

Working Paper

INTERNATIONAL MONETARY FUND



WP/07/252

IMF Working Paper

Why Focus on Spending Needs Factors? The Political Economy of Fiscal Transfer Reforms in Mexico

*Ehtisham Ahmad, José Gonzalez Anaya,
Giorgio Brosio, Mercedes García-Escribano,
Ben Lockwood, and Ernesto Revilla*

IMF Working Paper

Fiscal Affairs Department

Why Focus on Spending Needs Factors? The Political Economy of Fiscal Transfer Reforms in Mexico

**Prepared by Ehtisham Ahmad, José González Anaya, Giorgio Brosio,
Mercedes García-Escribano, Ben Lockwood, and Ernesto Revilla¹**

October 2007

Abstract

This Working Paper should not be reported as representing the views of the IMF.

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

An equalization system ensures that subnational governments can provide similar level of public services at a comparable level of own tax-effort. This paper focuses on the importance of spending needs factors in the design of equalization transfers as well as special purpose transfers—and the role that this could have in setting the agenda for better accountability for recipient governments, illustrating both design and implementation questions with examples from Mexico. The paper also takes into account the difficult political economy constraints to reforming any system of transfers.

JEL Classification Numbers: H7, H77

Keywords: Intergovernmental fiscal relations, transfers

Authors' E-Mail Addresses: eahmad@imf.org; josea_gonzalez@hacienda.gob.mx;
mgarciaescribano@imf.org; b.lockwood@warwick.ac.uk;
ernesto_revilla@hacienda.gob.mx

¹ Ahmad and García-Escribano are with the Fiscal Affairs Department of the IMF; González Anaya and Revilla are with the Mexican Secretariat of Finance and Public Credit; Brosio is Professor of Economics at the University of Turin; and Lockwood is Professor of Economics at the University of Warwick. This paper was presented at a conference on “Spending needs factors in Transfer Design,” held in Copenhagen (September 13–14, 2007), organized by the Danish Ministries of Finance and Interior and the Korean Institute of Public Finance for OECD member countries.

Contents	Page
A. Introduction.....	3
B. The Political-Economy Context of Reforming a System of Transfers in Mexico	3
C. Equalization Transfers—the Scope for Introducing “Needs Factors”	10
D. Conclusions.....	27
Tables	
1. Revenue Transferred from Federal Government to States, 2006	4
2. Indicators and Weights	13
3. State-Level Fiscal Capacity and Fiscal Needs	15
4. Phasing in of Equalization Transfers	24
5. The Effect of Different Growth Rates	25
Figures	
1. Allocations by States of General Transfers and Shared Taxes, 2006	6
2. Reform of the Current System—Marginal Changes (Option 1)	16
3. State Income per Capita and Option 1 Transfers	19
4. A Simple Equalization Transfer (Option 2).....	20
5. State Income per Capita and Option 2 Transfers	21
6. An Equalization Transfer Based on Fiscal Capacity and Needs (Option 3).....	22
7. State Income per Capita and Option 3 Transfers	23
8. Phasing in of Transfers with “Hold Harmless” Grants "	26
References.....	28

A. Introduction

There are good reasons to focus on spending needs factors in designing fiscal transfer systems, whether as part of a reform of special purpose transfers or equalization systems (see Ahmad 1998, Dafflon 2007, Reschovsky 2007). In the former case, this would help establish the proper basis for providing special purpose transfers, and also provides a basis for entering into performance contracts between the center and subnational governments—effectively providing actionable conditionality in meeting desirable outcomes for the central government. In the case of equalization systems, spending needs factors provide a better basis than revenue capacities alone (see Ahmad and Searle, 2006) in ensuring that subnational governments are capable of providing a similar level of public services at a comparable level of own-tax effort.

In this paper, we address both design issues as well as implementation questions. In countries planning to reform their transfer systems, should the government be advised to begin first with special purpose transfers, and then follow with an equalization system? How might these measures be sequenced, taking into account the difficult political economy constraints and vested interests that exist with any system of transfers? We illustrate with examples from an OECD country, Mexico, that intends to reform its transfer system in the short to medium term.

B. The Political-Economy Context of Reforming a System of Transfers in Mexico

Complexity of current arrangements

Intergovernmental relations in Mexico are characterized by a huge vertical imbalance. For states, almost 90 percent of their total revenues are derived from the federal transfers, and 65 percent for municipalities. On the whole, federal transfers represent 8.1 percent of GDP, a significant increase over the level in 1998 of 6.8 percent—reflecting the corresponding changes in expenditure assignments. Although called “decentralized” these expenditures are not necessarily so, as most are financed by special purpose transfers from the federal government.

The federation provides to subnational governments, general transfers (*participaciones*), specific transfers (*aportaciones*), as well as revenue from federal taxes, presently administered and collected by the states. Budgeted amounts for 2006 are reported in Table 1. The concept of general transfers used in Mexican budget documents includes all those sources of revenues whose use by the recipient government is unconditional.

General transfers

The existing “*participaciones*” reflect their design to close vertical gaps, and historically were designed to compensate for the loss of own-source revenues of the states as the federal VAT replaced a myriad of state taxes. Strictly interpreted, general transfers are the *participaciones* derived from a common pool—the *Recaudacion Federal Participable* (RFP)—constituted by federal assignable taxes and petroleum revenues.

Table 1. Revenue Transferred from Federal Government to States, 2006
(In millions of pesos)

	Origin	Amount	Use	Allocation
General Transfers ²				
National Transfer Fund	21.06% of RFP	274,305.9	Unconditional, but at least 20% to municipalities	Formula
Contingency reserve	0.25% of RPF	13,023.0		Formula
Shared taxes				Formula
Excise on alcoholic drinks	20% of collections	5,246.5	Unconditional, but at least 20% to municipalities	
Excise on beer	20% of collections			
Excise on tobacco	8% of federal collections			
Federal taxes administered by states		31,357.0		Derivation
Vehicle tax	100% of collections			
Tax in new vehicles	100% of collections			
Earmarked funds				
FAEB		186,461.5	Education	Historical expenditure
FAM	0.815% of RFP	9,300.6	Education	Infrastructural needs
FAETA	Share of RFP	3,738.2	Education	Personnel and other factors
FASSA		38,972.9	Health	Historical expenditure
FAIS	0.303% of RFP		Social infrastructure	Poverty indicator
FASP	Discretionary	5,000.0	Public order and security	Discretionary
FAFEF	1.4% of RFP	22,500.0	Multipurpose	Formula
Cofinancing schemes (<i>Convenios</i>)	Discretionary	27,129.9	Multisector	Mainly projects
Supplementary allocations	Supplementary oil revenue	23,770.3	Multipurpose	Multipurpose
Total		627,795.9		

Source: SHCP.

This pool is composed of the main federal taxes, such as the personal and corporate income tax, the tax on assets, the VAT and the excises. It includes also revenue from oil and mines. Some deductions apply. As shown in Table 1, a share of 21.06 percent of this pool is transferred to the states according to a formula that separates three components.³ These include (1) 45.17 percent of the pool is distributed according to population; (2) 45.17 percent of the pool is allocated on a historical basis—the previous year's allocation—corrected by a tax effort indicator, more precisely the rate of growth over the previous years of revenue from shared taxes and federally owned but state-administered taxes (see below); and (3) the remaining 9.66 percent is allocated according to the inverse of the per capita allocations of

² There are others, but are small, i.e., *Bases Especiales de Tributación*, *Fondo de Fomento Municipal (FFM)*, and the small funds for oil exporting, and frontier municipalities.

