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Abstract*

This paper focuses on options for reforming the Brazilian Revenue-Sharing scheme for the States, the so-called Fundo de Participação dos Estados or FPE, which constitutes one of the main intergovernmental transfers in Brazil. This focus is justified by the fact that such a reform has become an urgent policy priority, following a decision of the country's Supreme Court to declare the current formula for horizontal distribution of the FPE unconstitutional and require the enactment of a new formula by the beginning of 2013.

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EXECUTIVE SUMMARY

This paper, prepared at the request of the Inter-American Development Bank (IDB), focuses on options for reform of the Brazilian **Revenue-Sharing Fund for the States (Fundo de Participação dos Estados, or FPE)**, which constitutes one of the main intergovernmental transfers in Brazil. This focus is justified by fact that this reform has become an urgent policy priority, following a decision of the country's Supreme Court (Supremo Tribunal Federal, or STF) to declare the current formula for horizontal distribution of the FPE unconstitutional and require the enactment of a new formula by the beginning of 2013.

As a background to the choice and motivation of a recommended reform strategy, the paper begins **with a summary of Brazil's intergovernmental transfers system in light of international experience**. This review points to the following **main conclusions**:

- Brazil compares well with most countries (including some other large federations) in the average degree of revenue autonomy provided to subnational governments (SNGs), especially the states. However, reflecting wide disparities in taxing capacities and efforts, revenue autonomy varies widely among individual states and municipalities. Intergovernmental transfers represent a major source of revenue for the majority of SNGs.
- The intergovernmental transfer system presents the following main characteristics:
    - A relatively **low discretionality** of the transfers. This imparts to the predictability of the system and immunity from continuous political bargaining, but also to the cyclical volatility and inflexibility in the face of changing economic, social and demographic trends;
    - The basing of a significant portion of the revenue sharing arrangements on **origin (devolution) criteria**, a fact that compounds the already substantial differences in revenue capacities that characterize subnational own taxes. The (also devolution-based) sharing of natural resource revenues further aggravates these differences, as these resources are concentrated in relatively few states and municipalities;
    - A relatively high **degree of fragmentation of the transfer mechanisms**, regarding the purpose of the different regimes, the definition of their bases (with resulting distortive incentives for upper-level governments to exploit nonshared taxes), and their horizontal distribution formulas. This complicates

the assessment of the allocative and distributional effects of the overall transfer system; and finally

- **The lack of a comprehensive, well-designed equalization transfer system**.

Against this background, **future reform efforts for the system should focus on the following main objectives:**

a. Making it more equitable
b. Simplifying it and increasing its transparency
c. Ensuring sufficient flexibility in the distribution formulas to accommodate changes in the relative situations of the subnational jurisdictions affected; and
d. Reducing its cyclical sensitivity.

While the design of a comprehensive reform is beyond the scope of this paper, most of the above-mentioned objectives are applicable to the reform of the horizontal distribution formula of the FPE.

In principle, it would be desirable to use FPE transfers to equalize the capacity of the individual states to provide a standard set of goods and services of their responsibility, with average degrees of own-revenue effort and spending efficiency (along the lines of the system used in Australia). Unfortunately, **there are currently no conditions in Brazil for the implementation of such a full-fledged equalization model**, given the wide differences in the definition of the tax bases across states (that prevent the estimation of a representative revenue system of the Canadian type) and the lack of accurate and timely data on tax bases and costs of expenditure programs.

Given these limitations, **the best feasible approach to the reform of the system in the near term appears to be one that limits equalization to the revenue side, and uses the actual net revenues of each state before FPE transfers as a proxy for its revenue capacity**. Differences in spending needs can continue to be addressed in the foreseeable future through the other types of transfers (FUNDEB, SUS, and *convenios*), revised as needed for this purpose.

An approach of this type would meet most of the objectives specified above:

- It would be simple, transparent, and easy to calculate and control, with very little delay given the short time lags involved in the preparation and reporting of state revenues.
- It would increase the correspondence of FPE transfers per capita with individual states' capacity to spend, compared to the current system, thereby enhancing equity.

- It would facilitate a dynamic and timely response of FPE transfers to changes in socioeconomic conditions (e.g., population or per capita income) and other changes (e.g., in the royalty regime or in other intergovernmental transfers) that would affect the basic revenues per capita of individual states.

Given the limited size of the FPE, an important decision in the design of the distribution formula is the **choice of the degree of redistribution desired**, specifically the choice of the reference value (RV) for net revenues per capita above which states would not receive transfers. The higher such a ceiling, the higher the number of states (in the limit all) that would receive transfers, but the lower the amount received by each, and accordingly the lower the degree of redistribution of the system. Based on the results of simulations of alternative options in this respect, this paper recommends distributing two-thirds of the FPE according to a criterion of maximum redistribution and the other one-third according to one of maximum coverage.

A comparison of this reform option with the status quo suggests that **the proposed approach is indeed more equalizing than the present one** since:

- Its application would reduce the gap between the highest and lowest net state revenues per capita after FPE transfers (a measure of each state's capacity to spend); and
- The largest gainers in terms of net revenues would be the poorest states in the northeast and the north.

To be politically viable, any proposal for reform of the distribution formula of the FPE would need to provide **adequate time to the states adversely affected by the reform to adjust their finances to the loss.** This can be done with a number of alternative **transition mechanisms**. One approach would involve distributing the losses and gains over a number of years. An alternative approach would be to ensure to each state a floor equivalent to the nominal value of the transfers in the year preceding the adoption of the new distribution formula, and to apply the latter only to the increases in the resources of the FPE from that year. Over time, the weight of the floor would gradually decline, and that of the component distributed according to the new formula would increase correspondingly.

If the reform of the FPE were to be enacted simultaneously with other reforms, for example, in the ICMS and or the distribution of revenues from petroleum, the design and length of the transition mechanism should take into account the distribution among the states of gains and losses from the other reforms.

I. Introduction

This paper, prepared at the request of the Inter-American Development Bank (IDB), focuses on options for reform of the Brazilian **Revenue-Sharing Fund for the States (Fundo de Participação dos Estados, or FPE)**, which constitutes one of the main intergovernmental transfers in Brazil. This focus is justified by fact that such a reform has become an urgent policy priority, following a decision of the country's Supreme Court (Supremo Tribunal Federal, or STF) to declare the current formula for horizontal distribution of the FPE unconstitutional and require the enactment of a new formula by the beginning of 2013.

It must be emphasized from the outset, however, that **the reform of the FPE is only one component of much needed reforms of the intergovernmental fiscal relations system in Brazil**, including, in particular, reforms of the main source of own revenues of the states (the Imposto sobre Circulação de Mercadorias e Serviços, or ICMS, a mixed origin-destination based VAT); of the distribution of revenues from petroleum; and of other types of intergovernmental transfers. Although, in principle, a comprehensive and simultaneous approach to such reforms could help the formation of political consensus by facilitating trade-offs and compensation of losses and gains, such a consensus has proven so far to be elusive in practice.[1] At the same time, the fast-approaching deadline imposed by the STF increases the **urgency of identifying a politically viable, but also economically and socially sound, new horizontal distribution formula for the FPE**, and in particular one that can flexibly adapt to changing socioeconomic conditions as well as to further reforms of the intergovernmental relations' framework in the future.

The paper begins with an **overview of international experiences** regarding intergovernmental transfers, with special emphasis on the design and implementation of equalization transfer systems. The following section **reviews the main features and problems of the intergovernmental transfer system, including the FPE, in Brazil**. Both reviews are deliberately brief, given the extensive available literature on the subjects. The last section discusses a recommended **reform of the horizontal distribution formula of the FPE** in the light of the international experience, and of simulations, conducted with the helpful assistance of the Brazilian National Treasury (Secretaria do Tesouro Nacional, or STN), of its impact on states' revenues. It also briefly discusses possible transition mechanisms to facilitate political consensus on the proposed reform. The Appendix presents

[1] For a forceful statement of the advantages of a comprehensive approach to reforms of intergovernmental fiscal arrangements in Brazil, see Rezende, F. 2007.

the assumptions and main results of a few alternative reform options that were also analyzed, but do not appear preferable to the recommended one.

II. Overview of International Experience with Intergovernmental Transfers

a. The Role of Transfers in Intergovernmental Fiscal Relations

Both normative and positive theories of fiscal federalism recognize the **benefits of a significant degree of subnational revenue autonomy**. These benefits include:

- The potential to enhance overall revenue mobilization by tapping revenue sources (such as property taxes and user fees) that would likely be neglected or administered less effectively at the central government (CG) level.
- Providing greater certainty to subnational governments (SNGs) about their resource availability, thereby facilitating the preparation of more realistic budgets and reducing volatility in the execution of spending programs.
- Facilitating alignment of the composition and design of subnational taxes with local preferences, and with the incidence of the benefits of subnational spending programs.
- Making more visible to electorates the cost of subnational spending, and promoting subnational fiscal responsibility, which tends to be undermined by SNGs' reliance on gap-filling transfers or other bailouts by the CG.

