

**International Studies Program  
Working Paper 07-03  
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in the Distribution of Revenues  
of the States in Federal Countries:  
A Comparative Study**

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# *Inequality and Progressiveness in the Distribution of Revenues of the States in Federal Countries: A Comparative Study*

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## **Abstract**

In federal countries it is common to debate the distributive effects of the regional financing system. This paper applies the traditional measurement tools of inequality and progressiveness to the financing systems in the States in federal countries with the aim of making an international comparison. In the first part we describe the financing systems of five federal countries: Germany, Australia, Canada, Spain and Switzerland. In the second part we estimate inequality in the distribution of resources before and after transfers, noting the equalizing effect of the transfers. In the third part the same exercises are carried out to assess progressiveness, also noting the progressive impact of the aforementioned transfers.

**Key words:** fiscal federalism, inequality, transfers, compared research.

**JEL classification:** H71, H73.

## Introduction

In all federal or quasi-federal structures, the States and the like<sup>1</sup> have a fiscal ability that constitutes the original source of their revenues. This fiscal capacity consists of different fiscal sources, either of their own or shared. In that set or "basket" of taxes we find taxes collected in different ways and levying to different taxable facts. From an international viewpoint, there is also inequality in the distribution of income, production and consumption across countries, and thus also an unequal distribution of their tax bases. All this makes the distribution of resources in the States have different levels of inequality, depending on the country.

However, the original allocation of fiscal resources coexists with a system of grants in most federal countries. These transfer systems consist of significant programmes and/or many small programmes of subventions that, independently of their organization and declared objectives, can result in a reduction, elimination or even in a change in the order of the original financial disparities among the States.

This question of primary inequality and later equalization of resources in the States in federal countries has been studied extensively and reported in the literature about fiscal federalism from its beginnings. In particular, studies about horizontal equity and fiscal equalization are very common. Buchanan's pioneering work (1950) already introduces the need of incorporating an equalization program into the systems of decentralized financing, and supports his claim in both efficiency as well as horizontal equity grounds. Later works of authors such as Scott (1964) and Graham (1964) stressed the equity argument, although

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<sup>1</sup> From now on we will use the term "State", to refer to intermediate level governments that have their own legislative assembly, no matter how they are named by the Constitution of each country: *Länder* in Germany, States and Territories in Australia, Provinces and Territories in Canada, Autonomous Communities in Spain and Cantons in Switzerland.

most of the literature focused on efficiency as the main justification for equalization transfers programs.<sup>2</sup> However, with Boadway and Flatters (1982) comes about a change of trend, taking up again horizontal equity as the foundation of equalization transfers. The literature on this issue expands enormously since the middle-nineties. Some examples are Ladd and Yinger (1994), Oakland (1994), Usher (1995), Petchey, Shapiro and Walsh (1997), Boadway and Hobson (1998), Mieszkowski and Musgrave (1999) or Boadway (2001, 2003).

However, the abundant published works have not dealt with in-depth subjects like the inequality measurement, the equalizing impact of the grants or their effect on redistributing income among the States. There are papers that refer to the measurement of vertical fiscal imbalances, such the pioneering work of Hunter (1974, 1977), or more recently, Bird and Tarasov (2002). Other authors, like Martinez-Vazquez and Boex (1999), Brodjonegoro and Martinez-Vazquez (2002) and Hofman and Cordeira (2004), attempt to measure horizontal imbalances and the equalizing impact of the grants using simple dispersion measures. Rao (2000) reckons the income elasticity of the grants and Hofman and Cordeira (2004) estimate the elasticity of revenues and expenses. However, there is an absence of literature describing more powerful techniques to measure inequality and progressiveness.

This work proposes the incorporation of traditional measures of inequality and progressiveness to the study of federal systems. It aims to improve information about these aspects and make international comparisons easier. This paper is arranged in four parts. Firstly, the main features and financial instruments of the selected countries are briefly

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<sup>2</sup> See Buchanan and Wagner (1970), Buchanan and Goetz (1972) or Flatters, Henderson and Mieszkowski (1974) among others.

described. In the second part inequality in the distribution of resources before and after grants is measured. Progressiveness is mentioned in part three. And finally conclusions are presented.

## 1. The reference countries

We have selected a group of five countries that have some effective transfer systems. They include Germany, Australia, Canada, Spain and Switzerland, and can be considered a pattern in the subject of financing of federal political structures. Next, the corresponding financing systems of their States are very succinctly described.

### a.-Germany<sup>3</sup>

Practically all the legislation on taxes corresponds to the federal government in Germany. Those federal laws that regulate taxes whose total or partial collection depends on the *Länder* must be approved by the Bundesrat.

The fiscal system of the *Länder* is made up of the following elements:

-Own taxes: wealth tax, estate and gift tax, wealth transfer tax, beer tax, motor vehicle tax and tax on bets, games and lotteries.

-Shared taxes: personal income tax<sup>4</sup>, corporation tax<sup>5</sup>, value-added tax (VAT)<sup>6</sup> and a participation in the local industrial tax<sup>7</sup>.

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<sup>3</sup> See Boadway and Watts (2004), Watts and Hobson (2000) and Spahn, Föttinger and Steinmetz (1998).

<sup>4</sup> Since 1980 on the *Länder* has a participation of 42,5% (the distribution among them is made according to territorialized collection). The federal government has another 42,5% and the local governments have the remaining 15%.

<sup>5</sup> Since 1970 the tax is shared between the federation and the *Länder* at 50%.The distribution among the *Länder* is made according to the criterion of territorialized collection.

The system of grants is structured as follows: Some transfers go from the federation to the *Länder* and horizontal equalization payments are made from one *Länder* to another. The first group can be divided in two types: conditional transfers mainly related to financing of public investment, and the so-called complementary federal transfers. The last ones are a part of the German system of equalization.

The horizontal equalization system aims to reduce inequality in the financial capacity of the *Land*. It is organized by means of a system of equalization payments where the expense needs are estimated from an adjusted per capita funding. In such estimation, the standard of reference is the average national expense need and the final objective is to obtain a “politically acceptable” inequality of financial capacity. The calculation of equalization transfers is made in three successive stages. First, the goal is that no *Land* has a per capita fiscal ability<sup>8</sup> below 92% of the national average. The *Land* that is not reaching that level will receive a share of 25% of the VAT collections received by the *Länder*. In the second stage, the equalization transfers of horizontal distribution among the *Länder* are calculated. The calculation is based on the difference between the per capita fiscal ability of each *Land* and the federal average. If the financial capacity of the *Land* is inferior to 92%, the *Land* receives equalization transfers for 100% of the difference. If the capacity is between 92% and 100%, the *Land* receives 37.5% of the difference. On the contrary, when the financial capacity is between 100% and 101% of the national average,

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<sup>6</sup> The present distribution of tax collection was articulated in 1999. 46.38% corresponds to the federal government as general financing; 5.63% is destined to the financing of the guarantee funds of the public pensions; 45.91% corresponds to the *Länder* and the remaining 2.2% is assigned to the local governments. The funds of the *Länder* are distributed according to the population (75%) and the fiscal capacity (25%). This distribution constitutes the first stage in the calculation of equalization as we will see later.