³ This share results from the sum of three separate funds that have the same allocation formula. They are referred to as *Participaciones Generales* (20 percent), *Coordinación de Derechos* (1 percent), and *Bases Especiales de Tributación* (0.06 percent).

the previous two components. For the sake of completeness, a very minor general transfer, the Contingency Reserve, has to be mentioned. Its total amount corresponds to 0.25 of RFP and the formula used for its distribution takes into account the evolution of resources since 1990 and reflects compensation of states that lost their share of *participaciones* that occurred in 1991.

Shared taxes

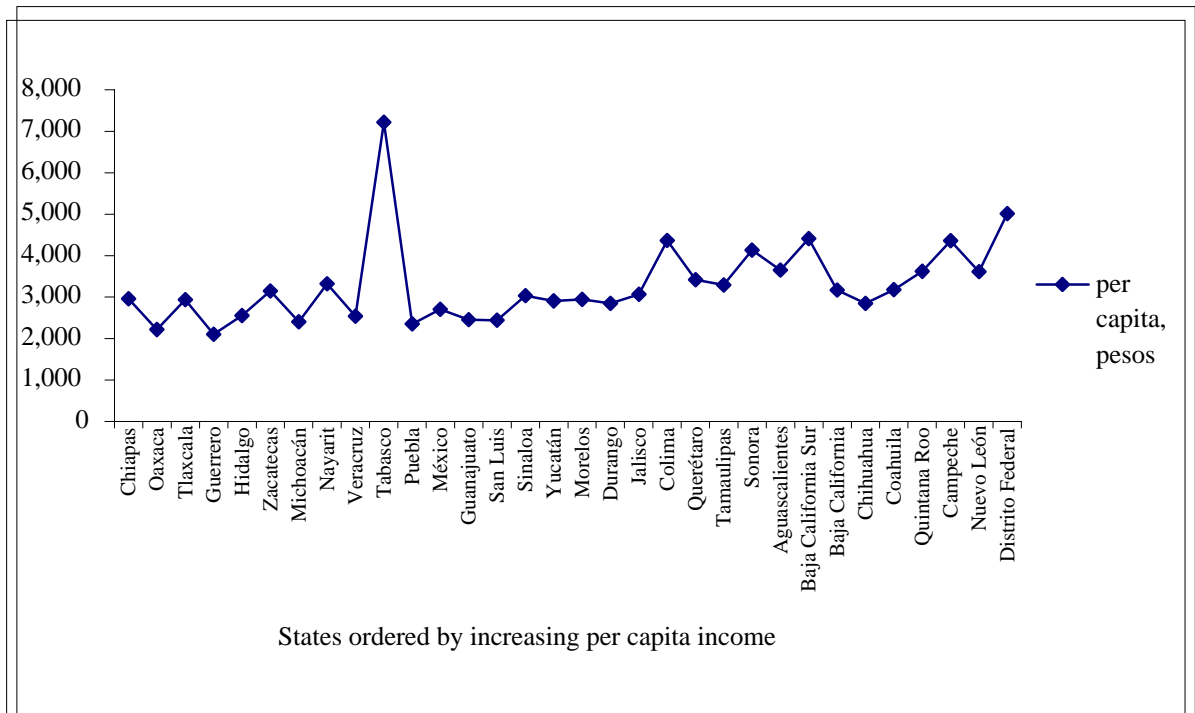
These include for 2006 varying percentages of the collections of a few excises on beer and alcoholic drinks (the sharing rate is 20 percent) and tobacco (8 percent).

Revenue from federally owned taxes administered by the states (incentivos)

This is a group of taxes owned by the federation according to the Constitution but currently administered by the states, and may also be considered to be transfers. The main two components are a typical tax on the use of vehicles and a registration tax on new vehicles. Basically, they have been kept in line with the pace of general transfers, staying consistently below a share of 10 percent of the latter.

States have to pay a statutory general transfer of at least 20 percent to their municipalities out of their general transfers and all shared taxes. States are mandated to determine the formula for the distribution of the proceeds to their municipalities. These formulae have different aims and structure, as is to be expected in a federal setting, and in many cases states do not have transparent or published formulae.

Viewed as a whole, transfers (that is, general-purpose grants (*participaciones*) and the special-purpose grants (*aportaciones*)) are not redistributive: in fact, as Figure 1 shows, the higher the per capita income of the state the higher the transfers it receives. This is due partly to the fact that the transfers address vertical imbalances, or compensation for the states relinquishing their taxation powers, more than horizontal considerations. The most salient feature of the transfers system is the favorable treatment reserved to small states, such as Baja California Sur, Campeche, and Colima. This favorable treatment to small states is a direct consequence of the “linearity” of the current formula. That is, since the population component is “added up” to the other parts of the formula, we have the (unintended and undesirable) consequence that *participaciones* per capita still depend on population! That is, smaller states—just for the fact of being small—receive more per capita transfers than the others. Thus the transfer system does not provide much incentive for tax effort, or increased efficiency in spending.

Figure 1. Allocations by States of General Transfers and Shared Taxes, 2006

Source: SHCP.

Making special purpose transfers more responsive to need and policy objectives

A fundamental shift in policy making in Mexico, as in other OECD countries, is to make the recipients of federal funds more responsible for the results for which resources have been appropriated. For special purpose transfers, which reflect or should reflect federal objectives for actions that are carried out by subnational agencies, the emphasis is equally on better defining the policy objectives for which transfers are provided, as on ensuring that the monies have actually been spent on for the purposes intended. In both respects, specifying the need for spending accurately and then being able to track the spending and the outcomes becomes part of a major reform of the public financial management and transfer systems.

The main special purpose programs are for education and health. In both cases, there are overlapping responsibilities between the federation and the states. In addition to the federal earmarked transfers for education and health, most (though not all) states allocate additional spending for these purposes. Given weaknesses in information and reporting systems, it is difficult for the center to be certain where federal responsibilities end and state functions take over. It is also difficult for the federation to assess whether the federal funds have been used efficiently. Under the circumstances, providing the federal resources according to objective measures of need and then monitoring outcomes would seem to be a sensible first step.

As is argued below, it is often not possible to introduce even these relatively small changes within the jurisdiction of the federal government's responsibilities. The main issue, thus, is whether or not such measures could be introduced in isolation—with relatively limited

own-source revenues for the states together with an absence of a system of equalization transfers—as perturbations in the federal government’s ambit is likely to have an impact on state responsibilities.

Reforming the aportaciones

As described above, the *aportaciones* for education and health form the bulk of the special purpose transfers. These are used largely to pay teachers’ and doctors’ salaries.⁴ Rather than reflecting current needs, *aportaciones* for education and health received by each state are based on historical trends. The public sector workers tend to belong to strong unions and the local governments have little jurisdiction over hiring or firing decisions.

The public sector workers tend to belong to strong unions and the local governments have little jurisdiction over salaries, hiring or firing decisions. Wage adjustments for teachers are negotiated first between the federal government and the national union, and then at the state level. As neither the state nor the federal government can easily change the structure of employment in the education and health sectors, changing the basis of financing in these sectors poses difficulties if these actions are taken in isolation. If based on needs factors, there is an excess in the number of teachers in some localities and a shortage in others—thus, in order to implement this criterion to allocate transfers, states have to be able to take up the excess teachers or find new ones, in case adjustments in employment cannot take place.

The preconditions for local governments must be that either (1) they have sufficient own-source revenues to take up the additional slack; or (2) there is an explicit equalization program that builds on these factors. Neither is the case at present in Mexico. Thus, reforms to the special purpose transfer cannot be taken in isolation. In practice, some of the additional participaciones could also be used for additional spending for the teachers. However, the states are not obligated to use the additional resources for this purpose, nor is there any sanction for not doing so or for providing basic service levels. Thus, the incentives to use the additional funds for education or health care at present are relatively weak.