There are also, however, **significant economic, distributional, institutional, and political economy obstacles to subnational own revenue mobilization**. The main economic obstacle is the high mobility of goods and factors of production inside a national territory, which increases the scope for tax evasion and for predatory tax competition (the so-called race to the bottom) among subnational jurisdictions. From the distributional standpoint, substantial economic disparities among SNGs within a country tend to result in corresponding disparities in their revenue-raising capacities, with adverse effects on citizens' access to goods and services provided by subnational entities across the national territory. Institutional obstacles include weaknesses in the administrative capacity of SNGs and increased compliance costs for taxpayers having to deal with different subnational tax and tax administration systems. Finally, political economy constraints can arise from both the CGs' desire to keep control of the main tax bases and SNGs' reluctance to bear the political costs of own revenue-raising.

Since tSNGs' own revenues typically fall well short of the amounts needed to carry out, at a reasonable level of efficiency, the spending responsibilities assigned to them,

intergovernmental transfers are used in all countries to fill the resulting vertical gaps. Intergovernmental transfers are also used to pursue **a number of other objectives**, including regional redistribution of resources, compensation for inter-jurisdictional externalities, and the fulfillment of higher-level governments' priorities in spending areas assigned to lower-level ones. The relative importance attached to these objectives in individual countries contributes importantly, along with various economic and institutional constraints, to shaping the nature and mix of intergovernmental transfers in the countries. The weight of intergovernmental transfers in subnational revenues varies widely across countries. In the OECD, it ranges from a low of under 30 percent in Sweden to a high of virtually 100 percent in Turkey.[2]

b. Main Types of Intergovernmental Transfers

Country experiences vary widely not only as regards the size, but also the main characteristics of intergovernmental transfers. The extensive literature on the subject distinguishes several categories of transfers, according to:[3]

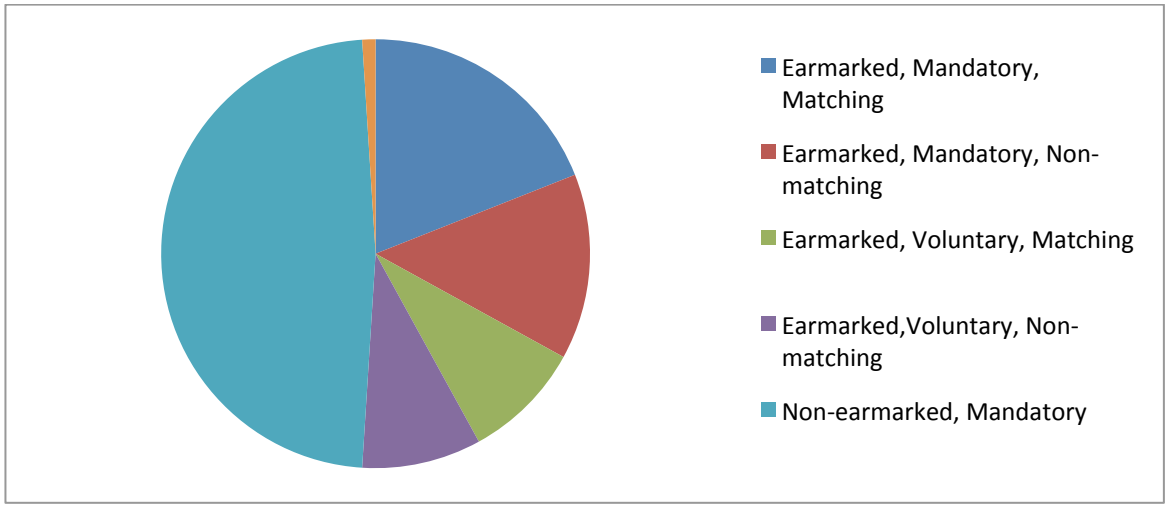
- Their **mandatory or voluntary nature**. Mandatory transfers have clear advantages in terms of predictability for subnational budgets and lesser susceptibility to political bargaining, but impart rigidity to the budget of the government providing the grant
- Whether or not the resources are **earmarked** to particular spending functions (the so-called block grants), programs, or projects (special-purpose grants). Earmarking is typically used as a means of influencing the composition of subnational spending, ensuring a "floor" for resources devoted by SNGs to functional or geographic areas considered of high national interest
- Whether or not they are accompanied by **specific conditions on the use of the funds** (related e.g., to the modalities of execution of the programs financed and/or to their performance, as measured by various indicators). These types of grants are frequently used to promote achievement by SNGs of nationally determined standards for the public services they provide. Conditionality typically applies to special-purpose grants, but the monitoring of its fulfillment is often hampered by the lack of relevant, reliable and timely performance indicators.

[2] See OECD, 2009.
[3] See for example Ahmad, E., 1997; Ahmad, E. and Brosio, G., 2006; and Boadway, R. and Shah, A., 2007.

- Whether or not they involve **matching requirements** for the recipient government. Matching grants are typically used to reduce SNGs' incentives to under-provide goods and services with positive spillover effects on other jurisdictions, as the grant implicitly compensates the recipient government for such spillover. Grants of this type have the disadvantage that poorer jurisdictions may not be able to qualify for them, if they are unable to meet the matching requirement.
- Whether or not they are of a **recurrent nature**. One-off and capital grants are typically used to fund subnational investments or other operations of a non-recurrent nature. Some grants are provided on a one-off basis by upper level governments to support lower-level ones in financial difficulty (so-called **gap-filling transfers**). These are de facto bailouts and, unless required by circumstances clearly beyond the SNG's control (e.g., an unexpected natural disaster), should be avoided, because they open space for political bargaining and give rise to significant moral hazard.

Figure 1 shows the composition of transfers to regional governments in the OECD.

Figure 1. Composition of Transfers to Regional Governments in the OECD



c. Revenue-sharing Arrangements

An important category of transfers is represented by revenue sharing. These are typically mandatory arrangements involving the transfer of a portion of revenues assigned to a high-level government to lower ones. As such, they share the pros and cons of other mandatory types of transfers noted above.

The **basis of the sharing** may be the totality of the upper-level government's revenues or a subset thereof. The latter system is distinctly more common, despite the fact that it gives rise to significant inappropriate incentives (namely for the upper government to concentrate its revenue-raising efforts—in terms of both policy and administration—on the types of taxes that are not shared, regardless of their allocative or distributional quality).

The **horizontal distribution of the shared revenues** is frequently based (at least in part) on origin (so-called devolution) criteria, namely on the share of each subnational unit in the total collections of such revenues. Under such criteria, the distribution of shared revenues largely reflects that of own revenue capacities of SNGs, thus compounding, rather than helping to correct, large disparities in the latter. For this reasons, a number of countries (e.g., Australia, China, and Germany) utilize non-devolution based criteria in the horizontal distribution of all or part of shared revenues. Table 1 summarizes the main features of revenue-sharing systems in OECD countries.

Table 1: Main Characteristics of Revenue-sharing Systems in Selected OECD Countries

Country	Basis of sharing	Power to change formula	Frequency of changes	Equalization mechanisms
Australia	VAT	National Parliament, with states' agreement	Every four years	Yes
Germany	Income taxes and VAT	National Parliament	Ad hoc	Yes
Italy	Income taxes, VAT and excises	Annual budget law	Annual	No
Mexico	Income taxes, VAT, and excises	Federal government	Rare	No
Spain	VAT and excises	National Parliament	Rare	No
Switzerland	Personal income tax	National Parliament	Once, in 2007	No
Turkey	All taxes	National Parliament	Rare	Yes

Souce: OECD, 2009.

d. Sharing of Natural Resource Revenues

The distribution of **revenues from nonrenewable natural resources** (royalties, production sharing arrangements or dividends from state-owned enterprises in those sectors) among and within levels of government is one of the most controversial subjects in intergovernmental fiscal relations. **The theoretical literature on the subject typically argues for centralization of such resources** on economic grounds (to avoid imparting to subnational budgets the high volatility associated with this type of revenues) as well as distributional grounds—as nonrenewable natural resources (NRR)—are frequently concentrated in a few subnational jurisdictions).[4] It is also recognized, however, that that there is some justification for assigning some share of resource revenues to the subnational entities where the resources are located, to compensate them for environmental damage resulting from the exploitation of the resources, and for additional infrastructure needs related to the same.

International practice frequently differs from the theory, as it tends to be shaped by historical developments and political power balances more than by the theoretical considerations mentioned above.[5] **The ownership and control of NRR and the distribution of revenues from such resources vary widely across countries**. Typically those with a high degree of dependence on NRR tend to centralize resource revenues more than less dependent ones. Also, unitary states (e.g., the large oil producers in the Middle East) tend to centralize resource revenues more than federations. The degree of centralization also tends to vary over time, reflecting shifting balances of power among levels of government (e.g., in Canada, Nigeria, and Russia). Finally, the legal framework often also differs for onshore and offshore oil and gas fields, as shown in Tables 2 and 3.

[4] See e.g., Brosiov (2006); Boadway and Shah (2009); and Chowdurie-Aziz, Kaise, and Vinuela (2010).
[5] See Anderson (2011) for a comprehensive and up-to-date review of the treatment of revenues from oil and gas in large federations.