<sup>7</sup> Since 1998 15% of the local industrial tax is distributed in the following way: 42.2% for the federal government and 57.8% for the corresponding *Land*.

<sup>8</sup> This fiscal ability is calculated by adding the share in the collection of personal income tax, corporation tax and the set of exclusive tax revenues (concepts described before).

the *Land* must pay 15% of the excess. If it is between 101% and 110%, the *Land* must pay 66% of the excess and when it surpasses 110% of the federal average, it rises to 80% of the excess. Finally, there are some payments of complementary federal transfers (vertical distribution of the Federal Government) whose aim is that the *Länder* reaches a fiscal ability of 99.5% of the national average if after the first two stages they haven't reached that level.

## **b.-Australia<sup>9</sup>**

Although the Australian Constitution establishes a system of concurrence for the fiscal sources, in practice a clear separation of taxes with primacy of the federal Government has taken place. The federal Government holds the main taxes: income tax, sales and exercise taxes and customs duties; while the State's fiscal capacity is concentrated in payroll taxes, taxes on financial and capital transactions, gambling taxes and taxes on motor vehicles.

The transfer system to the States and Territories<sup>10</sup> consists of an unconditional equalization transfer, a set of conditional transfers with specific objectives<sup>11</sup>; and other smaller transfers. The equalization transfer is based on the distribution of collection of the federal goods and services tax (GST from now on) and the joint financing of medical assistance. Among the set of smaller transfers we find the budgetary balance transfer that

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<sup>9</sup> See Commonwealth of Australia (1999, 2004), Commonwealth Grants Commission (2004).

<sup>10</sup> The financial system of the states and Territories in Australia experience a reform in 1999 with the intergovernmental Agreement on the reform of the financial relations Commonwealth States, which is currently in force. The content of the Agreement is in the Commonwealth of Australia (1999).

<sup>11</sup> They are regulated according to intergovernmental agreements and respond to objectives of national scope. They must fulfil certain conditions of general policy requirements, certain conditions regarding the percentage of shared financing of the expenses to which they are destined and conditions of presentation of periodical objective reports on the part of the governments that receive them. The main expense sectors to which it is destined are health care (38% of the total), education (15%), social security (7.5%), transport (5.2%) and housing (4%).

compensates the loss of the equalization transfer derived from the last reform and the payments for competition policy and the reforms associated with it.

The equalization system, which represents the most outstanding grant, aims at giving every Australian State or Territory a provision capacity of public services equal to the national average standard. It is assumed that the State makes the average effort to collect incomes from its own taxes and that it efficiently manages these services. The implementation of the equalization implies the identification and measurement of the differences among the States in costs of service lending and in relative capacity to collect revenues. In order to obtain it, first, the financial standards are calculated and an equalization budget is elaborated. Then, the expense and revenue needs of each State are estimated<sup>12</sup>, and they are added to determine the total per capita participation of each State in the equalization global fund. And finally, the average of estimations of per capita weighting factors (relativities) in the last five fiscal years is calculated to quantify the weighting factor to be applied in the current year. These weighting factors are expressed in ratios of a national average that is equal to one. A factor below 1 indicates that the State in question requires a per capita participation in the global fund below the per capita egalitarian participation among all the States and Territories and vice versa if the weighting factor is above 1.

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<sup>12</sup> For each service it is calculated the *per capita* expense every State should incur if they supplied the national average level of the service, bearing in mind the level of use and the unitary costs of the public service supply in question (needs of use and costs). For every income source it is calculated the *per capita* income that every State should collect if they applied the national average tax effort to their own tax base (if they applied the national average tax rate). The tax base is generally estimated using the value of the transfers in every State that should be burdened according to the common tax policy among States. In other cases, although they are not very common, other economic indicators like variable proxy of the tax base are used (for example, the disposable gross family income in the estimation of the base of gaming tax).

### **c.-Canada<sup>13</sup>**

The Canadian Provinces financial system is made up of a set of provincial exclusive taxes and a group of shared taxes. The provincial taxes are excise taxes, wage taxes, social and sanitary contributions, payroll taxes, capital taxes and insurance premium taxes. The shared taxes include income tax (except in Quebec), corporation tax (except in Quebec, Ontario, and Alberta) and the harmonized sales tax that is applicable in the provinces of Newfoundland, New Brunswick and Nova Scotia.

The federal government collects personal income and corporation taxes on behalf of the Provinces and Territories according to the Tax Collection Agreements in force since 1962. In return, the Provinces and Territories undertake to maintain the same tax base and tax rate schedule. The Provinces that do not subscribe to the TCA (Quebec with respect to the income tax and Quebec, Ontario, and Alberta in relation to the corporation tax) maintain their own income taxes although with a configuration very similar to the federal.

On the other hand, there is a federal sales tax (the federal goods and services tax, GST) and a provincial retail sales tax that is applied in all Provinces except in Alberta and the Territories. Some Provinces apply *ad-valorem* rates on fuels, tobacco and spirits in addition to the general rate. However, a harmonized sales tax exists due to an agreement between the federal government and the Provinces of Newfoundland, New Brunswick and Nova Scotia. The rate is 15% and is distributed between the federation (7%), and the affected provinces (8%). There is also harmonization in regard to sales tax rate between federal GST and the Quebecker sales tax.

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<sup>13</sup> See Treff and Perry (2006), Boadway and Hobson (1998, 1993), Smith (1998) or Atienza (2004).

The equalization transfer and the transfer for sanitary issues and social programmes (henceforth, TSSP) are the most outstanding intergovernmental transfers. The equalization transfer is unconditioned and its objective is to provide all the Provinces with the necessary financial resources to offer the citizens a “reasonably comparable level” of public services at equivalent tax rates. The quantifying and distribution are made by means of the application of a formula that considers the difference between the outcome coming from the application of the national average rate to the standard tax base and the one coming from the application to the tax base of the province in question. This process affects all the 33 sources that make up the equalization system. The fiscal capacity level that every Province must achieve to be “reasonably up to par in comparison to other Provinces” is the per capita average revenue of the tax in question in five moderately rich “standard” Provinces: Quebec, Ontario, Saskatchewan, British Columbia and Manitoba.