Needs factors in equalization transfers?

How would one introduce an equalization system in Mexico—given that the current transfer system is so different from what one would expect an equalization system to achieve? We consider three simple options for reform. Our purpose here is simply to evaluate how each of these types of reform performs in terms of redistribution and tax effort in the Mexican case. These options are not mutually inconsistent with the reform of the special purpose transfers and could be considered to represent a medium-term objective for the reform of the transfer system.

⁴ FAEB and FASSA are used to pay for “federalized” teachers and doctors. That is, employees that were transferred to states with the decentralization of education (1992) and health (1996). There are also “state” teachers and doctors, which the federation does not pay for.

1. **A simple reform of the existing system** This combines *participaciones* and *aportaciones*, except those funding education and health, and redistributes them according to (equally weighted) tax effort⁵ and inverse income per capita criteria.
2. **A simple equalization transfer.** This combines *participaciones* and *aportaciones*, except those funding education and health, and redistributes them according to (equally weighted) population and inverse income per capita. This is a variant of option 1 where the tax effort component is replaced by a population-based transfer.
3. **An equalization transfer based on spending needs and fiscal capacities.** As in Nordic countries and Australia, this transfer will facilitate the provision of similar levels of public services at similar levels of tax effort, and is perhaps the most advanced formulation in OECD countries. In Mexico, this could combine *participaciones* and **all** *aportaciones* into a single fund. The standardized fiscal capacities and expenditure needs are estimated from the underlying characteristics of the states (e.g., size of the tax base and demand for, and cost of, producing particular kinds of services such as health and education), and are not determined by actions of individual states.

Thus, the first two options are more conservative in that they ring-fence the *aportaciones*, funding education and health (FAEB, FAETA, FASSA), which are the responsibility of line ministries. Thus, these reforms are designed with political economy constraints in mind. The third option is more radical, and is a simple example of the kind of equalization grant that international best practice would recommend in the absence of the political constraints. To the extent that there might be constraints on the availability of data in a particular country, one might examine whether option 2 might provide an adequate or acceptable degree of equalization as an intermediate measure.

All options are evaluated using data for the year 2005. Also, for each option, the available funds for redistribution are chosen so that they add up to *actual* payments of *participaciones* and the relevant *aportaciones* in 2005. Thus, in each case, both the actual transfers and the reform option can easily be compared to each other. These revenues are:

- Total state *participaciones* minus FFM, i.e., the sum of *Fondo General de Participaciones*, *Reserva de Contingencia*, *Impuesto Especial Sobre Producción y Servicios*, 0.136 percent of the *Recaudación Federal Participable*, *Derecho Adicional Sobre la Extracción de Petróleo*. These sum to MEX\$242,733.6 million.
- For option 3: total *aportaciones* (all of *Ramo 33*) minus municipal *aportaciones* (FORTAMUN and FISM).⁶ FISM is the part of FAIS that is allocated to municipalities. These sum to MEX\$239,044 million.

⁵ Our procedure for measuring tax effort is described in more detail below.

- For options 1 and 2: the sum for option 3, i.e., MEX\$239,044 million *minus* the sum of FAEB, FAETA, and FASSA, which gives MEX\$16,902 million.

So, we can see that in options 1 and 2, the available “pot” of money for redistribution is much smaller than under option 3 (MEX\$259,635 million as opposed to MEX\$481,777 million), and the latter is almost entirely composed of *participaciones*.

Note that we take out any federal funds for municipalities, *before* considering redistribution to states. However, the states are under a legal obligation to pay 20 percent of the *participaciones* they receive to the municipalities: we do not subtract this from the pot. Also, we are excluding any redistribution of FAFEF, which was outside *Ramo* 33 for the year under consideration,⁷ and of *Convenios de Descentralización* and *excedentes*. This is primarily for data reasons: we do not have any information on the distribution of these funds by state. However, one could argue that for political reasons, the case of *Convenios de Descentralización* would be difficult to bring into an equalization fund, although this would be recommendable in view of the lack of transparency in their allocation, and in the case of *excedentes*, one would not want to do this, because they are highly variable.

Sequencing of reforms

Finally, for each of the three options, we study a **static** and a **dynamic** scenario. The static scenario assumes that the option is implemented fully without any attempt to compensate possible losers. The dynamic scenario assumes gradual introduction of the reform option with a “hold harmless” provision, i.e., compensation of losses in nominal terms.

Specifically, the “hold harmless” provision means that in each year following the reform, every state receives (i) a fixed payment equal in nominal terms to the total transfer from federal government in the year preceding the reform; plus (ii) a transfer of additional funds based on the new formula. In the years following the reform, there will be a growing pool of additional funds for three reasons: inflation, real economic growth, and increased efficiency of tax collection.

The relationship between the static and the dynamic scenarios is that, other things equal, as time goes to infinity, the relative allocation of funds across states gets closer to the allocation in the static scenario, assuming that characteristics of regions, insofar as they affect the transfer formula, do not change in relative terms over time.⁸ Of course, if the economy as a whole is growing, the absolute real values of the transfers will grow too.

⁶ FISM is the part of FAIS that is allocated to municipalities.

⁷ FAFEF is now under *Ramo* 33 since 2007. It is now fund number 8 of *aportaciones*.

⁸ To understand the meaning of this, suppose that the transfer depended only on per capita state incomes, and all states grow at the same rate. Then relative transfers, i.e., the size of the transfer in state A relative to that in state B, will stay the same.

So, the static scenario can be regarded as a long-run outcome (assuming, rather unrealistically, that the characteristics of states, insofar as they affect the transfer formula, do not change relatively to each other over time). Or, more precisely, it can be regarded as the outcome of a “big bang” reform where there is no attempt to compensate the losers.

C. Equalization Transfers—the Scope for Introducing “Needs Factors”

The options for reforming equalization transfers range from marginal changes to the status quo to the full equalization system based on spending needs and revenue capacities (Options 1 and 3 described above). But, in the absence of good information, one could ask whether it might not be simpler to use an approximation for Option 2 using “macro-factors” such as state GDP per capita. In the rest of the paper, we examine the case for using a full equalization approach based on needs factors—recognizing that these might have to be brought in gradually and estimation procedures refined as more data become available.

Option 1

The existing formulae stress tax effort, although there are relatively few significant own-source tax bases available to the states. There are two ways in which one could measure tax effort. First, and most obviously, one could look at the taxes that are legally assigned to states (e.g., the payroll tax).

Second, there are a number of federal taxes which are assigned to a state, i.e., although the rate and the base are set by federal government, the state is responsible for the collection of the tax and keeps all the revenue (the *incentivos*). The most important of these are the vehicle tax (ISTUV) and the tax on new vehicles (ISAN), but also included are revenues from VAT and income tax paid by small taxpayers (REPECOS).

We choose to measure tax effort by the size of the *incentivos*. This is for two reasons. First, not all states use the most important state taxes, the payroll tax, or the state tax on the use of vehicles over 10 years old. So, measuring tax effort by one of these taxes would lead to a bias against those states that do not use it (e.g., Baja California in the case of the payroll tax for the year under consideration).⁹ Second, the volume of revenue raised by the *incentivos* is much larger than that of the state taxes and thus arguably a more important indicator of state tax effort.

Our measure of the tax effort of the state is then constructed as follows. First, we calculate the percentage increase in the revenue from *incentivos* over the period 2000–2005 for each state (data supplied by SHCP). Taking a five-year average rather than a one-year average helps smooth out fluctuations due to state-specific shocks to revenues.