Table 2: Ownership, Control, and Distribution of Revenues from Onshore Fields in Selected Federations

Country	Ownership	Control	Distribution of revenues
Argentina	Provinces	Provinces	Federal and provinces
Australia	States	States	States
Brazil	FG	FG	FG, states, and municipalities
Canada	Provinces	Provinces	Provinces
India	States	FG	FG and states
Malaysia	States	FG	FG and states
Mexico	FG	FG	FG
Nigeria	FG	FG	FG and states
Pakistan	Joint	FG	Provinces
Russia	Joint	FG	FG
USA	FG or states	FG or states	States
Venezuela	FG	FG	FG

Source: Anderson, G., 2011.
Note: FG: federal government.

Table 3: Ownership, Control, and Distribution of Revenues from Offshore Fields in Selected Federations

Country	Ownership	Control	Distribution of revenues
Argentina	FG	FG	FG
Australia	FG	Joint	FG
Brazil	FG	FG	FG, states and municipalities
Canada	FG	Provinces and joint	Provinces
India	FG	FG	FG
Malaysia	FG and states	FG	FG
Mexico	FG	FG	FG
Nigeria	FG	FG	FG and states
Pakistan	Joint	FG	FG
Russia	FG	FG	FG
USA	FG	FG	FG
Venezuela	FG	FG	FG

Source: Anderson (2011).

c. Equalization Transfers

Most countries include the reduction of regional inequalities among their objectives in the design of intergovernmental transfer systems. In principle, **equalization transfers** aim to equalize the capacity of different SNGs to provide the goods and services of their responsibility, at predetermined levels in terms of quantity, quality, and cost-effectiveness. The translation of this principle into practice is quite complex, as it involves a number of choices and trade-offs, which are significantly constrained by financial and human resources

and data availability. **The main questions to be addressed in the design of equalization transfers are**:

- To equalize only revenue capacities or also spending needs?
- To equalize to an absolute or a relative standard?
- To use a vertical or a horizontal redistribution mechanism?
- To cap or not the total size of the transfer?
- To include or not shared revenues and other grants in the calculation of revenue capacities?

These questions are briefly discussed in what follows, with reference to some relevant country examples.[6]

Most countries that utilize equalization transfer mechanisms include some **indicators of revenue capacity** in the horizontal distribution formula for the transfers. The accuracy with which such indicators measure revenue capacity varies significantly across countries, depending on the availability of data and technical capacities. The most complex equalization system based on revenue capacity is the one used by **Canada.** In this system, individual provinces' revenue capacities are calculated with reference to a **representative tax system (RTS) that is essentially an average of provincial tax systems.**[7] The entitlements of individual provinces are based on potential, rather than actual, revenues to avoid discouraging above-average tax efforts and rewarding below-average ones. The Canadian system is funded by the federal budget (vertical-type redistribution), on an open-ended basis, and is complemented by important block grants, which aim in part to compensate for the differences in provincial spending needs that are not taken into account in the (entirely revenue capacity-based) equalization system.

Despite its conceptual sophistication and appeal, the Canadian system has been significantly criticized for its complexity and related opacity to the average citizen, as well as for the fact that revenues for nonrenewable resources are not included in the calculations. The desire for simplicity, as well as data and in some cases capacity limitations, have led other

[6] See Ahmad and Searle (2007;) Dafflon (2007); Wilson (2007); and Reschovsky (2007) for more detailed discussions of methodological issues in the design of equalization transfers.

[7] The specific calculation of transfer entitlements is made for each provincial revenue source (37 of them) by comparing the per capita revenue base of the province with the nationwide average and multiplying the difference by the relevant nationwide (RTS) average tax rate. The entitlement will be negative if the province's estimated revenue potential so calculated exceeds the national average and positive in the opposite case. The total equalization transfer entitlement for the province is given by the algebraic sum of the individual ones (with a floor of zero).

countries to use **more easily available macroeconomic variables**, such as regional GNP or personal income as proxies for revenue capacities.

Formal **equalization of spending needs** is even more complex than that of revenue capacities, and is only practiced by few countries, the most advanced country being **Australia.** The Australian equalization system aims to ensure that individual states have a capacity to provide a level of services assigned to them equivalent to the nationwide average, taking into account regional differences in costs and other relevant factors (such as the demographic profile of the provincial population, geographic characteristics, etc.). The system thus combines equalization of revenue capacities and spending needs. The data and computational requirements of the system are huge, and its implementation is entrusted to a standing Commission. The formulas and estimates of relevant parameters are reviewed, and amended as necessary, every five years to reflect evolving conditions. The calculations are updated annually in the context of the budget cycle.

South Africa uses a provincial equalization system (the Provincial Equitable Sharing System) that is based entirely on indicators of spending needs.[8] It does not attempt to equalize revenue capacities, since own revenues of South African provinces cover only a very small proportion of their expenditures. The system has seven components, each of which includes various needs indicators, partly overlapping across the components. The system does not make allowance for cost or efficiency differentials. Other countries utilize simpler needs equalization systems, based on fewer and more easily available indicators (such as income per capita, population concentration in urban areas, and age profile of the population, among others). Experiences with such systems starkly highlight the **trade-off** between simplicity of the system and ease of collection of the relevant information, on the one hand, and avoidance of wrong incentives (if cost and efficiency differences are not taken into account), on the other.

Equalization transfers based on absolute standards aim to ensure that each SNG included in the system has the capacity to provide a minimum standardized basket of services. Systems of this type are typically funded by upper-level budgets and by nature are **open ended (uncapped**). To avoid the risk of significant budgetary overruns, it is important that the cost of the basket be carefully estimated, and that the choice of the minimum level be a prudent one. **Systems based on relative standards** (such as a nationwide average) typically involve horizontal redistribution, as SNGs below the standards would receive

[8] The system is described in some detail in Wilson, 2007.

positive transfers, and those above would have to pay into the system. This is for instance the case with the German equalization criteria for the distribution of the *lander*'s share of VAT revenues. However, the system may also envisage **asymmetric equalization**, whereby SNGs below the average receive transfers sufficient to raise their capacity to the average (or a fraction thereof) and those below do not receive any transfers. This is for instance the case in the Canadian equalization system.

There is some debate in the literature on the issue of the **inclusion or exclusion of revenue sharing and other grants in the calculation of revenue capacities**. The case for inclusion is clear for shared revenues, including those from NRR, distributed on a devolution basis, as these resources both augment spending capacities of the recipient jurisdictions, and reflect differences in the distribution of the taxable bases. The case is more debatable for special-purpose grants, as they are tied to specific spending programs considered of national interest, and also frequently already fulfill a redistributive role.

III. Brief Overview of the Intergovernmental Transfer System in Brazil

A. Key Features of the Subnational Revenue System

In comparison with most countries, including several large federations, **Brazil is characterized by a relatively high degree of revenue decentralization**, especially at the state level. The states currently account for over one-quarter, and the municipalities for a further 6 or so percent, of total taxes. Own taxes represent, on average, more than 60 percent of total states' revenues, but with large variations across states, reflecting both different revenue potentials and revenue efforts. Typically, the share of own revenues is around 70 percent in the richer states of the south-southeast, but under 50 percent in the poorer states of the northeast, and even below 20 percent in the more remote and less populated states of the north. The combination of a relatively high degree of revenue autonomy and wide disparities in revenue-raising capacities among the states makes it all the more important to ensure that the intergovernmental transfer system in Brazil be appropriately equalizing. As discussed further below, the current system falls somewhat short of the desirable in this respect.

Moreover, **the Brazilian subnational own revenues system is fraught with significant flaws** that are widely recognized to affect adversely both horizontal equity and competitiveness. The main problem is the reliance of state finances on partly origin-based VAT (the ICMS) characterized by a wide dispersion of effective rates across goods and services and across the national territory; extensive predatory tax competition (the *guerra fiscal*); significant de facto cascading, due to poor functioning of the credit mechanism; and

high compliance costs for taxpayers.[9] These distortions compound significant flaws in the federal indirect taxes/contributions (IPI, PIS and COFINS).

Reform efforts to date have been stymied, in particular, by the fact that transition to a more neutral destination-based VAT with a uniform base across the nation would entail significant losses for those states that are net exporters to the rest of the country. However, the urgency of a comprehensive reform of indirect taxation is becoming more apparent, as state revenues are eroded by the *guerra fiscal*, and the competitiveness of Brazilian enterprises is hampered by the cumulativeness and high compliance costs of the above-mentioned taxes, in an environment of already substantially appreciated exchange rate and weakened export performance. There are increasing indications of preparedness by the states to accept a significant reduction of the interstate rate of the ICMS that would begin to approximate a shift to a destination-based VAT, significantly reducing the efficiency costs noted above.