Finally, the TSSP is a transfer conditioned to the financing of the sub-central programmes of health, post-secondary education and social welfare that provides every Province with the same per capita total amount. This objective is obtained by summing three components: a cession of fiscal room in personal income tax and corporation tax with the purpose of financing sanitary attention and post-secondary education; an additional amount for the poorest Provinces that raise the value of the cession of fiscal room to the average of the five standard Provinces aforementioned. Finally, a payment in cash to achieve an egalitarian distribution in per capita terms among all the Provinces.

#### **d. Spain<sup>11</sup>**

A new system of autonomic financing of common regime is applicable since 2002. This system establishes its own taxes, the user charges that are subject to the transferred services, the taxes already ceded previously (wealth tax, inheritance and gift tax, tax on wealth transfers and official documents and gambling taxes)<sup>12</sup> and the total collection of excise tax on certain means of transport, tax on retail sales of certain hydrocarbons (both with certain normative faculties) and excise tax on electricity, as fiscal resources of Autonomous Communities under common system. In addition, the most essential taxes, with the exception of the corporation tax, are shared by the central Government and Autonomous Communities. In particular, Autonomous Communities have got their own tax rate on personal income that is equivalent to 33% of the collection, as well as a participation in the collection of the indirect taxes in proportion to different consumption indexes (a 35% in VAT and a 40% in excise taxes on beer, wine and fermented drinks, intermediate products, alcohol and derived drinks, tobacco and hydrocarbons).

The transfer system meant for warranting a financial sufficiency of Autonomous Communities is as follows. An initial amount of financing that includes the anticipated financing for the common powers, the sanitary powers and the ones concerning services define the equalization transfer estimate. The financing needs of each Autonomous Community are defined according to the aforementioned amount. Such financing needs are determined according to a set of associated variables and weightings, among which population occupies first place. This process determines the static sufficiency of the global expense needs of all the powers. The mechanism subtracts the normative collection of

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<sup>11</sup> See Salinas (Dir.) (2002), Monasterio (2002), Rodriguez-Ponga (2002), Monasterio and Suárez (1998).

<sup>12</sup> The new system extends normative faculties on these taxes.

ceded or shared taxes and user charges from the cost needs and in this way, the expense needs which are not covered by that autonomic fiscal capacity are covered by a contribution from the Sufficiency Fund. The aforesaid contribution operates as a closing mechanism of the financing system. The contribution of the Sufficiency Fund that an Autonomous Community receives evolves according to the variation rate of a set of taxes. This set of taxes composes the index that is called State Structural Taxes Income.

Apart from the resources of ordinary financing that the model for autonomic financing of common regime establishes, there are other additional resources which are transferred to Autonomous Communities by the State. So, on the one hand, the Interterritorial Compensation Fund (ICF) carries out the interterritorial solidarity principle with respect to the convergence in the economic development of Autonomous Communities<sup>13</sup>. The ICF has annual character and it is set aside for the financing of investment projects of Autonomous Communities. Its endowment, the distribution criteria, and their weighting have been the same since 1990 and Autonomous Communities that are defined as regions Objective number 1 according to the European regulation on Structural Funds (those Autonomous Communities with per capita GIP below 75% of the European Union average) are the only ones that have the right to perceive this transfer.

The transfer system is concluded with the joint investment agreements and the contract-programmes. These instruments constitute financing additional resources and they are basically characterized by their bilaterality and discretionary nature<sup>14</sup>.

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<sup>13</sup> The article 158.2 of the Spanish Constitution establishes its existence with obligatory character.

<sup>14</sup> That is to say, these transfers are not designed on the basis of an objective formula of multilateral distribution. Its implementation depends on the discretionary power of the State as well as on the negotiation and pressure power of the Autonomous Communities in the corresponding forums of bilateral relations.

## **e. Switzerland<sup>15</sup>**

In Switzerland, the federal tax system is made up of: value-added tax (TAV); direct federal tax, which includes two taxes (personal income tax and corporation tax); mineral oil tax, which levies on trade in oil products; stamp duties; advance tax, which levies on property capital incomes (interest and dividends); lottery prizes and the benefits paid by insurance companies; the excise tax on tobacco, beer and alcoholic drinks, the tax on automobiles, and the fee on the exemption of the obligation to serve.

On the other hand, the Cantonal tax system is fundamentally made up of income tax, personal wealth tax, corporation tax, society wealth tax, capital gains tax and patrimonial transmission tax. In addition to estate duty (it does not exist in Schwyz), gift duty (it does not exist in Schwyz or in Lucerne) and real-estate property tax (which does not exist in 11 Cantons).

With regards to the financing by means of transfers, an equalization element based fundamentally on the financial capacity of cantonal governments, measured by the so-called "financial capacity definitive index" is used for the distribution of all the federal transfers among the Cantons. The mentioned index is obtained by weighting four variables: cantonal per capita income; tax burden (the inverse of the sum of cantonal and municipal taxes that each canton collects; fiscal effort (tax revenue by inhabitant weighted by the tax burden index) and a variable related to special expense needs of the mountainous areas that is calculated by weighting the percentage of cultivable surface and the density of

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<sup>15</sup> See Administration Federale des Contributions (2005) or Dafflon (1998).

population. The system of equalization transfers is completed with another element of equalization in the distribution of resources that is based on the population<sup>16</sup>.

The main transfers are: the cantonal participation in the federal income (30% of the direct federal tax collection<sup>17</sup>, 10% of the net collection, less management costs of advance tax<sup>18</sup>, 20% of the exemption of obligation to serve tax and a percentage of the profits from the Swiss National Bank); the conditional federal transfers that include a set of subventions of shared cost or compensatory transfers<sup>19</sup> as well as 50% of customs rights on fuels and their surcharge that is tied up to the financing of the expense of road infrastructures<sup>20</sup> and, finally, the cantonal contributions to federal expenses in the social security system, which are also weighted by the financial capacity definitive index.

As we can see, the financing systems of the States in the federal countries that we are taking as reference are highly variable, even though that there is a certain similarity due to the presence of compensation mechanisms for financing inequalities in tax resources. We dedicate the following section to the study of the aforementioned circumstance. In order to do that, we are going to take the figures from each country as reference, which are provided in the Tables in the Appendix.

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<sup>16</sup> It is important to notice that the Swiss equalization system has suffered a reform process since 2003. This year, the federal law on the financial equalization and the compensation of the burden (3<sup>rd</sup> October 2003) that will take effect in 2008 was approved. See the Switzerland finances federal Department web.

<sup>17</sup> This amount is distributed according to the territorialized collection (17%) and the population, weighted by the "financial capacity definitive index" (13%).

<sup>18</sup> 50% of this tax collection is distributed according to the population and the remaining 50% is distributed according to the population weighted by the "definitive index", but only among the cantons whose definitive index is below 100.