Then, we calculate the population-weighted share of each state in the total increase in *incentivos*. Generally, if Δ_i is the percentage increase in state i , we calculate

⁹ Baja California instituted a payroll tax as of 2007—so all states now use the payroll tax.

$$s_i^{TE} = \frac{pop_i \times \Delta_i}{\sum_i pop_i \times \Delta_i} \quad (1)$$

where “TE” stands for tax effort. Then, half the total amount of the funds available (i.e. half of MEX\$259,635 million) is distributed according to these shares i.e. state i gets half of MEX\$259,635 times s_i^{TE} .

This formula (1) has a simple interpretation. If all states have the same rate of increase of *incentivos*, then the money is shared out according to population, so that every state receives the same amount per capita. More generally, states with a larger percentage increase will receive a larger amount per capita.

The other half of the total “pot” of money is shared out by a similar kind of formula. The share of state i is given by (1), but where the inverse of GSP per capita in state replaces Δ_i . That is, the shares are given by

$$s_i^{YPC} = \frac{pop_i \times 1/YPC_i}{\sum_i pop_i \times 1/YPC_i} \quad (2)$$

where YPC_i is gross state product (GSP) per capita in state i . So, generally, states with a smaller GSP per capita will receive a larger amount per capita. Overall, then, state i gets a share $0.5s_i^{YPC} + 0.5s_i^{TE}$ of the total, and so the grant both equalizes and rewards tax effort.

Option 2

This is an intermediate option based on population and the inverse of per capita income. The population variable could be considered to be a simple summary of needs factors, and the inverse of per capita income also reinforces relative need.

The two share variables are calculated, as first, the simple population share, i.e.,

$$s_i^{POP} = \frac{pop_i}{\sum_i pop_i}, \quad (3)$$

and, second, the inverse per capita income share. These two shares are then equally weighted to obtain an overall share for state i . That is, state i receives $s_i = 0.5s_i^{POP} + 0.5s_i^{YPC}$ of the total funds to be distributed. This provides a mechanism to introduce some aggregate needs factors in a fairly rough manner and to become the basis for a degree of horizontal equalization.

Option 3

Finally, with option 3 one may consider a more complete equalization framework based on revenue capacities and expenditure needs (estimated with more or less detail depending on

the factors used and information available). We explain how this might work in a country like Mexico, using simple factors, and then explain the political economy rationale for why this might be preferable to the other two options—one which has the advantage of being close to the status quo, and the second which has the benefit of simplicity.

The construction is more complex than the other two cases, and proceeds in a number of steps.

Step 1: Fiscal capacity. Fiscal capacity is defined as the tax revenue that each state could raise from its own tax instruments if it sets the average tax rate of the federation on each of the tax bases. The idea is that states with relatively large (small) tax bases have strong (weak) fiscal capacity. We assume that the tax bases of the states are proportional to GSP. Also, we have to deal with the additional complication of *incentivos*. This comprises revenues from taxes that are federally set. Because the **rates** for taxes in the *incentivos* are federally set (and thus are the same for all states) it is appropriate to simply add this to the basic measure of fiscal capacity. So, overall, our formula for the fiscal capacity of state i is

$$FC_i = \frac{\sum_i OR_i}{\sum_i GSP_i} GSP_i + INCENTIVOS_i \quad (4)$$

So, here, OR_i is the own-revenue for state i (taxes and non-tax elements, such as fees), and so $\frac{\sum_i OR_i}{\sum_i GSP_i}$ is a measure (at the aggregate level) of the average tax rate in the federation.

Step 2: Expenditure needs. Due to data constraints (i.e., the fact that functional classification of state expenditures are generally not available¹⁰ at the state level), we only have three categories of expenditure: education (ED), health (H), and other (O).

For each of these categories, we calculate an index of relative need. Generally, N_{ij} is the index of relative need for expenditure type $j=H,ED,O$ by state i . These indices are normalized to add up to 1 for each expenditure type. Overall expenditure need for state i is thus

$$N_i = N_{i,H} E_H + N_{i,ED} E_{ED} + N_{i,O} E_O \quad (5)$$

Note, that by construction, the sum of N_{ij} across states is equal to total expenditure by states, i.e., $E_H + E_{ED} + E_O$. In our case, $E_H=241687$, $E_{ED}=53117$, $E_O=671851$, all in million pesos for 2005.

The expenditure need by state i for a specific category j , i.e., N_{ij} is calculated using *need factors* (denoted A,B,C, etc.) specific to that category. For example, with health, need factor

¹⁰ These are currently only available for six states.

A might be the infant mortality rate. Then (assuming for simplicity two need factors A and B), state i's overall need factor for expenditure j is given by the general formula

$$N_{ij} = \frac{(\omega_A s_{ij}^A + \omega_B s_{ij}^B) C_i}{\sum_i (\omega_A s_{ij}^A + \omega_B s_{ij}^B) C_i} \quad (6)$$

This is in fact quite intuitive. First, the denominator just normalizes the need factors so that we can focus on the numerator. In the numerator, s_{ij}^A, s_{ij}^B , are simply the population-weighted shares of state i (as in (1)) of the need factors A, B for expenditures of type j. Then, ω_A, ω_B are weights measuring the relative importance of factors A and B. So, $\omega_A s_{ij}^A + \omega_B s_{ij}^B$ can be interpreted as a measure of state i's true demand for expenditure type j, ignoring any fiscal constraints (see Table 2). Finally, C_i is a cost of living index, so $(\omega_A s_{ij}^A + \omega_B s_{ij}^B) C_i$ is a measure of the true cost of meeting demand in state i.

Table 2. Indicators and Weights

Category	Indicators (A, B)	Weights (ω)
Education	Share of population 0-14	0.5
	Average number of years of schooling of males, females over the age of 15	0.25, 0.25
Health	Infant mortality rate, share of population over 65	0.5, 0.5
Other	Inverse of GSP per capita, square root of population density	0.84, 0.16

Source: SHCP.

Some comments on these choices are in order. First, the choice of indicators follows standard practice in this area (see, e.g., Ahmad, et. al.(2002)), as far as time and data constraints allow. The choice of weights is arbitrary and follows an equal weighting pattern (except for other expenditure—see below). This is a procedure that is often followed. Weighting can be refined and made less subjective by using regression analysis.

The “other” category deserves special mention. This includes both current expenditure (84 percent at the national level) and capital expenditure (16 percent at the national level). Functionally, it comprises expenditure categories such as: police and criminal justice, expenditure on culture and sports, and infrastructure. Following Ahmad, et. al., 2002, we have implicitly assumed that the need for the current expenditure component can be proxied by the inverse of income per capita, and that the need for the capital expenditure component can be proxied by population density. The square root is used to avoid bias in favor of the Federal District, which has an extremely high population density.

Finally, the living costs index is derived from Bank of Mexico data on price indices for 46 major cities. We use February 2007 data (the most recent available date) as all indices are normalized to 100 in January 1995. Thus, these indices underestimate true cost of living

differences between cities. The state-level index is constructed by taking the average for all the cities in the state, if the state has more than one city in the database.

The results of these calculations are shown in Table 3 below. Column 1 gives the need factors for health ($N_{i,H}$) and column 2 multiplies these by total state expenditure (i.e., summed across all states). Columns 3 and 4 repeat the same calculations for education, and columns 5 and 6 for other expenditure.

Step 3. Calculation of the fiscal gap and the grant. Using (4) and (5), we can calculate the fiscal gap of state i as

$$FG_i = N_i - FC_i$$

where N_i is the expenditure need of the i th state, and FC_i is its fiscal capacity. Table 2 below shows this calculation. The fiscal gap by state is in column 9.