B. The Intergovernmental Transfer System

The intergovernmental transfer system in Brazil includes a variety of (partly overlapping) mechanisms:[10]

i) Revenue Sharing

Revenues are shared by the federal government separately with the states (primarily through the FPE) and the municipalities (through the Fundo de Participação dos Municípios, or FPM), and by the states with their respective municipalities (through the Cota-parte do ICMS).[11] Some of the revenue-sharing arrangements are mandated by the constitution, others by federal or state laws. All share the characteristic of having as a base only a subset of the revenues of the higher-level government, a fact that has created incentives for the federal government to privilege nonshared sources of revenues in recent decades. The criteria for vertical and horizontal distribution

[9] There is a vast literature highlighting the substantial flaws in the current design and practices of the ICMS and ISS. See Rezende, F., 2009, for a summary.

[10] Comprehensive descriptions of the intergovernmental transfer system in Brazil can be found in: *Forum Fiscal dos Estados Brasileiros* (2006) and in Mendes, Boueri Miranda, and Blanco Cosio (2008.)

[11] In addition to these, there are several other un-conditional mechanisms to share individual taxes across government levels (e.g., the sharing of the federal tax on rural properties with municipalities; of the federal regulatory tax on gold purchases (*IOF-ouro*) with states and municipalities; and of the state tax on vehicles (IPVA) with the municipalities). These sharing arrangements are effected at different rates, and are mostly distributed on the basis of devolution criteria. They contribute to the fragmentation of the intergovernmental transfer system, and make it difficult to assess its overall distributive impact.

differ substantially among them, with those of the FPE and FPM being primarily redistributive, and those of the Cota-parte primarily devolution-based.

Specifically regarding **the FPE** that is constituted by 21.5 percent of revenues from the federal income tax and selective VAT (IPI), the **criteria for distribution among the states** were set by a complementary law (LC no.62) of 1989 following a lengthy negotiation, the result of which was a determination that the combined shares of the states in the less developed north, northeast, and central west regions should amount to 85 percent of the total. Within this constraint, the coefficients for individual states were determined through marginal modifications in preexisting criteria that related them to each state's territory (with a weight of 5 percent), population share, and the inverse of per capita income (with a weight of 95 percent).

These coefficients (reproduced in Table 4, in descending order) have not been changed since 1989, despite significant changes in the distribution of per capita income across states in the intervening period. These changes have been especially marked for the central west region, which has benefited from the boom in agro-business during the last decade. As indicated in section I above, the recent decision of the Supreme Court has ruled unconstitutional the maintenance of fixed distribution coefficients for the FPE, and required the enactment of a new dynamic distribution formula by the beginning of 2013.

Table 4: Distribution Coefficients of the FPE

State	Region	% of FPE	State	Region	% of FPE
Bahia (BA)	NE	9.3962	Amapá (AP)	N	3.4120
Ceara (CE)	NE	7.3369	Paraná (PR)	S	2.8832
Maranhão (MA)	N	7.2182	Goiás (GO)	CO	2.8431
Pernambuco (PE)	NE	6.9002	Rondônia (RO)	N	2.8156
Para (PA)	N	6.1120	Amazonas (AM)	N	2.7904
Paraíba (PB)	NE	4.7889	Roraima RR)	N	2.4807
Minas Gerais (MG)	SE	4.4545	RG do Sul (RS)	S	2.3548
Tocantins (TO)	N	4.3400	Mato Grosso (MT)	CO	2.3079
Piauí (PI)	NE	4.3214	Rio de Janeiro (RJ)	SE	1.5277
RG do Norte (RN)	NE	4.1779	Espírito Santo (ES)	SE	1.5000
Alagoas (AL)	NE	4.1601	MG do Sul (MS)	CO	1.3320
Sergipe (SE)	NE	4.1553	Santa Catarina (SC)	S	1.2798
Acre (AC)	N	3.4210	São Paulo (SP)	SE	1.000
			Distrito Feder. (DF)	CO	0.6902

Source: *LC* no. 62, 1989.
Notes: N: north; NE: northeast; S: south; SE: southeast; CO: central west.

ii) Sharing of NRR Revenues

Revenues from nonrenewable natural resources (hydro-carbons and minerals) are shared by the federal government, which is by law the owner of such resources, with the states and municipalities, at rates that vary depending on the nature of the field, the involvement of the subnational unit in the production, and distribution of the resources, among others.[12] Table 5 shows the vertical distribution of revenues from oil exploration, as well from consumption of oil products.

Table 5: Vertical Distribution of Oil-related Revenues *(as percent)*

Type of revenue	Federal government	States	Municipalities
Royalties on offshore oil	30	24.3	45.7
Royalties on onshore oil	12.5	52.5	35
Participação especial	50	40	10
Signature bonus and fees	100		
Company income tax	55	21.5	23.5
CSLL	100		
Dividends	100		
IPI	45	29	26
PIS/COFINS	100		
CIDE-Combustíveis	76.8	17.4	5.8
ICMS		75	25

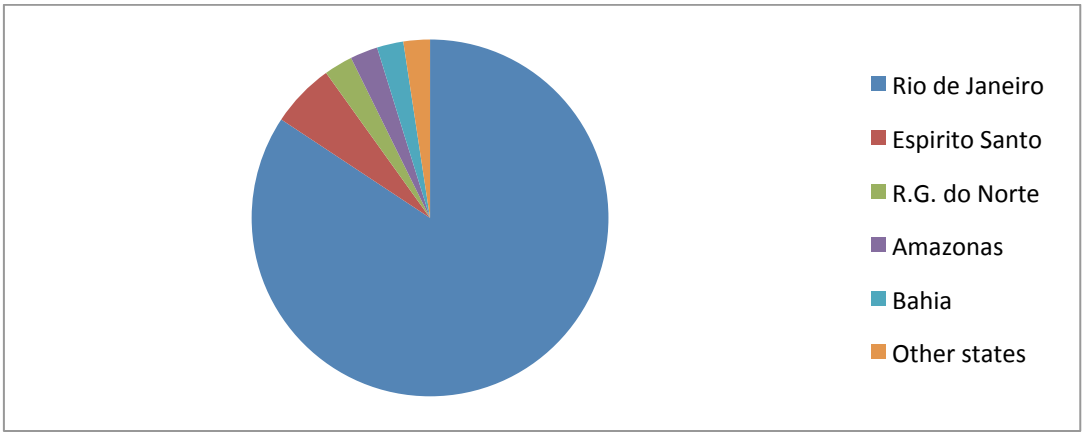
Source: Gobetti (2011).

The **horizontal distribution coefficients** also vary depending on the type of levy and the (onshore or offshore) nature of the field. Onshore revenues benefit mainly the states and municipalities in which the field is located. Offshore revenues benefit mainly the coastal states and municipalities facing the deep-sea field (sometimes at a distance of hundreds of miles). A part of the revenues goes to the port municipalities from which the oil is shipped. A very small portion of the revenues is distributed on the basis of the criteria of the FPE and FPM.

[12] The **current regime for the rents from petroleum exploration** (which account for over 85 percent of total revenues from natural resources) and their sharing across government levels was set in 1997 (in Law 9478/97), following the end of the Petrobras monopoly in 1995. The current exploration regime is one of concessions: companies bid for the exploration rights and own the production of the fields awarded to them. In exchange, they pay various types of rents: (1) a signature bonus, that goes entirely to the federal government; (2) area fees, that are related to the extension of the oil field being explored, and go the National Petroleum Agency (ANP), a federal institution; (3) royalties levied on a monthly basis as a share of production at a basic rate of 5 percent, or at a higher rate (of up to 10 percent), depending on characteristics of the field; and finally (4) a special rent, levied on the more productive and profitable fields. Both the royalties and the special rent are shared between the three levels of government.

Not surprisingly, these criteria result in a **very high concentration of resource revenues on a limited number of states and municipalities**. Figure 2 shows that five states account for over 97 percent of the total states' share of these revenues, with Rio de Janeiro receiving 85 percent of the total. The distribution of the municipalities' share of petroleum revenues is only slightly less concentrated than that of the states. Specifically, municipalities in the state of Rio de Janeiro (RJ) account for about 75 percent of the total, and those in four other states for a further 16 percent. One municipality receives nearly a quarter of the total (Campos de Goytacazes in RJ).[13]

Figure 2: Distribution of Oil Royalties and Rents Among the States



The **petroleum rent regime** is expected to change with the coming into effect of a recent law that envisages a shift from concessions to production sharing arrangements (PSA) for the deep sea (Pre-sal) and other fields considered of strategic national interest. The PSA regime is expected to increase significantly the federal government's take of petroleum resources, compared with the current concessions regime.[14]

The **formula for horizontal distribution of the oil revenues under the new regime** is currently under heated debate in Brazil. A provision approved by Congress

[13] Some studies of the efficiency costs of the high concentration of petroleum rents (Conceição, 2006; Serra, 2007; and Afonso and Gobetti, 2008) have found evidence of reduced incentives to own revenue mobilization, higher expenditure per capita on payroll (but not on social spending and investment), and generally lower cost-effectiveness of spending, in the largest recipient municipalities.