<sup>19</sup> In such transfers, the percentage of federal compensation is generally graduated by two components. The first one, with a basic character, which depends on the characteristics of the subsidized good or service and another complementary one that depends basically on the "financial capacity definitive index".

<sup>20</sup> 12% from that global fund is destined to the cantonal expense in roads. 93% from this amount is distributed among the cantons according to different necessity indicators that fundamentally combine the cantonal effective expenses in highways with the financial capacity definitive index.

## 2. The inequality in resource distribution

The distribution of resources among States is usually an issue subject to intense social debate in most decentralized countries. In fact, as it has been indicated, in general, federal financial systems contain some instruments meant to guarantee a certain equalization level in the distribution of resources. This suggests, on the one hand, that, originally, the distribution of resources is not equalized; and, on the other hand, a tendency to correct it. We consider that it could be interesting to measure this inequality and the effectiveness of this correction.

Moreover, financial systems with reference to grants and taxes are very different in every federal country. Because of this, it is necessary that the measure instruments should be able to evaluate the original inequality and the impact of the different grant systems under homogeneous and comparable criteria.

In order to cover these measurement needs, we can resort to traditional instruments to measure inequality<sup>21</sup> and to inequality specific indexes. The dispersion statistical instruments, among which we can find the relative range, the coefficient of variation, and the logarithmic variance, are some usual inequality measures. It is possible to make international comparisons of these indicators. The Gini index<sup>24</sup>, in our case Concentration index, or others that measure the inequality variation, such as Reynolds-Smolenski<sup>22</sup> and

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<sup>21</sup> See Atkinson (1970), Sen (1973), Shorrocks (1980, 1982, 1984), Lambert (1989), Chakravarty (1990) or Cowell (1995), among others.

<sup>24</sup> The original formulation is in Gini (1912).

<sup>22</sup> Reynolds and Smolensky (1977).

Pechman-Okner<sup>23</sup> indexes, constitute the most usual examples of inequality specific indexes.

We calculate the dispersion of per capita resources before and after interjurisdictional grants. These calculations are of immediate application in view of their purely statistic character. On the other hand, inequality rates are originally meant to evaluate individual inequalities in their income levels and we must explain their application to the States' financing.

In fact, the Gini index, the most elementary inequality measurement, is calculated as the area between the line of equal distribution and the Lorenz curve. In our case, the index calculates a similar area, but with the concentration curve of the States resources. Previously, the States resources have been sorted, from the smallest per capita income to the largest. On the other hand, an "adapted" Reynolds-Smolensky and Pechman-Okner index seek to measure how grants help to reduce inequality. We have calculated the adapted Reynolds-Smolensky index as the difference between the Gini index before and after grants. The adapted Pechman-Okner index is Gini index after grants as a percentage of the initial Gini index, before grants.

Likewise, we measure the contribution by reranking because reranking effects produced by grants is highly controversial in many countries. The above-mentioned contribution is represented by the difference between the concentration curve of the total resources organized according to the fiscal revenues and the one ordered according to the total resources. The reranking contribution is the result of subtracting the respective

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<sup>23</sup> Pechman and Okner (1974).

concentration indexes of these concentration curves<sup>25</sup>. The reranking contribution takes a negative value<sup>26</sup> and represents the loss of the impact for achieving equality derived from the alteration in the relative positions of the different States. The reranking contribution is therefore an indicator of the reranking degree that each system of transfers produces.

The values obtained are indicated in table 1. The table includes the arithmetic mean where it can be used as a reference. We also show the concentration curves of financial resources before and after grants in figures 1 and 2 respectively.

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<sup>25</sup> See Lambert (1993) and Plotnick (1981, 1985).

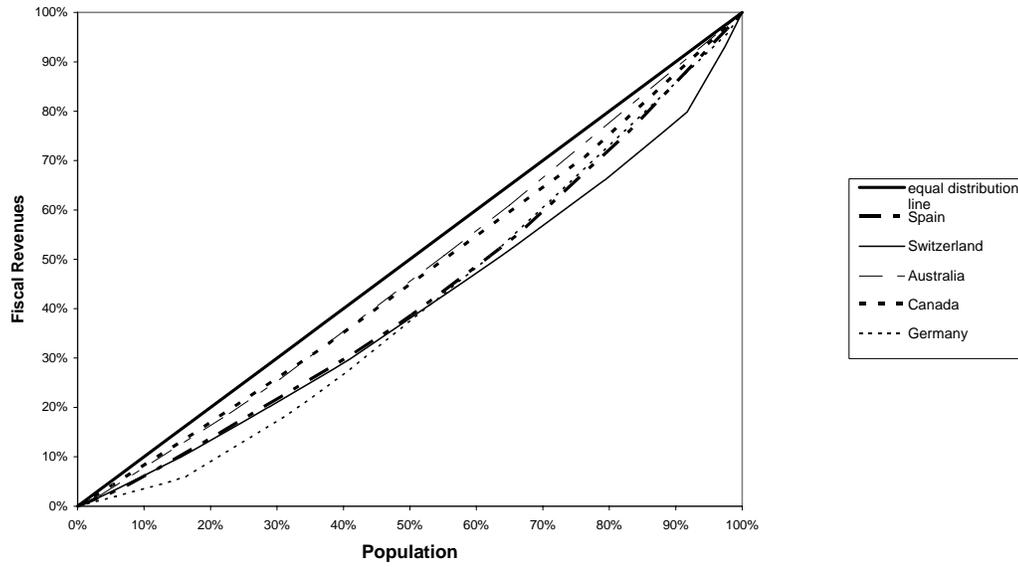
<sup>26</sup> That loss is already discounted when we calculate the transformation of the Reynolds-Smolensky index.