Generally, and this is also true in our case, the available pool of resources for redistribution, P , is less than the sum of the fiscal gaps, and so each state receives an actual transfer in proportion to the relative size of its fiscal gap, i.e.,

$$TR_i = \frac{P}{\sum_i FG_i} \times FG_i$$

In our case, from Table 3 we see that the available transfers are only 87 percent of the aggregate fiscal gap of MEX\$553,575. These transfers by state are shown in column 10.

Equalization framework and the sequencing of measures

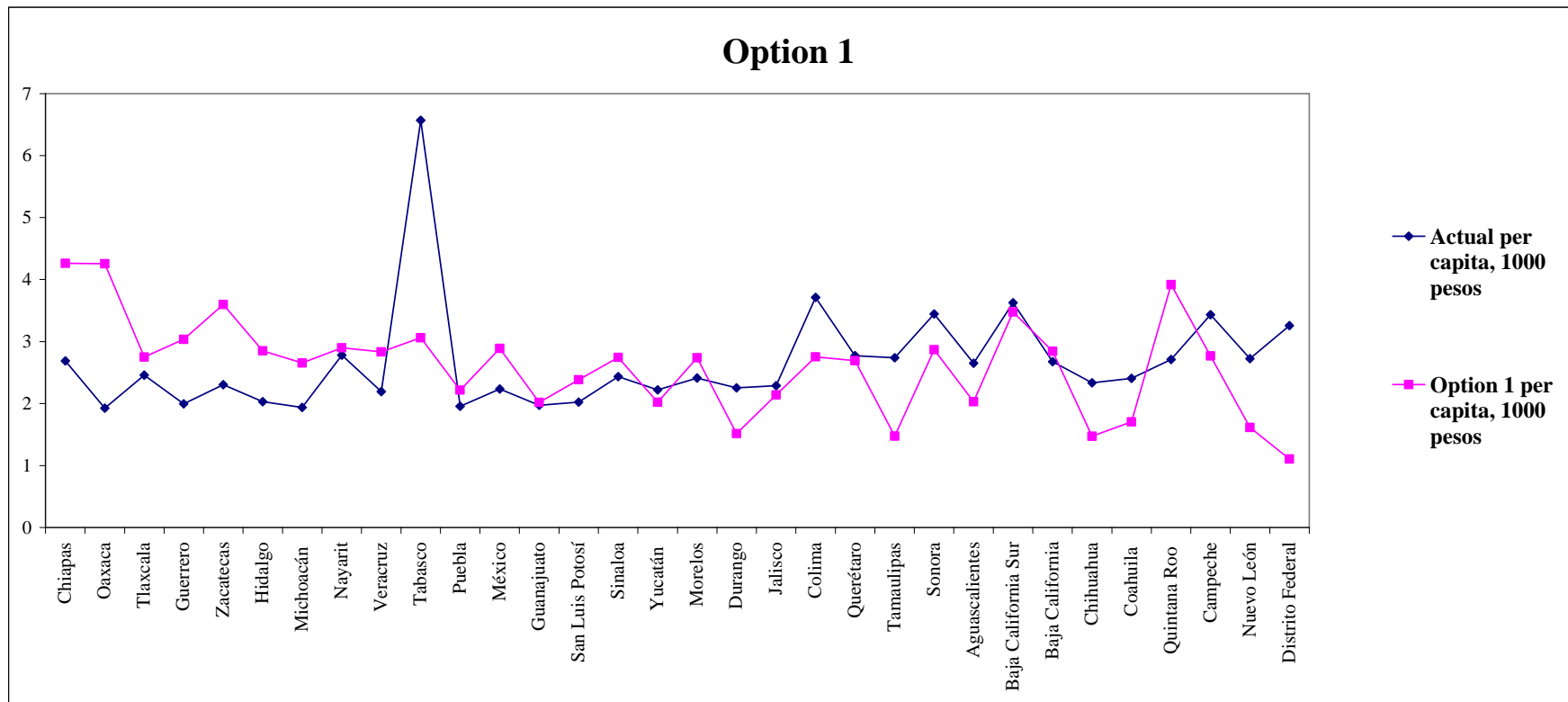
Before going to the detail of the options, we report here the main findings. These are best described through use of figures. Figure 2 below shows the adjustments to the existing transfer system, based on per-capita payments and tax effort to states (in the static scenario) for option 1 compared to the current situation. In this figure, and all the other figures in this chapter, states are ranked on the horizontal axis by increasing income per capita.

Table 3. State-Level Fiscal Capacity and Fiscal Needs

State	Health Need Share ($N_{i,H}$) 1	$N_{i,H} \times E_H$ 2	Education Need Share ($N_{i,ED}$) 3	$N_{i,ED} \times E_{ED}$ 4	Other Need Share ($N_{i,O}$) 5	$N_{i,O} \times E_O$ 6	Sum of Needs (2+4+6) 7	Fiscal Capacity 8	Fiscal Gap (7-8) 9	Option 3 Transfer 10
Aguascalientes	0.0086	459.12	0.0112	2,700.99	0.0071	2,549.17	5,709.28	1,214.80	4,494.48	3,911.55
Baja California	0.0206	1,095.43	0.0274	6,611.44	0.0154	5,497.89	13,204.76	3,465.01	9,739.75	8,476.52
Baja California Sur	0.0040	214.61	0.0052	1,246.01	0.0029	1,026.45	2,487.07	593.22	1,893.85	1,648.22
Campeche	0.0073	388.57	0.0074	1,776.42	0.0032	1,136.40	3,301.40	1,221.28	2,080.12	1,810.33
Chiapas	0.0428	2,272.93	0.0391	9,450.30	0.0690	24,661.88	36,385.10	1,676.22	34,708.88	30,207.17
Chihuahua	0.0284	1,506.40	0.0310	7,491.17	0.0159	5,701.76	14,699.33	4,280.56	10,418.77	9,067.46
Coahuila	0.0212	1,127.36	0.0260	6,276.55	0.0127	4,544.49	11,948.40	3,333.49	8,614.91	7,497.56
Colima	0.0052	277.28	0.0054	1,312.59	0.0043	1,529.65	3,119.52	527.61	2,591.91	2,255.74
Distrito Federal	0.0870	4,621.16	0.0881	21,294.98	0.0878	31,415.34	57,331.49	21,587.08	35,744.41	31,108.40
Durango	0.0147	780.62	0.0147	3,551.81	0.0110	3,935.47	8,267.90	1,311.77	6,956.13	6,053.93
Guanajuato	0.0715	3,798.52	0.0498	12,034.48	0.0461	16,492.83	32,325.84	3,554.19	28,771.65	25,039.99
Guerrero	0.0377	2,003.36	0.0300	7,251.75	0.0372	13,297.58	22,552.68	1,664.41	20,888.27	18,179.08
Hidalgo	0.0329	1,749.05	0.0224	5,414.48	0.0303	10,829.14	17,992.67	1,288.51	16,704.15	14,537.64
Jalisco	0.0492	2,612.09	0.0622	15,028.97	0.0504	18,029.80	35,670.85	6,236.01	29,434.84	25,617.17
México	0.0900	4,778.59	0.1276	30,833.72	0.1526	54,566.13	90,178.44	9,368.35	80,810.09	70,329.10
Michoacán	0.0433	2,298.57	0.0363	8,781.19	0.0473	16,912.34	27,992.10	2,185.71	25,806.39	22,459.33
Morelos	0.0155	825.11	0.0149	3,606.01	0.0138	4,937.22	9,368.34	1,364.49	8,003.85	6,965.76
Nayarit	0.0107	566.18	0.0096	2,325.49	0.0116	4,139.40	7,031.06	532.40	6,498.66	5,655.79
Nuevo León	0.0350	1,859.92	0.0425	10,265.65	0.0180	6,443.13	18,568.70	7,345.91	11,222.78	9,767.20
Oaxaca	0.0432	2,295.96	0.0323	7,798.89	0.0530	18,965.20	29,060.05	1,504.95	27,555.10	23,981.23
Puebla	0.0577	3,064.79	0.0536	12,943.27	0.0588	21,023.94	37,032.00	3,513.48	33,518.52	29,171.20
Querétaro	0.0147	781.95	0.0170	4,103.39	0.0116	4,159.92	9,045.26	1,698.62	7,346.64	6,393.79
Quintana Roo	0.0074	393.47	0.0109	2,634.49	0.0052	1,844.61	4,872.57	1,621.69	3,250.88	2,829.25
San Luis Potosí	0.0266	1,411.14	0.0240	5,805.14	0.0218	7,788.66	15,004.93	1,792.63	13,212.30	11,498.67
Sinaloa	0.0270	1,436.47	0.0273	6,609.15	0.0245	8,770.51	16,816.13	1,965.71	14,850.42	12,924.34
Sonora	0.0230	1,222.68	0.0260	6,290.75	0.0153	5,479.85	12,993.28	2,649.18	10,344.10	9,002.48
Tabasco	0.0193	1,025.35	0.0203	4,899.87	0.0224	7,995.77	13,920.99	1,231.45	12,689.54	11,043.72
Tamaulipas	0.0280	1,485.83	0.0301	7,270.32	0.0191	6,820.70	15,576.85	3,299.54	12,277.32	10,684.96
Tlaxcala	0.0103	545.27	0.0109	2,625.16	0.0143	5,109.64	8,280.07	562.85	7,717.22	6,716.30
Veracruz	0.0826	4,385.25	0.0675	16,320.14	0.0860	30,760.55	51,465.94	4,122.57	47,343.37	41,202.98
Yucatán	0.0196	1,041.93	0.0170	4,114.33	0.0160	5,719.51	10,875.77	1,398.25	9,477.52	8,248.30
Zacatecas	0.0149	792.65	0.0125	3,018.59	0.0155	5,545.12	9,356.36	747.76	8,608.60	7,492.07
Totals	1.0000	53,117.59	1.00	241,687.50	1.00	357,630.04	652,435.12	98,859.69	553,575.44	481,777.21