[14] Under the PSA, the federal government will receive, in addition to signature bonuses and its share of royalties, the entire value of the oil obtained from a field, after deduction of exploration and production costs and of the profit margin stipulated in the leasing arrangement to go to the enterprise (Petrobras or a consortium including a minimum 30 percent participation of the latter) granted the exploration of the field. In the new system, royalties will continue to exist, but the *participação especial*, currently shared with the states and municipalities, will disappear.

in late 2010 requiring the distribution of the shared revenues in line with the distribution criteria of the FPE and FPM is under presidential veto, and no agreement has been reached yet on an alternative formula.

iii) Mandatory Transfers Linked to Education, Health and Other Programs

These include:

- For **education**, the transfers to states and municipalities by the Fundo de Manutenção e Desenvolvimento da Educação Básica, or **FUNDEB**, a fund constituted by contributions (equivalent to 20 percent of total (own and shared) revenues) of the states and municipalities, complemented by a contribution of the federal government (equivalent to 10 percent of the total subnational contributions). These transfers aim at reducing disparities in the capacity of different subnational governments to finance basic education, and are therefore distributed primarily on the basis of the number and characteristics of the students' population.[15]
- For **health** services (which are delivered by the national health system, Sistema Único de Saúde or **SUS**), federal transfers to states and municipalities that have grown rapidly in recent years as a share of total federal spending on health, signaling a growing decentralization of spending responsibilities in the sector. These transfers are partly mandatory and partly discretionary, and account for over a third of total health financing on average, but with substantial variations across regions. They are generally viewed as having been relatively successful in reducing differences in per-capita health spending across regions over the last decade or so. They suffer, however, from a lack of clear linkage with indicators of both need and performance.
- Federal transfers to states and municipalities of a portion of a tax on the consumption of oil products (the so called **CIDE-Combustíveis**), earmarked to the financing of environmental projects, ethanol subsidies, and investments in transport infrastructures. These are based on a mixture of devolution-based and redistributive criteria.

[15] A portion of the FUNDEB is reserved to reward schools that record improvements in performance of their students, measured by a standardized index (Índice de Desenvolvimento da Educação Básica). This provision constitutes an initial attempt to increase subnational accountability in the use of earmarked transfers.

iv) Transfers of a Compensatory Nature

These are transfers aimed at compensating subnational governments for certain externalities resulting from federal government policies. The main such transfers are intended to compensate the states and municipalities for the loss of ICMS revenues due to the zero rating of exports.

They are of two types. One (established by the constitution) relates to exports, industrial goods, and mandates sharing with the states 10 percent of the revenues from the federal selective VAT (IPI); the distribution among states is proportional to each state's share in industrial exports. Twenty-five percent of this transfer is shared by the states with their municipalities.

The second type relates to the exports of primary and semi-manufactured products, which were zero rated by the "Lei Kandir" of 1996. These transfers also acquired constitutional status in 2003 with the Constitutional Amendment no.42, but the determination of their amount was left to a complementary law, which has not yet been put forward. In the meantime, the federal government sets in the annual budget both the amount of the transfer and its distribution among the states (a process involving intense negotiations with the latter).

This type of transfers presents significant flaws, in terms of lack of transparency, predictability for the recipient governments and scope for political influence. For their part, the states tend to resist granting full ICMS credit for exports and capital goods, with clear costs in terms of efficiency and competitiveness. A reform of the ICMS towards the destination principle would eliminate these costs, while at the same time obviating the need for such compensatory transfers.

v) Discretionary Special Purpose Grants

These grants (known as *convenios* and *acordos*) represent a relatively small portion (less than 2 percent) of total intergovernmental transfers in Brazil. They may be matching or non-matching. They often stipulate specific conditions for the use of the funds, but the monitoring of the fulfillment of such conditions may be limited by the availability of relevant information. The distribution of these types of grants does not reflect transparent criteria, and is often influenced by political bargaining during the budget process.

Intergovernmental transfers represent substantial sources of revenue for the states, and even more so for municipalities. They significantly re-shape the vertical distribution of resources among the three levels of government, as can be seen in Figures 3 and 4 below that compare **revenue distribution before and after transfers**. The figures show that the municipalities are the main net beneficiaries of the transfers, as the reduction in the share of resources of the federal government after transfers is entirely matched by the increase in the share of the municipalities, with the share of the states remaining nearly unchanged.

Figure 3: Distribution of Revenues before Intergovernmental Transfers

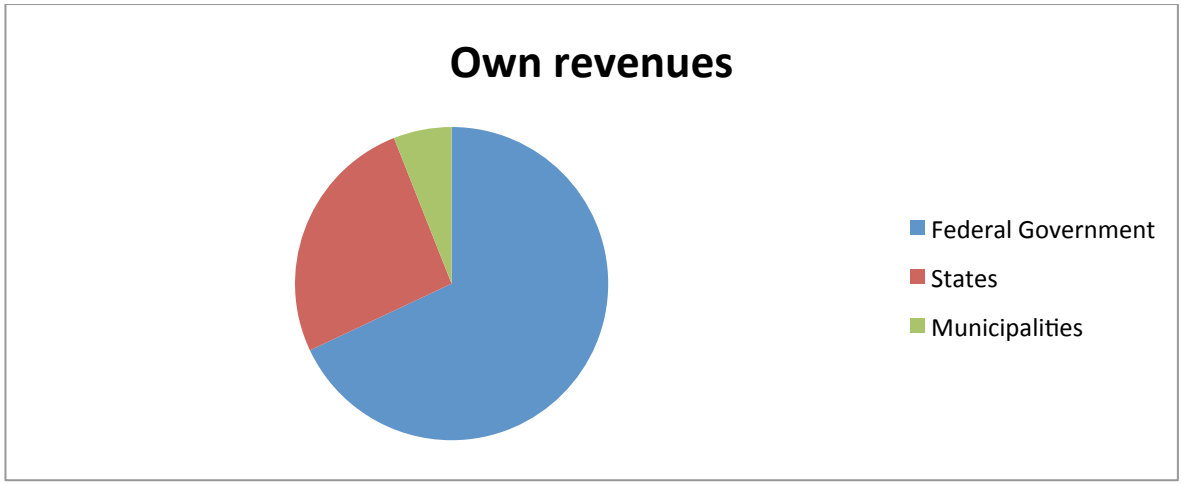
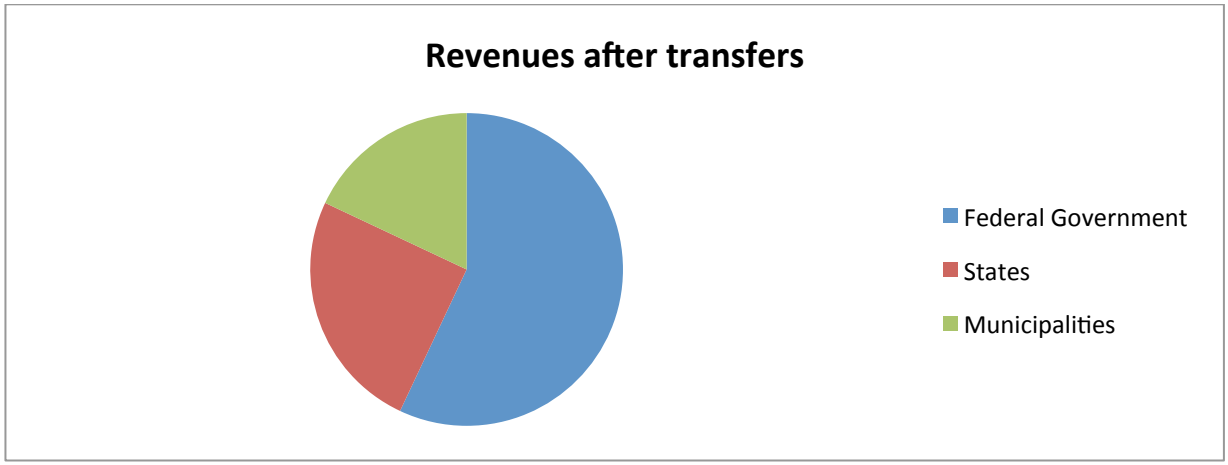


Figure 4. Distribution of Revenues after Intergovernmental Transfers



On the whole, **the intergovernmental transfer system in Brazil appears to be characterized by:**

- Relatively **low discretionality** of the transfers, a fact that promotes transparency, predictability, and immunity from continuous political bargaining, but also cyclical volatility and inflexibility of the transfers in the face of changing economic, social, and demographic trends;
- A **multiplication of transfer mechanisms** that complicates the assessment of the allocative and distributional effects of the overall system;
- **A significant reliance on devolution criteria** in the horizontal distribution of resources, which compounds the already substantial differences in revenue capacities that characterize subnational own taxes. The current (also devolution-based) **sharing of natural resource rents further aggravates these differences**, as such resources are concentrated in relatively few states and municipalities; and finally
- The **lack of a comprehensive, well-designed equalization transfer system**. While existing studies suggest that some of the transfers (notably those through the FUNDEB) have a (more or less significant) progressive redistributive impact, they fall well short of an equalization system. Specifically regarding the FPE, Table 6 below shows that the per capita transfers received by each state from the fund bear only limited relation with its per-capita income or its revenue capacity, as proxied by its revenues before the transfers. The six largest recipients of FPE transfers (the states of Roraima, Amapa, Acre, Tocantins, Sergipe, and Rondonia) are not among the poorest in terms of either per capita GDP or revenues before the transfers; rather they lie in the middle of the distribution. Five of them are in the sparsely populated north region.