**Table 1 .- States resources distribution inequality measurement in the federal countries.**

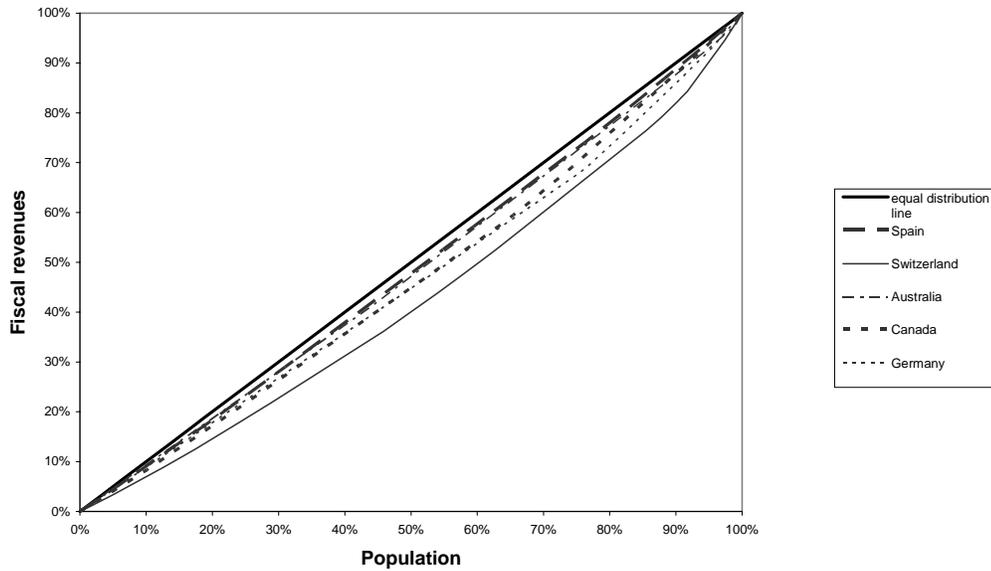
<b>Before transfers indexes</b>						
	Germany	Australia	Canada	Spain	Suitzerland	Arithmetic mean
Dispersion statistical Measurements						
1) Relative range	1,6006	0,5094	0,4387	0,9408	2,1722	1,1323
2) Coefficient of variation	0,3408	0,1174	0,1416	0,2668	0,4564	0,2646
3) Logarithmic variance	0,0379	0,0030	0,0035	0,0143	0,0221	0,0162
Inequality indexes						
4) Concentration Index	0,1796	0,0623	0,0742	0,1498	0,1906	0,1313
<b>After transfers indexes</b>						
	Germany	Australia	Canada	Spain	Suitzerland	Arithmetic mean
Dispersion statistical Measurements						
1) Relative range	0,6501	1,5286	0,4557	0,2757	1,4415	0,8704
2) Coefficient of variation	0,1844	0,1556	0,1341	0,0624	0,3097	0,1692
3) Logarithmic variance	0,0051	0,0021	0,0032	0,0007	0,0129	0,0048
Inequality indexes						
4) Gini Coefficient	0,0813	0,0417	0,0716	0,0339	0,1466	0,0750
5) Reynolds-Smolensky Index	0,0983	0,0206	0,0026	0,1159	0,0439	0,0563
6) Pechman-Okner Index	54,73%	33,07%	3,53%	77,39%	23,06%	
7) Reranking contribution	-0,1430	-0,0441	-0,0272	-0,0500	-0,0314	

Source: Authors's calculations based on the next sources: for Germany, federal statistics bureau, "Statistisches Jahrbuch für die Bundesrepublik Deutschland und für das Ausland CD-ROM", año 2005 publication year and online data base GENESIS; for Australia, Australian Bureau of Statistics ([www.abs.gov.au](http://www.abs.gov.au)), and Commonwealth of Australia (2004); for Canada, Statistique Canada ([www.statcan.ca](http://www.statcan.ca)); for Spain, IEF, BADESPE (Spanish Public Sector data base) ([www.ief.meh.es](http://www.ief.meh.es)); Ministerio de Economía y Hacienda ([ww.meh.es](http://ww.meh.es)) and Ministerio de Administraciones Públicas ([www.map.es](http://www.map.es)); for Suitzerland, Administration fédérale des finances (2005) and Statistics federal bureau ([www.bfs.admin.ch](http://www.bfs.admin.ch))

**Figure 1.- State fiscal revenue concentration curve in the federal countries.**



**Figure 2.- State total revenue (before transfers) concentration curve in the federal countries.**



First, we analyse the situation before grants (the States are only financed with fiscal revenue). According to the relative range and coefficient of variation, we can see that the original inequality in the *per capita* financial resources distribution is larger in Switzerland and Germany than in Canada and Australia. Spain is in an intermediate position. Likewise, we wish to emphasize the situation in Switzerland. In this country, there is an important difference among the per capita resources of the Cantons. The value of the relative range is 2.17, that is, the difference between the per capita resources obtained by the Canton with higher per capita resources and the Canton with lower resources is 2.17 times the mean. On the other hand, we find Canada, where this gap is only 43%.

The Concentration index indicates similar results. Switzerland and Germany have an initial inequality which is approximately 18.5%. This value is clearly superior to the mean, which is 13%. However, Australia and Canada show an initial inequality remarkably inferior to the aforementioned mean. Spain is again in an intermediate situation, with a Concentration index that represents an inequality around 15%.

In fact, Germany and Switzerland concentration curves are the farthest from the equal distribution line as shown in figure 1. However, the reasons that explain this situation are different in each country. In Germany, the inequality is a consequence of Sajonia-Anhalt, Turingia, Mecklemburgo-Antepomerania, Sajonia and Brandenburg, the *Länders* which have got inferior fiscal capacity. In Switzerland, the reason is in the *cantons* with higher resources, Geneva and Basilea-Town, which are significantly more affluent relative to the rest of the country.

After the transfers, Switzerland has higher inequality, as all the indicators, with the exception of the relative range<sup>27</sup>, show, with a significant difference in comparison with the mean in the values of all the indicators. In fact, the inequality degree in Switzerland after grants is slightly over 14.5%, approximately equal to Spain's pre-grants inequality. In second and third place are Germany and Canada with a Concentration index of 8% and 7% respectively. And finally, we find Australia and Spain with an inequality of 4% and 3% respectively, values which are less than the mean.

Figure 2 represents the resources of the States concentration curve after transfers. In this figure, we can notice three distinguished effects. First, a perceptible reduction of the difference among countries exists with the exception of Switzerland, whose concentration curve is farther from the equal distribution line. Second, the difference between Canada and Germany is in the inequality levels of the *Landers* with higher final revenues. And third, the results for Australia and Spain equalization systems are practically identical.

The difference between the initial and final inequality of the considered financial systems can be summed up through Reynolds-Smolensky and Pechman-Okner indexes. Table 1 also presents the values of these measurements. Therefore, the Spanish system of transfers produces the highest inequality decrease of 11.5%. This decrease is only comparable to the reduction by the German system that is approximately 10% (with regard to the initial inequality, the reductions are 77% and 55% respectively). The classification continues with the Swiss and Australian systems, which decrease the inequality more than 4 and 2 points respectively, however, the original inequality in Switzerland is 19% and

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<sup>27</sup> Australia is the country with the highest relative range because the Northern Territory receives an amount in per capita transfers which is disproportionately higher than the national mean.

Australia's is 6%. Finally, the Canadian system hardly changes the inequality as its reduction is almost non-existent.

As for the reranking, we can see that the systems of transfers change the ranking of the States in every case. Germany stands out in this aspect. This country has an index of 0.143, which is substantially superior to the remaining countries. That is due to the fact that its system of transfers changes the relative positions of most German States.