Sources: SHCP and Fund staff calculations.

Figure 2. Reform of the Current System—Marginal Changes (Option 1)



Source: SHCP.

First, note that the current allocation of transfers under consideration (largely *participaciones*, plus states FAIS and FASP) tends to **rise** with per capita income and is thus **disequalizing**. Small states currently do disproportionately well (notably Tabasco, Colima, Baja California Sur, and Quintana Roo).

Option 1 reproduces the random nature of the existing grant system. From Figure 2, it is clear that it is only equalizing at the top and bottom of the income distribution across states. That is, only the poorest (richest) states have a per capita grant systematically above (below) the average. Specifically, over 28 of the 32 states ranked by increasing income per capita (Tlaxcala to Campeche) there is no downward trend at all; the mean transfer is flat at between MEX\$2,000 and MEX\$3,000 per capita. But, over this range, although there is no trend, there is a lot of variation around this mean: for example, Quintana Roo gets about twice as much as Chihuahua. This variation must be driven by variations in tax effort. So, there is a clear trade-off between equalization and explicit tax effort incentives.

To put it another way, Option 1 provides “super incentives” for tax collection, i.e., the state gets more than 100 percent of every peso raised, but it is questionable whether these additional incentives are worth the lack of equalization.

One feature of Option 1 that is not very clear¹¹ from Figure 2 is exactly how Option 1 transfers are correlated with state per capita incomes (it only has an ordinal ranking of states by per capita income). Figure 3 gives more information about this correlation: it shows that there is a negative relationship between per capita incomes and Option 1 transfers across states, although there is a lot of variation around the linear regression line, but to the tax effort component of the transfer. An increase in per capita income of 10,000 pesos (roughly, 1,000 U.S. dollars) leads on average to only a 100 peso decrease in the per capita grant.

Option 2, as might be expected, is highly equalizing, not just at the ends of the income distribution, but throughout the range. Figure 4 below shows this very clearly. So, this indicates that building a reward for tax effort (over and above 100 percent retention of taxes) may have a high cost in terms of loss of equalization.

Moreover, it is important to note that pure equalization Option 2 (and Option 3) also give strong *implicit* tax effort incentives, even though there is no explicit reward for raising more tax revenue. That is, under each option, the state keeps 100 percent of every peso raised (to a first approximation, the indicators used to construct Options 2 and 3 are independent of separate tax effort). As the states have no control over the variables used for the design of the transfers under Options 2 and 3, they have to resort to own-revenue sources if they need additional revenues. This provides the strongest incentives to actually utilize assigned revenue-bases.

Figure 5 gives more information about the correlation between Option 2 transfers and income per capita: it shows that there is a very clear negative non-linear relationship between per capita incomes and Option 2 transfers across states.¹² This is of course, driven by the use of

¹¹ Figure 2 is designed also to allow comparison between the existing transfers and the new option, as well as per capita incomes: it is the only way to represent three data series without losing clarity.

¹² In this case, a linear regression line is not fitted: it would not have much meaning, as the relationship is obviously non-linear.

inverse per capita income as a criterion for redistribution. The relationship is convex: that is, the grant initially falls rapidly with income per capita, and then more gradually.

In Option 3, a full equalization is proxied based on expenditure needs and revenue capacities. As Figure 6 indicates, the end result is that the transfer is quite equalizing, with some exceptions. For example, the Federal District gets more per capita than some other rich states, because it has a very high population density, which is the factor (in our set-up) driving the demand for infrastructure investment. But overall, a notable feature is that the transfers fall with per capita incomes, even though the fiscal gap is calculated using many other indicators besides per capita incomes.