Table 6: Comparison of the Distribution of FPE Transfers per capita with Income per capita and Capacity of Individual States to Spend, 2009 *(in reais)*

State	GDP p.c.	Basic revenues p.c.	FPE transfers p.c.	Net revenues p.c.
AC	10,477	989	1,790	2,779
AL	6,623	523	474	997
AM	14,360	1,375	297	1,672
AP	11,569	988	1,973	2,962
BA	9,326	628	233	861
CE	7,668	543	313	856
DF	51,142	3,417	99	3,516
ES	19,185	1,831	157	1,988
GO	14,387	977	175	1,152
MA	6,161	454	408	862
MG	14,290	1,086	81	1,167
MS	15,170	1,492	203	1,695
MT	18,742	1,434	277	1,711
PA	7,809	676	300	976
PB	7,506	523	457	980
PE	8,892	651	286	937
PI	5,961	543	494	1,037
PR	17,756	1,042	98	1,140
RJ	22,396	1,531	35	1,566
RN	8,753	833	479	1,312
RO	13,217	1,239	671	1,910
RR	13,008	1,030	2,133	3,163
RS	19,773	1,186	78	1,264
SC	21,076	1,273	76	1,349
SE	9,633	1,007	741	1,748
SP	26,385	1,603	9	1,612
TO	11,072	1,042	1,205	2,247

Source: Author's calculations.
Notes: BR: net revenues before transfers from the *FPE*; NR: net revenues after transfers from the *FPE*; p.c.: per capita.

IV. A Recommended Reform of the FPE

A. Priorities for Reform of Intergovernmental Transfers in Brazil

Against the background of the above brief reviews of both international experiences and the current system of intergovernmental transfers in Brazil, it would appear that future reform efforts for the system should focus on the following **main objectives**:

a. Making the system more equitable
b. Simplifying it and increasing its transparency

c. Ensuring sufficient flexibility in the distribution formulas to accommodate changes in the relative situations of the subnational jurisdictions affected

It would also be desirable to reduce the cyclical sensitivity of the transfers. Since (as discussed in the previous section) the different components of the system (i.e., the various revenue-sharing arrangements, and the other types of transfers outlined above) fare differently in relation to equity, simplicity, transparency, flexibility, and cyclical sensitivity, **a blueprint for comprehensive reform would need to be designed taking into account the specific characteristics and effects of each type of transfer.** Moreover, the design of any reform strategy would need to take into account considerations of its political viability.

A **comprehensive and simultaneous approach to the reforms would promote their mutual consistency, and facilitate trade-offs that might increase their political viability**. For example, contentious reforms of the royalties' regime, or other reforms aimed at reducing the weight of devolution criteria in the system, could be facilitated by the introduction of a well-designed and flexible equalization mechanism, and by a transparent use of discretionary transfers to compensate for some of the losses engendered by the reforms. The political viability of any proposed reform would certainly be facilitated by the inclusion in it of appropriate **transition mechanisms** that, by distributing the impact of the reform over a suitable period of time, would smooth the adaptation of adversely affected SNGs to the new regime.

A detailed analysis of a menu of reform options for the entire intergovernmental transfer system is beyond the scope of this paper. In what follows, **the focus is on options for reform of the horizontal distribution formula for the FPE**, given the urgency for such a reform, in the aftermath of the decision of the Supreme Court mentioned above. The fact that such reforms may take place in advance of, and separately from, other possible future reforms of the system makes it all the more important to ensure that the new formula for the *FPE* include adequate elements of flexibility to adjust to other subsequent reforms, if and when they occur.

B. Criteria for Reform of the Horizontal Distribution Formula for the FPE

Any option for reform of the horizontal distribution formula of the FPE will need to meet the **two criteria specified in the Supreme Court's decision**, namely that the formula should be equalizing and capable of adjusting dynamically to changing relevant relative conditions of the states.

As indicated in Section II herein, an equalization system should ideally aim to equalize the capacity of the different states to provide a standard set of goods and services of their

responsibility, with average degrees of own-revenue effort and spending efficiency (along the lines of the Australian model). Unfortunately, **there are currently no conditions in Brazil for the implementation of such a full-fledged equalization model** for the following main reasons:

- The principal own-revenue source for the states (the ICMS) presents wide differences not only in the rate structure but also in the definition of the base across states. This makes it very difficult to estimate a representative state tax system of the Canadian type, and therefore to calculate through this system the revenue-raising potential (the taxing capacity) of each state
- Alternative methods of estimating the revenue potential (e.g.,, through the use of regression-based or stochastic frontier analyses)[16] are equally constrained by the lack of reliable standardized data on the state tax bases
- Reliable information is also missing on the cost structure of the main categories of state expenditures, which would be required to calculate spending needs at an average level of efficiency.

Given these limitations, the best feasible approach to the reform of the system in the near term appears to be one that limits equalization to the revenue side, and uses actual basic revenues of each state as a proxy for its revenue capacity on a per capita basis. Basic revenues are defined here to include all the state own revenues (current and capital, but excluding financing items) net of revenues shared with the municipalities, plus all transfers received from the federal government, except those of the FPE itself and those earmarked to specific spending under *acordos* o *convenios*. The closed nature of the FPE implies that reductions in own revenue efforts by individual states would be only partly compensated by increases in transfers from the fund, thus limiting the potential disincentive effect of using actual instead of potential revenues.

An approach of this type would meet most of the objectives specified above:[17]

- It would be simple, transparent, and easy to calculate and control, with very little delay given the short time lags involved in the preparation and reporting of state revenues

[16] See Fenocchietto, R. and Pessino, C., 2011 for a discussion of stochastic frontier techniques in estimating tax potential

[17] The objective of reducing the cyclical sensitivity of the transfers cannot be addressed through a reform of the horizontal distribution formula of the *FPE.* It would require a modification of the vertical sharing mechanism, e.g., by using a moving average of the relevant federal revenues as a base for the calculation of the *FPE.* A thorough analysis of the pro's and con's of such an approach is beyond the scope of this paper.

- It would increase the correspondence of FPE transfers with individual states' capacity to spend, compared to the current system, thereby enhancing equity; and
- It would facilitate a dynamic and timely response of FPE transfers to changes in socio-economic conditions (e.g., population or per-capita income) and other changes (e.g., in the royalty regime or in other intergovernmental transfers) that would affect the basic revenues per capita of individual states.

Given the closed nature of the FPE, an important decision in the design of the distribution formula is the **choice of the degree of redistribution desired**, specifically the choice of the **reference value (RV) for basic revenues per capita**, that is, the value of such revenues above which states would not receive transfers. The higher such a value, the larger would be the number of states (in the limit all) receiving transfers, but the lower the amounts received by each, and accordingly the lower the degree of redistribution of the system. This trade-off is highlighted by illustrative simulations (discussed in some detail in the Appendix below) of the effects of setting the RV at the level that ensures maximum redistribution, on the one hand, and at a level (equivalent to 105 percent of the basic revenues of the state (the *Distrito Federal*) with the highest such revenues) that ensures maximum coverage, on the other.

The choice of the relative weights to be given to the redistribution versus the coverage criteria is clearly a political one. An acceptable compromise between the two objectives could be achieved by **distributing two thirds of the FPE according to the maximum redistribution criterion and the other third according to the maximum coverage one**. Table 7 and Figure 5 below show the distribution by state of basic revenues, FPE transfers, and net revenues after the FPE transfers (all on a per capita basis) under this distribution formula. Figure 6 shows the gains and losses in total FPE transfers by state, compared with the current situation.[18]

[18] All calculations were made on the basis of 2009 data.

Table 7. Impact of Recommended Distribution Formula for FPE Transfers on States' Revenues per capita[19]

State	Basic revenues p.c.	*FPE* p.c.	Net revenues p.c.
DF	3,417.4	4.5	3,421.9
ES	1,831.0	45.8	1,876.8
SP	1,602.7	51.7	1,654.4
RJ	1,530.8	53.6	1,584.4
MS	1,491.7	54.6	1,546.3
MT	1,434.7	56.1	1,490.8
AM	1,375.1	57.6	1,432.7
SC	1,272.7	60.3	1,333.0
RO	1,238.9	61.2	1,300.1
RS	1,185.6	62.6	1,248.2
MG	1,086.3	65.2	1,151.5
PR	1,042.3	66.3	1,108.6
TO	1,041.5	66.3	1,107.9
RR	1,029.8	66.6	1,096.4
SE	1,006.6	67.6	1,074.2
AC	988.8	85.8	1,074.6
AP	988.3	86.3	1,074.6
GO	976.6	98.3	1,074.9
RN	833.8	244.8	1,078.6
PA	676.0	406.8	1,082.8
PE	650.9	432.6	1,083.5
BA	627.6	456.45	1,084.1
PI	542.6	543.6	1,086.2
CE	542.6	543.7	1,086.3
PB	523.3	563.5	1,086.8
AL	522.5	564.3	1,086.8
MA	454.2	634.4	1,088.6

[19] Calculations based on 2009 data from *STN*.