To sum up, with these data, we can state that all of the equalization systems produce a decrease of inequality in the initial distribution of the financial resources. However, the circumstances are very different in accordance with each country. For example, in Canada, the assignment of fiscal resources produces a reduced inequality, hence the grants have limited impact. The situation is the contrary in Germany and Spain where there is a great inequality before transfers and similar final results. Finally, the systems of transfers of Australia and Switzerland are representative of a reduced impact for diminishing the inequality. However, these countries start from antagonistic situations due to a great initial equality in Australia and a relatively significant inequality in Switzerland.

### **3. Is the distribution of resources progressive in federal countries?**

As we have seen in the inequality analysis, different systems of grants generate a clear trend to equalization in interjurisdictional distribution of resources in a federation. However, these calculations are in need of a reference in regards to the progressive nature of these actions because we have arranged the States according to their per capita resources. Because of this, it is necessary to introduce some instruments that allow the measuring of

the distribution of resources according to the initial economic capacity of the different States. In this particular instance, we are going to use an adaptation of Kakwani (1977) and Suits (1977) indexes. In their original version, these rates estimate the progressiveness or regressiveness of a fixed tax (or a set of taxes). The Kakwani index is the area between the concentration curve of the studied taxes and the Lorenz curve before taxes. The Suits index is similar to the Gini index except that it is calculated starting from a different concentration curve which shows on the y-axis the percentage of the taxes paid by each percentage of population (in  $x$ -axis).

In our case, the Kakwani index can be representative of the progressiveness in the distribution of resources, before and after transfers. The index interpretation is the opposite of the traditional one. If the index is negative, then the resources are distributed progressively and a positive index suggests a regressive distribution. Suits index compares resources and GDP instead of taxes and GDP. That is why a negative value is indicative of progressiveness and a positive value suggests regressiveness<sup>30</sup>.

Table 2 presents the values of these indexes for the selected countries. Figures 3 and 4 present the relative concentration curves that determine the Suits index before and after transfers.

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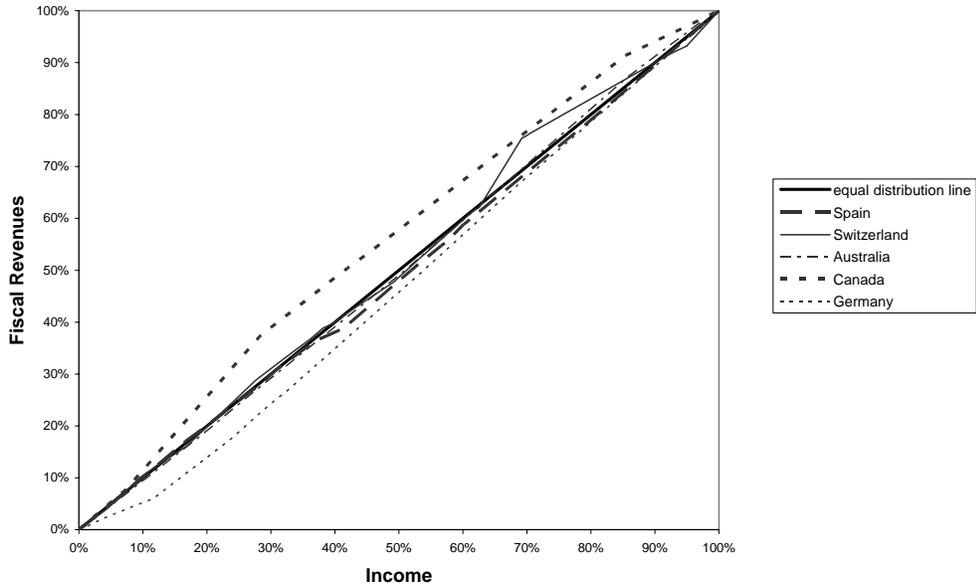
<sup>30</sup> The index assimilated to Kakwani index expresses the highest progressiveness with  $1+G$  ( $G$  is the Gini index). The index suggests the highest regressiveness and the smallest value with  $-(1+G)$ . However, the one assimilated to Suits index varies between 1 (top regressiveness) and -1 (top progressiveness).

**Table 2.- Progressiveness Measurement of the State resource distribution in the federal countries.**

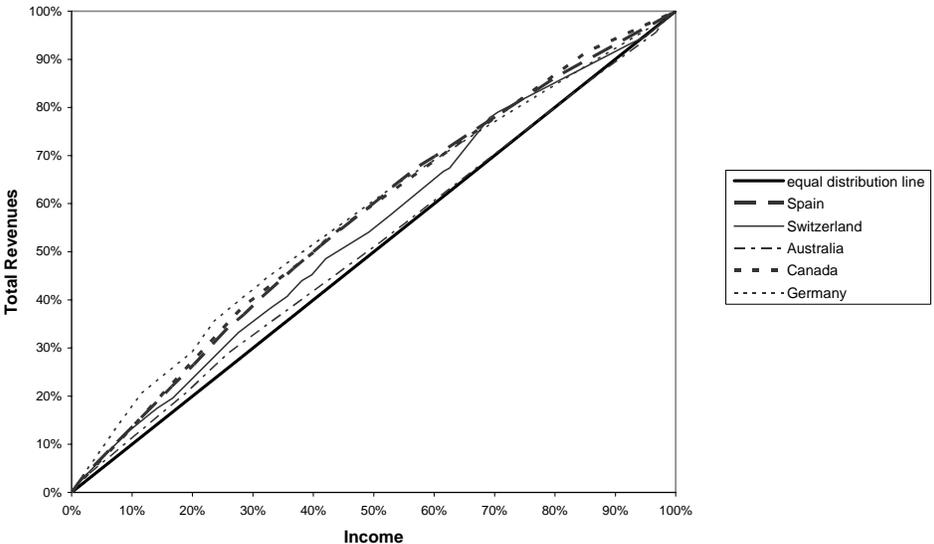
<b>Before transfers indexes</b>						
	Germany	Australia	Canada	Spain	Suizterland	Arithmetic mean
1) Kakwani index	0,0715	0,0041	-0,1145	0,0142	-0,0119	-0,0073
2) Suits index	0,0678	0,0034	-0,1143	0,0156	-0,0143	-0,0084
<b>After transfers indexes</b>						
	Germany	Australia	Canada	Spain	Suizterland	Arithmetic mean
1) Kakwani index	-0,1563	-0,0197	-0,1404	-0,1327	-0,0870	-0,1072
2) Suits index	-0,1525	-0,0189	-0,1390	-0,1335	-0,0864	-0,1061

