0.0268	0.0266	0.0265	0.0259	0.0254
Cantabria	0.0165	0.0164	0.0164	0.0163	0.0163
La Rioja	0.0088	0.0088	0.0088	0.0088	0.0089
Murcia	0.0314	0.0315	0.0316	0.0322	0.0323
Valencia	0.1055	0.1053	0.1061	0.1047	0.1085
Aragon	0.0338	0.0338	0.0337	0.0338	0.0334
Castilla-La Mancha	0.0491	0.0495	0.0493	0.0508	0.0499
Canarias	0.0461	0.0465	0.0463	0.0480	0.0469
Extremadura	0.0286	0.0287	0.0284	0.0287	0.0276
Baleares	0.0222	0.0217	0.0222	0.0196	0.0221
Madrid	0.1366	0.1374	0.1368	0.1416	0.1385
Castilla y Leon	0.0643	0.0641	0.0638	0.0633	0.0619
Total	1.0000	1.0000	1.0000	1.0000	1.0000

Source: Own calculations

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