Figure 5: Impact of Recommended Reform on State Revenues per capita *(in reais)*

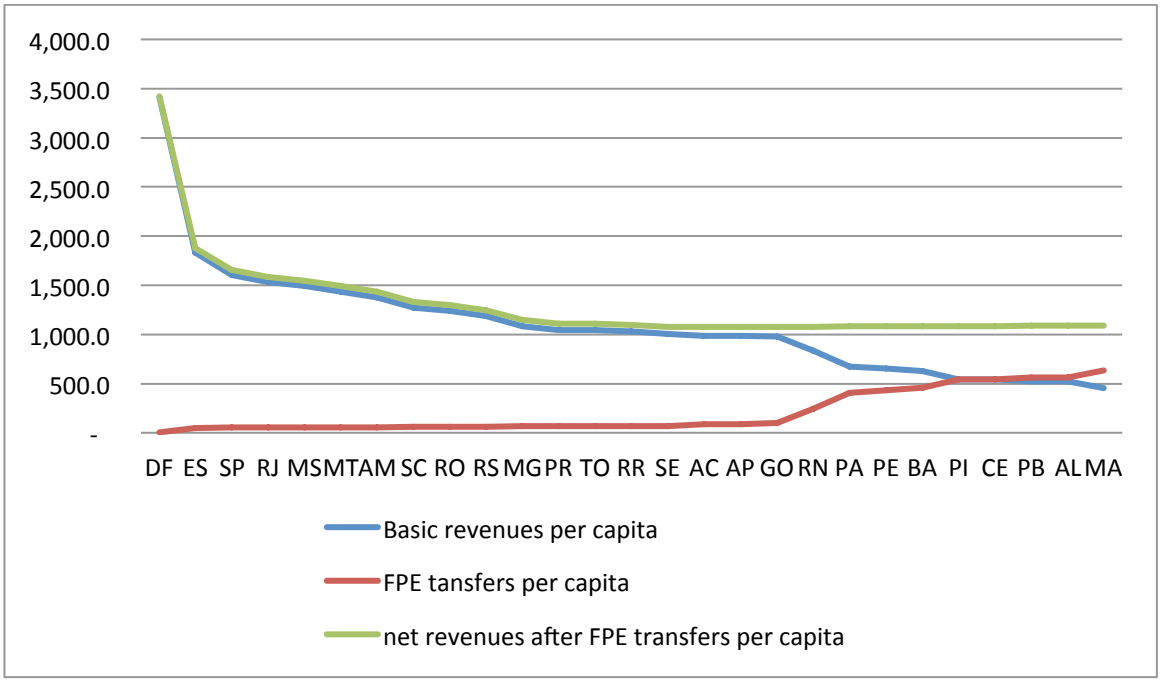
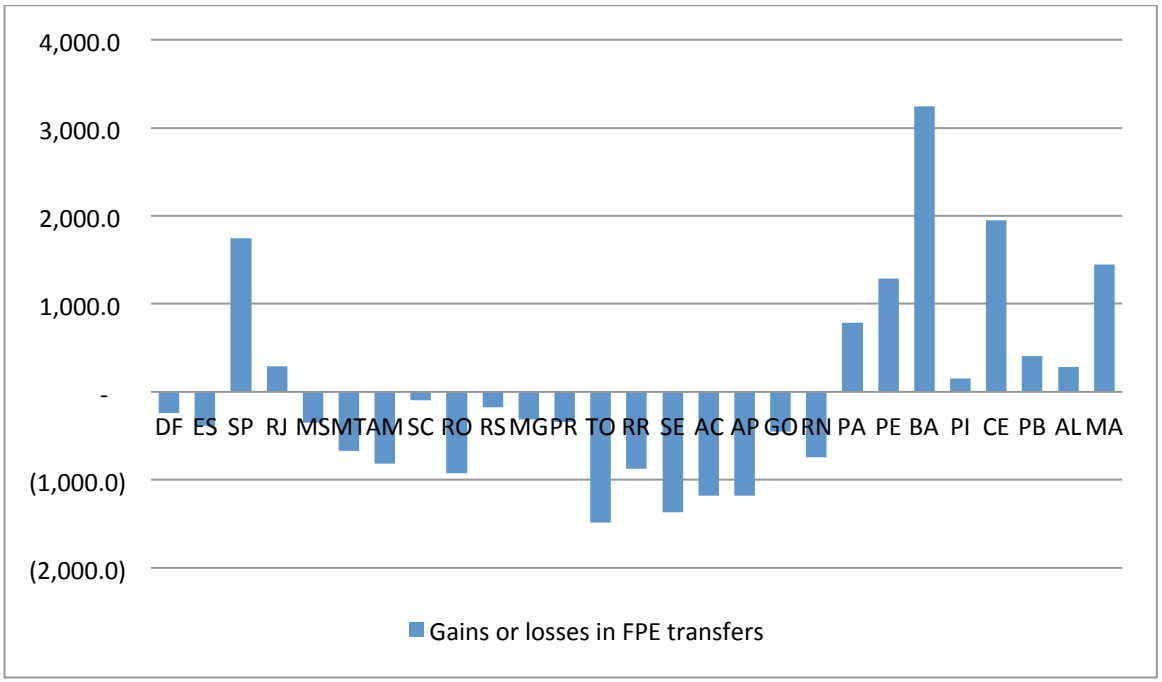


Figure 6: Gains or Losses in FPE Transfers *(in millions of Reais)*



A comparison of this reform option (Table 7) with the status quo (Table 6) suggests that **the proposed approach is indeed more redistributive than the present one** for the following reasons:

- The gap between the highest and the lowest net revenues per capita after *FPE* transfers is substantially reduce
- The largest gainers in terms of net revenues would be the poorest states in the northeast and north

As discussed in more detail in the Appendix, these results are robust to the use of some variants of this basic approach (e.g., the introduction in the formula of a proxy for fiscal efforts) aimed at minimizing the scope for states to substitute FPE transfers for own revenue-raising efforts. While the proposed approach appears an appropriate course of action in the time horizon mandated by the STF, it should be emphasized **that over the longer term it remains highly desirable to create the conditions for a shift to a representative revenue system** through a uniform definition of the ICMS base (a reform priority in itself, as discussed in sect. III above) and the preparation of a database on the states' tax bases (which should be facilitated by the ongoing adoption of electronic invoices (*nota fiscal eletronica*). Also, adequate progress in the incipient adoption of modern cost accounting systems by the states would facilitate the introduction of spending needs criteria in the distribution formula of the FPE over the medium term.

C. Transition Arrangements

Given the closed nature of the FPE, any reform of its horizontal distribution formula is **essentially a zero-sum game**, that is, gains by some of the states would have to be matched by losses of the others. This fact has been largely responsible for the stalemate that resulted in the freezing of the distribution coefficients since 1989. To be politically viable, any reform proposal would need to provide adequate time to the adversely affected states to adjust their finances to the loss. This can be done with a number of **alternative transition mechanisms**. One approach would involve distributing the losses and gains over a number of years. Another, possibly politically more palatable, approach would be to ensure to each state a floor equivalent to the nominal value of the transfers in the year preceding the adoption of the new distribution formula and to apply the latter only to the increases in the resources of the FPE

from that year. Over time, the weight of the floor would gradually decline, and that of the component distributed according to the new formula would increase correspondingly.[20]

[20] Assuming, for example, an annual nominal growth rate of the *FPE* of 7 percent per year (below historical averages), the size of the fund would double in 10 years, meaning that only half of it would be distributed on the basis of the current coefficients.

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Appendix

Assumptions and Main Results of the Simulation of Alternative Reform Options

This appendix discusses the assumptions underlying, and reports the results of, some illustrative simulations of alternative options for reform of the *FPE.* Simulations 1-5 represent possible variants of the recommended strategy of basing the horizontal distribution formula on the equalization of basic revenues, as discussed in sect. IV above. Simulation 6 models an alternative approach to equalization based on macro-variables (in practice a variant of the criteria initially underlying the current distribution formula). The results of the six simulations are summarized, in terms of FPE transfers per capita and net revenue per capita after such transfers, in tables A1 and A2, respectively.

Simulation 1: **Equalization of basic revenues per capita with maximum redistribution**

In this simulation the reference value (RV) was chosen so as to allow full equalization of net revenues per capita below it, subject to the size of the FPE. All the states with basic revenues per capita below this RV (calculated at 1147 Reais for 2009) would receive transfers sufficient to raise them to the RV; those above would receive no transfers. This option, as expected, would involve substantial losses and gains, compared with the current situation. Nine states (mainly relatively poorer ones in the Northeast) would gain, while the remaining eighteen would experience losses. The largest losses would be recorded by some states in the North and Center West that currently are major beneficiaries of the FPE. This option would significantly reduce (but, given the limited size of the FPE, would not eliminate) the differences in net revenues (after transfers) per capita: the ratio between the highest net revenue per capita after transfers and the lowest would fall from the current 4.1 to 3.0.