Source: Authors's calculations based on the next sources: for Germany, federal statistics bureau, "Statistisches Jahrbuch für die Bundesrepublik Deutschland und für das Ausland CD-ROM", año 2005 publication year and online data base GENESIS; for Australia, Australian Bureau of Statistics ([www.abs.gov.au](http://www.abs.gov.au)), and Commonwealth of Australia (2004); for Canada, Statistique Canada ([www.statcan.ca](http://www.statcan.ca)); for Spain, IEF, BADESPE (Spanish Public Sector data base) ([www.ief.meh.es](http://www.ief.meh.es)); Ministerio de Economía y Hacienda ([ww.meh.es](http://ww.meh.es)) and Ministerio de Administraciones Públicas ([www.map.es](http://www.map.es)); for Suizterland, Administration fédérale des finances (2005) and Statistics federal bureau ([www.bfs.admin.ch](http://www.bfs.admin.ch))

**Figure 3.- Suits concentration curve of the state fiscal revenues in the federal countries.**



**Figure 4.- Suits concentration curve of the State total revenues (after transfers) in the federal countries.**



We can distinguish three situations before grants. Canada has a progressive distribution; Switzerland, Spain and Australia have an almost proportional distribution and finally Germany has got a clearly regressive distribution. The values of Kakwani and Suits indexes are markedly negative and the Suits concentration curve before grants presents an atypical shape relative to the curves of the other countries. This special shape is due to the existence of a "jump" at the point where Quebec is introduced. This point puts the curve over the equal distribution line. The *sui generis* tax system of Quebec causes the aforementioned jump because Quebec is the only Province that has had its own income personal tax since 1954. Moreover, Quebec has not signed the Tax Collection Agreements (TCA). This agreement established a uniform income tax for all the subscriber Provinces<sup>31</sup>. However, if we eliminate the specific treatment of Quebec, results do not change and the initial distribution of tax resources stays progressive<sup>32</sup>. The Canadian fiscal room division explains this situation.

Germany is in a different situation. The German system produces outstanding regressive rates. Moreover, the concentration curve of Germany is the farthest below the equal distribution line. The small collections of the *Länder* with less per capita GDP explain the regressive rates.

With regards to the remaining countries, Australia shows the closest curve to the equal distribution line and some regressive rates near zero. That is, Australia has a fiscal resources division which is practically proportional to GDP. Spain and Switzerland also

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<sup>31</sup> Smith (1998) describes the history of the inter-governmental agreements which regulate the subcentral financial system in Canada, and specifically, the subscription of the Tax Collection Agreements, which have been in force since 1962.

<sup>32</sup> For example, if Ontario, Alberta and British Columbia (the most inhabited Provinces) fiscal spaces division is homogenized, then results are hardly modified. Kakwani and Suits indexes take the value of -0.0836 and 0.0844, respectively.

have their respective curves very close to the equal distribution line but slightly less than Australia. In the case of Spain, the curve practically coincides with the equal distribution line and then it has a little "jump" in the Canary Isles point (Canary Island is the only Autonomous Community that does not participate in the VAT and excise taxes). The Switzerland curve has a much more pronounced jump for Geneva and Basel-Stadt Cantons in comparison to the Spanish curve<sup>33</sup>.

Table 2 shows that all the countries display negative rates when they apply their systems of transfers. These values reveal a progressive behaviour of the set of financial systems. However, there are also substantial changes. For example, Germany has the highest progressiveness currently. Its system of grants changes a clearly regressive position into the most progressive one. This phenomenon is totally coherent with the reranking effect that was indicated in the previous section. Spain and Canada have high and similar progressiveness levels. However, Canada started from a situation of significant progressiveness. On the other hand, the Spanish system of grants produces a significant correction. The system changes the proportional initial distribution into one that is perceptibly progressive after transfers. The outcomes of Swiss system of transfers are similar to the Spanish one and this system also leads to a substantial increase in progressiveness. Finally, the system of grants keeps the distribution of resources near proportionality in Australia. These characteristics can be seen in figure 4. The figure shows that all the curves are above the equal distribution line. We also note that irregularities are smaller than before implementing the systems of transfers.

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<sup>33</sup> Basel-Stadt jump cannot be seen because Basel-Stadt is the Canton with highest per capita GIB. When we add it, it only has effect in the concentration curve slope in the last section. The use of the fiscal capacity in the own taxes is the origin of the high collection in Geneva and Basel-Stadt Cantons.

## 4. Conclusions

As a conclusion, this paper can be summed up in the following points:

The respective transfer systems of the analysed countries reduce the inequality in the distribution of financial resources among the States in all the cases and also rearrange the countries in its relative positions. Likewise, the distribution of the total financial resources increases its progressiveness after transfers in all these countries.

However, the causes of the reduction of the inequality resulting from the system of grants is very different between these countries. Transfers have the greatest effect on inequality in Spain. The Spanish system can only be compared with the German system. Transfers in Australia and Switzerland have a lesser impact on inequality. In spite of this, they also have a considerable impact. Finally, Canada stands out because of the almost non-existent egalitarian incidence of its system of transfers.

Inequality levels before transfers show significant divergences. Thus, Switzerland and Germany, in this order, have the most unequal distribution of fiscal resources. In addition, the inequality is concentrated in different ways in these countries; in Switzerland, in the Cantons with higher per capita fiscal resources, and, in Germany, in the *Länder* with inferior resources. On the other hand, the countries with less inequality are Canada and Australia, which have some rates less than the average. Spain is in an intermediate situation.

Variation among countries in regards to inequality is reduced substantially after the transfers. However, Switzerland is an exception in this aspect since it to display the highest inequality. Inequality rates in Germany and Canada are close to the average, although they

are slightly higher in Germany. A strong reranking of the relative positions of the States is observed in Germany. Finally, Australian and Spanish rates are noticeably below average now.

In relation to the progressiveness in the distribution of resources, they are distributed in a clearly regressive fashion in Germany before grants. Whereas in Canada they are distributed in an outstandingly progressive way. In Australia the distribution is practically proportional, and it is slightly proportional in Spain and Switzerland.

The distribution of resources after grants turns out to be progressive in all of the countries. However, Germany stands out with the greatest degree of progressiveness. This fact takes special relevance if we consider that it was the only country with clear regressiveness in the distribution of fiscal resources. Spain and Canada follow Germany, although they start from very different situations (almost proportionality and clear progressiveness, respectively). In Switzerland the situation is the same as in Spain, but with less intensity, while Australia, even after transfers, remains almost proportional.