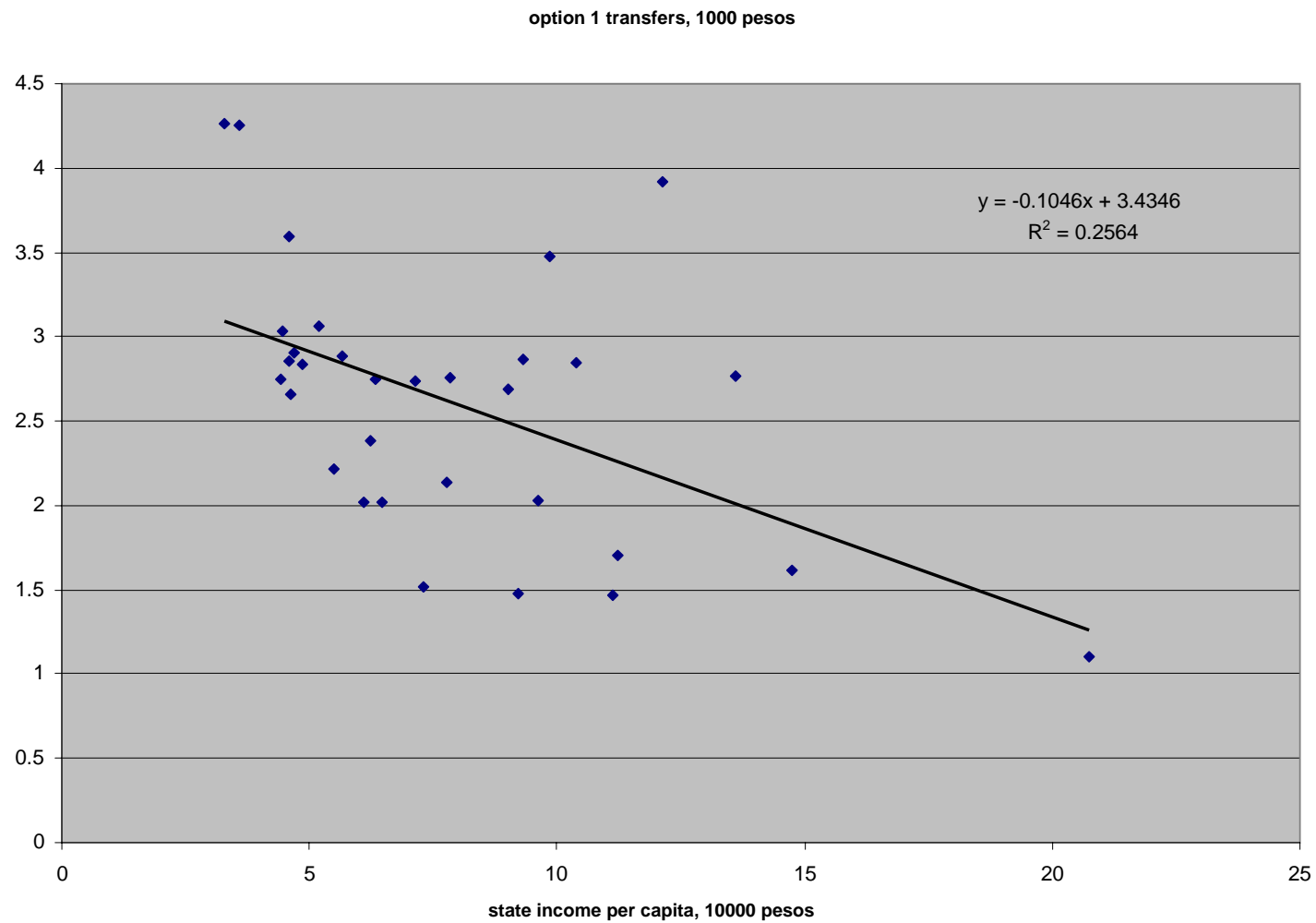
Figure 7 gives more information about the correlation between Option 3 transfers and income per capita: it shows that there is a quite a clear negative relationship between per capita incomes and Option 3 transfers across states. The relationship is slightly convex,¹³ but much less so than in the case of Option 2. So, the rate at which grants fall with state per capita income falls slightly over the range of per capita incomes, with the District of Mexico being an outlier, as already explained, of course, driven by the use of inverse per capita income as a criterion for redistribution. The relationship is convex: that is, the grant initially falls rapidly with income per capita, and then more gradually. The linear regression line indicates that an increase in per capita income of 10,000 pesos (roughly, 1,000 U.S. dollars) leads on average to only a 280 peso decrease in the per capita grant.

While Option 2 is equalizing, and may be preferable to Option 1, the issue arises whether or not it should be used as a proxy for a full equalization system based on needs factors and revenue capacities. This may well be the case in a particular context, but the advantage in focusing on needs factors is that it can help to change the policy debate and mould the changes in responsibilities that may be needed as part of a longer term strategy of the joint reforms of spending assignments and the transfer system.

Comparing Option 3 to Option 1, one can observe that it has several advantages: it is less variable, more equalizing, and is based on explicit needs and fiscal capacity criteria. These are all the advantages mentioned in relation to Option 2, plus the equalization that the current system does not provide.

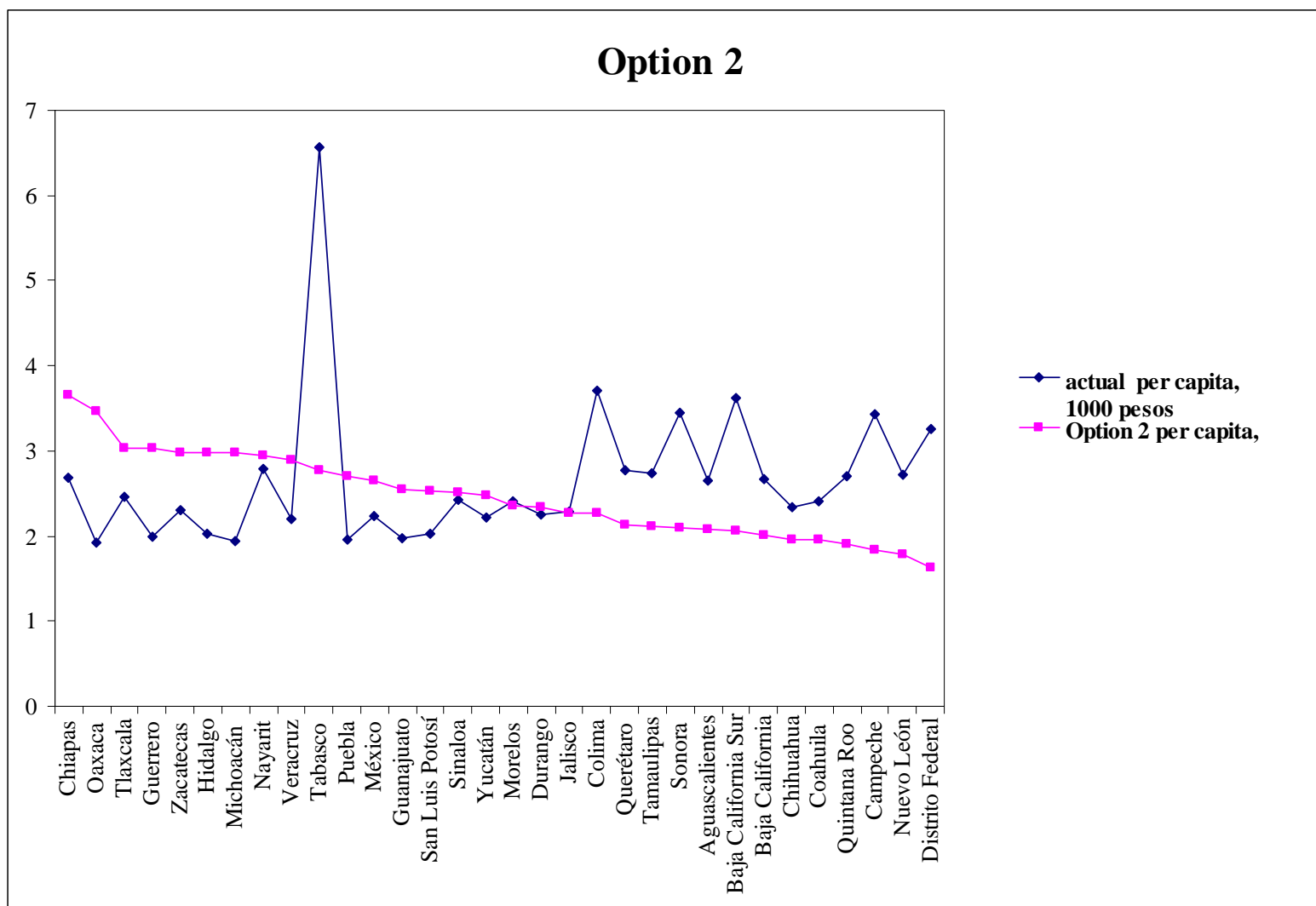
¹³ The convexity is probably due to the use of inverse of state per capita income as a needs indicator for some type of expenditure: see below for more details.

Figure 3. State Income per Capita and Option 1 Transfers



Source: Fund staff calculations.