Simulation 2: Equalization of basic revenues per capita with a RV equivalent to 105 percent of the basic revenue of the *DF*

In this simulation the RV was chosen to be equivalent to 105 percent of the highest basic state revenue per capita (that of the DF). All states would receive transfers per capita from the FPE proportional to the gap between the RV and their own basic revenue per capita. This simulation illustrates the trade-off between redistribution and coverage of the system.

Under this option, among the twenty states that would lose FPE transfers per capita, compared with the current situation, would be some of the poorer ones. Moreover, the ratio of the highest net revenue after transfers per capita to the lowest would increase, compared to the current regime, from 4.1 to 4.9.

Simulation 3: Combination of simulations 1 and 2 (the preferred option)

In this simulation it is assumed that two-thirds percent of the FPE would be distributed on the basis of the maximum redistribution criterion of Simulation 1, and one-third according to simulation 2. Under this scenario, all states would continue to receive transfers from the *FPE.* Ten of them, mainly the poorest states of the Northeast and the North, would see their per capita revenue after FPE transfers increase, while the remaining seventeen would experience a loss. The ratio of the highest to the lowest net revenues after FPE transfers would fall from 4.1 to 3.2. This simulation forms the base for the recommended reform option.

Simulation 4: introducing a reward for own revenue-raising efforts

Simulations 1–3 were repeated assuming that 5 percent of the FPE would be distributed in proportion to the changes in the ratios of the revenues before transfers per capita of each state to its respective GDP per capita (as a proxy for relative revenue efforts).[21] The simulations suggest that the introduction of a premium for (this proxy of) effort would involve some changes in losses or gains, compared with the simulations without the premium. The same states would continue to gain or lose as under option 3 above, but the size of the gain or loss may be altered, significantly in a few cases. This option would be as redistributive as option 3, with the ratio of the highest to lowest net revenues after transfers falling to around 3.2.

Simulation 5: Linking FPE transfers to macro-variables

Under this simulation, an alternative approach was explored utilizing macro-variables (area, population and inverse of per capita GDP of each state), instead of basic revenues per capita. Specifically, it was assumed that the FPE would be distributed according to the following formula:

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[21] The distribution formula for the reward portion of the FPE would be:

$TR_{it}^{*}=[(RB_{it-1}/PIB_{it-1}- RB_{it-2}/PIB_{it-2})/(RB_{t-1}/PIB_{t-1}-RB_{t-2}/PIB_{t-2})]*0.05*FPE_t$

where: TR_{it}^{*} = the part of the *FPE* utilized to reward the effort (or penalize the decline in such effort) of state i for the period t

RB_{it}= basic revenue of state i in period t

PIB_{it}= GDP of state i for period t; and

RB_t/PIB_t =sum of the ratios RB_{it}/PIB_{it} of all the states

$TR_i = ft_i*0.05*FPE + [(fp_i/fr_i)/FRP]*0.95*FPE$

where:

TR_i is the *FPE* transfer to state i

ft_i (the land factor) is the ratio of the land area of state i to the entire area of Brazil

fp_i (the population factor) is the ratio of the population of state i to the total population of Brazil

fr_i (the GDP per capita factor) is the ratio of GDP per capita of state i to the national average GDP per capita;

FRP is the sum of fp_i/fr_i for all the states; and

FPE is total size of the *FPE*.

This option—which mimics the criteria underlying the current regime, but without the 85 percent regional reserve—is distinctly less redistributive than those based on the basic revenues per capita. It is also less redistributive than the current system since many of the poorer states of the Northeast would experience revenue losses under this option, while some of the richer states would enjoy significant revenue gains. This fact, as well as the fact that some of the variables involved in the calculations (in particular the state GDP) are available with longer lags, and the choice of weights is inevitably a somewhat arbitrary one, makes this option inferior to the recommended one.

Table A1: FPE Per Capita Under Alternative Simulations,[22] 2009[23] *(in Reais)*

State	Actual	S1	S2	S3	S4	S5
DF	98.9	0	13.3	4.5	17.2	48.0
ES	157.5	0	137.3	45.8	53.4	112.9
SP	8.9	0	155.1	51.7	47.8	92.0
RJ	35.3	0	160.7	53.6	59.1	102.7
MS	203.3	0	163.8	54.6	77.8	191.0
MT	277.6	0	168.3	56.1	149.8	257.4
AM	297.2	0	172.9	57.6	0	257.4
SC	76.1	0	180.9	60.3	63.9	113.3
RO	671.1	0	183.6	61.2	79.1	222.7
RS	78.5	0	187.7	62.6	62.7	127.4
MG	81.0	61.0	195.5	65.2	58.3	163.4
PR	98.4	105.1	198.9	66.3	66.0	136.0
TO	1,206.0	105.8	199.0	66.3	126.5	266.7
RR	2,133.4	117.6	199.9	66.6	1131.4	300.7
SE	741.1	140.7	201.7	67.6	169.2	233.5
AC	1,789.9	158.5	203.1	85.8	173.1	273.2
AP	1,973.4	159.0	203.1	86.3	418.3	251.2
GO	175.4	170.7	204.0	98.3	83.0	185.3
RN	479.8	313.5	215.2	244.8	232.9	279.0
PA	300.4	471.4	227.5	406.8	408.8	314.6
PE	285.7	496.5	229.5	432.6	410.6	279.5
BA	233.6	519.7	231.3	456.5	431.1	275.4
PI	494.5	604.7	237.9	543.6	524.9	437.9
CE	313.6	604.8	237.9	543.7	540.0	317.4
PB	457.0	624.0	239.5	563.5	550.8	332.7
AL	474.7	624.8	239.5	564.3	522.6	364.8
MA	408.4	693.1	244.9	634.4	620.1	381.3

Source: STN.

[22] S1: Maximum redistribution. S2: RV for equalization: 105 percent of net revenues of DF before FPE transfers. S3: combination (two thirds - one third) of S1 and S2. S4: same as S3, with reward for own-revenue effort. S5: equalization based on macro-indicators.

[23] States that would gain FPE transfers from the reform option are marked in yellow.

Table A2: Net Revenues per capita after FPE Transfers under Alternative Simulations[24], 2009[25] (in *Reais*)

State	Actual	S1	S2	S3	S4	S5
DF	3,516.4	3,417.5	3,430.8	**3,421.6**	3,434.7	3,465.5
ES	1,988.5	1,831.0	1,968.3	**1,873.7**	1,884.4	1,943.8
SP	1,611.5	1,602.7	1,757.8	**1,651.0**	1,650.5	1,694.7
RJ	1,566.0	1,530.8	1,691.5	**1,580.8**	1,589.9	1,633.5
MS	1,695.0	1,491.7	1,655.5	**1,542.7**	1,569.5	1,682.6
MT	1,712.3	1,434.7	1,603.0	**1,487.1**	1,584.5	1,622.5
AM	1,672.3	1,375.1	1,548.0	**1,429.0**	1,374.1	1,632.5
SC	1,348.8	1,272.7	1,453.6	**1,329.1**	1,336.7	1,386.0
RO	1,910.0	1,238.9	1,422.4	**1,296.1**	1,317.9	1,461.5
RS	1,264.1	1,185.6	1,373.3	**1,244.1**	1,248.3	1,313.0
MG	1,167.3	1,147.3	1,281.8	**1,147.2**	1,144.5	1,249.6
PR	1,140.7	1,147.3	1,241.2	**1,104.2**	1,108.2	1,178.2
TO	2,247.5	1,147.3	1,240.5	**1,103.5**	1,168.0	1,308.3
RR	3,163.2	1,147.3	1,229.7	**1,092.0**	2,161.2	1,330.4
SE	1,747.8	1,147.3	1,208.3	**1,069.8**	1,175.8	1,240.1
AC	2,778.8	1,147.3	1,191.9	**1,070.2**	1,161.9	1,262.1
AP	2,961.7	1,147.3	1,191.4	**1,070.2**	1,406.6	1,239.5
GO	1,152.0	1,147.3	1,180.7	**1,070.5**	1,059.7	1,161.9
RN	1,313.6	1,147.3	1,049.0	**1,074.0**	1,066.8	1,112.9
PA	976.3	1,147.3	903.5	**1,077.8**	1,084.8	990.6
PE	936.6	1,147.3	880.4	**1,078.4**	1,061.5	930.3
BA	861.2	1,147.3	858.9	**1,079.0**	1,058.7	903.0
PI	1037.1	1,147.3	780.6	**1,081.1**	1,067.6	980.5
CE	856.1	1,147.3	780.5	**1,081.1**	1,082.5	860.0
PB	980.3	1,147.3	762.8	**1,081.5**	1,074.1	856.0
AL	997.2	1,147.3	762.0	**1,081.6**	1,045.1	887.3
MA	862.6	1,147.3	699.1	**1,083.2**	1,074.3	835.5

[24] Same as footnote 19 above.
[25] States that would gain net revenues after FPE transfers from the reform option are marked in yellow.