## **APPENDIX**

**Alemania.** *Länder* resources (not financial revenues). 2004. (billions of euros).

	Before transfers <sup>1</sup>	After transfers <sup>2</sup>
Baden-Württemberg	15.127	20.404
Bavaria	17.578	23.892
Berlin	3.085	10.978
Brandenburg	1.212	6.743
Bremen	789	2.048
Hamburg	3.783	4.416
Hesse	8.790	11.496
Mecklenburg-West. Pom.	691	4.691
Lower Saxony	7.336	14.960
North Rhine-Westphalia	21.878	34.195
Rhineland-Palatinate	4.432	7.854
Saarland	964	2.357
Saxony	1.735	11.392
Saxony-Anhalt	971	6.788
Schleswig-Holstein	3.005	5.316
Thuringia	928	6.361
<b>Total</b>	<b>92.304</b>	<b>173.891</b>

Note 1: Taxes: Shared taxes (personal income, corporation and industrial) and own taxes (wealth, estate and gifts, real estate transfer, motor vehicles, lottery and other bet taxes).

Note 2: Transfers: Participation in VAT, equalization transfer and the complementary federal transfers.

Source: Federal statistics bureau, "Statistisches Jahrbuch für die Bundesrepublik Deutschland und für das Ausland 2005 CD-ROM"; Federal statistics bureau, online data base GENESIS.

**Australia.** State and Territory Resources (not financial revenue). 2003-2004.  
(millions of Australian dollars)

	Before transfers <sup>1</sup>	After transfers <sup>2</sup>
Tasmania	631	2.464
Queensland	6.676	16.484
South Australia	2.806	7.328
Victoria	10.132	21.094
New South Wales	15.010	30.608
Western Australia	4.122	9.198
Northern Territory	264	2.227
Australian capital territory	753	1.699
<b>Total</b>	<b>40.394</b>	<b>91.103</b>

Note 1. Taxes: payroll, wealth transfer, gambling, insurances, motor vehicles.

Note 2. Transfers: equalization, budget balance, competition policy and specific transfers.

Source: For the taxation revenues: Australian Bureau of Statistics, "Taxation revenue, 2003-2004" and for the transfers: Commonwealth of Australia, "2004-2005 Budget paper n° 3: Federal financial relations 2004-2005"

**Canada.** Province resources (not financial revenues)<sup>1</sup>. 2005. (millions of Canadian dollars).

	Before transfers <sup>2</sup>	After transfers <sup>3</sup>
Prince Edward Island	604	1.044
New Brunswick	3.118	5.407
Nova Scotia	4.090	6.430
Manitoba	5.504	8.512
Quebec	48.807	59.491
British Columbia	19.663	24.837
Newfoundland	2.327	4.319
Saskatchewan	4.662	6.604
Ontario	63.812	76.075
Alberta	14.382	17.557
<b>Total</b>	<b>166.969</b>	<b>210.276</b>

Note 1. Territories are excluded because they enjoy a different financing system, mainly with respect to the transfers.

Note 2. Taxes: personal income, corporation, general sales, spirits, tobacco, hydrocarbons, real estate, motor vehicles, natural resources, medical insurances and social security contributions.

Note 3. Transfers: equalization, transfer for sanitary issues and social programmes (TSSP), specifics on joint financial programs.

Source: Statistique Canada, "Revenues of the general provincial administration, 2005"

**Spain.** Resources (not financial revenues) of the common regime Autonomous Communities<sup>1</sup>. 2003. (Thousands of euros)

	Before transfers <sup>2</sup>	After transfers <sup>3</sup>
Andalusia	8.336.763	15.503.164
The Canary Islands	1.346.724	3.842.868
Catalonia	11.432.985	13.812.820
Valencian Community	6.144.342	8.785.220
Galicia	2.929.073	6.175.654
Aragón	1.819.322	2.706.910
Asturias	1.400.647	2.343.816
Baleares	1.879.502	1.729.712
Cantabria	779.755	1.323.653
Castilla - La Mancha	1.832.551	3.769.540
Castilla y León	2.983.722	5.576.255
Extremadura	960.980	2.539.373
La Rioja	395.807	697.013
Madrid	11.131.936	10.925.028
Murcia	1.417.618	2.332.245
<b>Total</b>	<b>54.791.726</b>	<b>82.063.270</b>

Note 1: The foral AA.CC. aren't included because they enjoy a financing system that is substantially different from the rest.

Note 2: Taxes: own taxes and surtaxes, user charges that are subject to the transferred services, wealth tax, inheritance and gift tax, tax on wealth transfers and official documents and gambling, tax on certain means of transport, tax on retail sales of certain hydrocarbons, excise tax on electricity, autonomous tax rate on personal income, autonomous participation in the collection of the indirect taxes.

Note 3: Transfers: Sufficiency Fund, Interterritorial Compensation Fund, sanitary service financial guarantee and joint investment agreements and the contract-programmes.

Source: IEF, BADESPE (Spanish Public Sector data base), with the exception of the ICF that come from Ministerio de Economía y Hacienda ([www.meh.es](http://www.meh.es)) and the financing with joint investment agreements and agreements subscribed with the Central State, where the source is Ministerio de Administraciones Públicas MAP, "Los convenios de colaboración entre la Administración General del Estado y las CC.AA.". The own taxes and surcharges are have been estimated from the data of year 2001 to the same update rate that have experimented, in each A.C., between 1999 and 2001.

**Suitzerland. Cantons** Recursos (not financial revenues). 2003.  
(thousand of Swiss francs).

	Before transfers <sup>1</sup>	After transfers <sup>2</sup>
Obwalden	70.608	216.176
Jura	210.520	582.769
Valais	766.602	1.672.608
Fribourg	796.608	1.538.952
Ticino	1.230.180	1.879.378
Lucerne	995.121	1.796.309
Appenzell Innerrhoden	38.011	78.828
Appenzell Ausserrhoden	144.826	260.796
Thurgau	639.599	991.110
Bern	3.922.118	6.273.239
St. Gallen	1.508.334	2.305.285
Solothurn	799.692	1.163.812
Uri	99.465	288.243
Neuchâtel	664.674	1.214.354
Schwyz	288.820	545.356
Graubünden	639.486	1.533.726
Aargau	1.781.145	2.547.768
Basel-Landschaft	1.250.074	1.614.214
Vaud	2.926.886	4.189.801
Schaffhausen	228.665	340.290
Geneva	4.087.849	4.803.589
Nidwalden	126.188	254.467
Glarus	158.839	252.670
Zurich	4.742.438	6.599.537
Zug	403.556	644.860
Basel-Stadt	2.082.570	2.436.161
<b>Total</b>	<b>30.602.874</b>	<b>46.024.298</b>

Note 1: Taxes: income, wealth, capital gains, patrimonial transfer, real estates transfer, estate and gifts, motor vehicles, shows, dog possession and other.

Note 2: Transfers: Confederation transfers and refunds, cantonal participation on Confederation revenues.

Source: Administration fédérale des finances, "Finances Publiques en Suisse 2003", Neuchâtel, 2005.

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