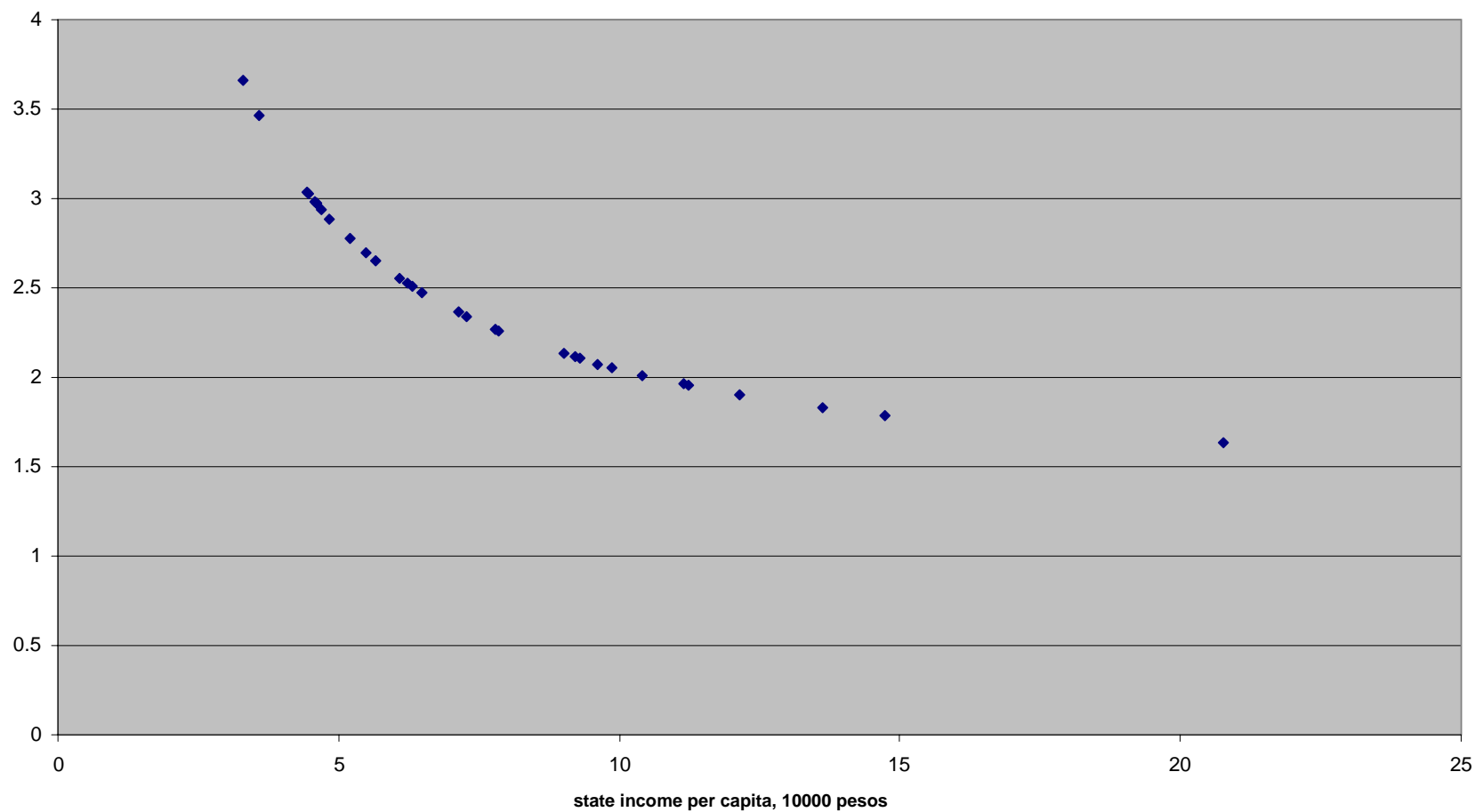
Figure 4. A Simple Equalization Transfer (Option 2)



Source: Fund staff calculations.

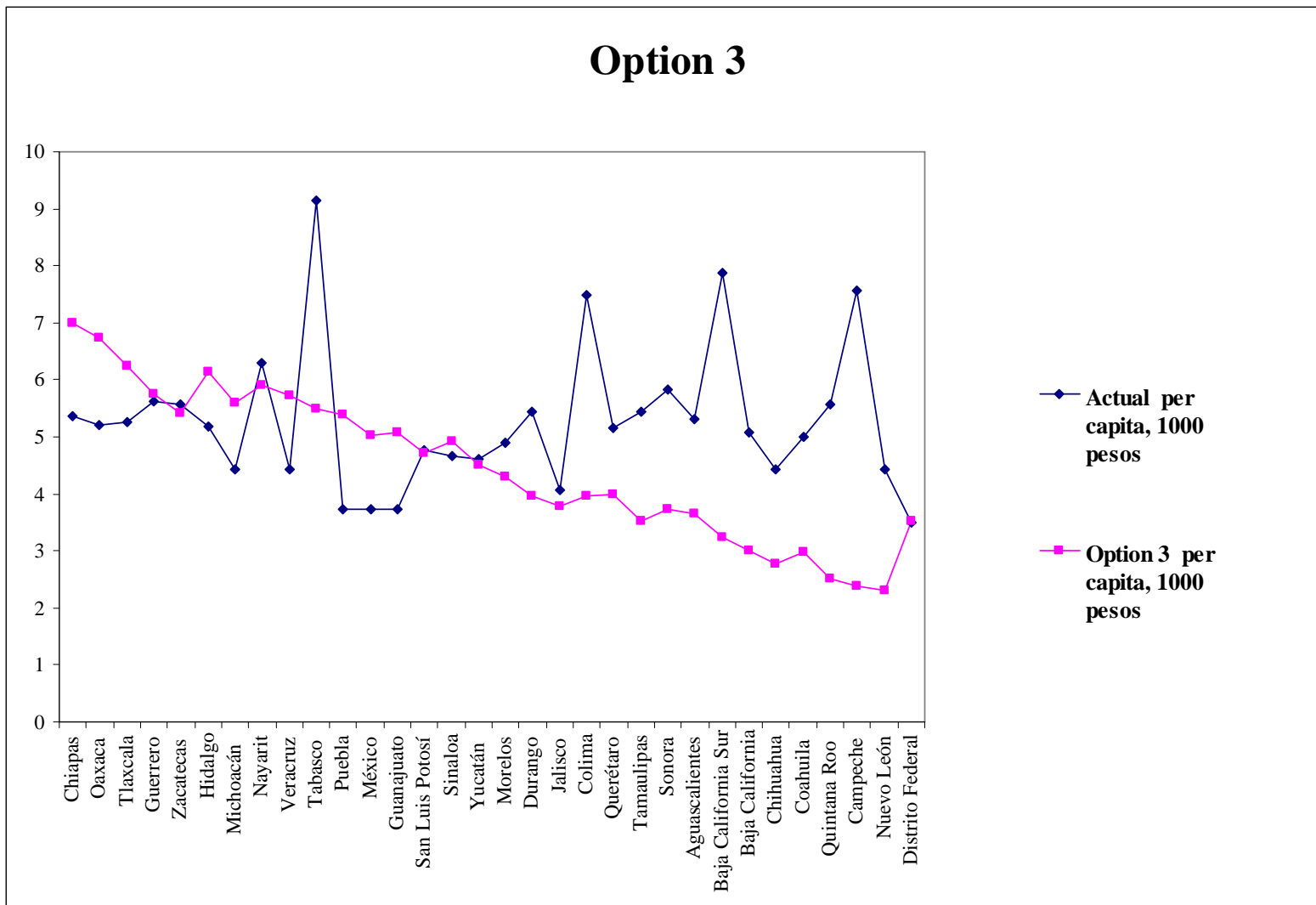
Figure 5. State Income per Capita and Option 2 Transfers

transfers per capita, 1000 pesos



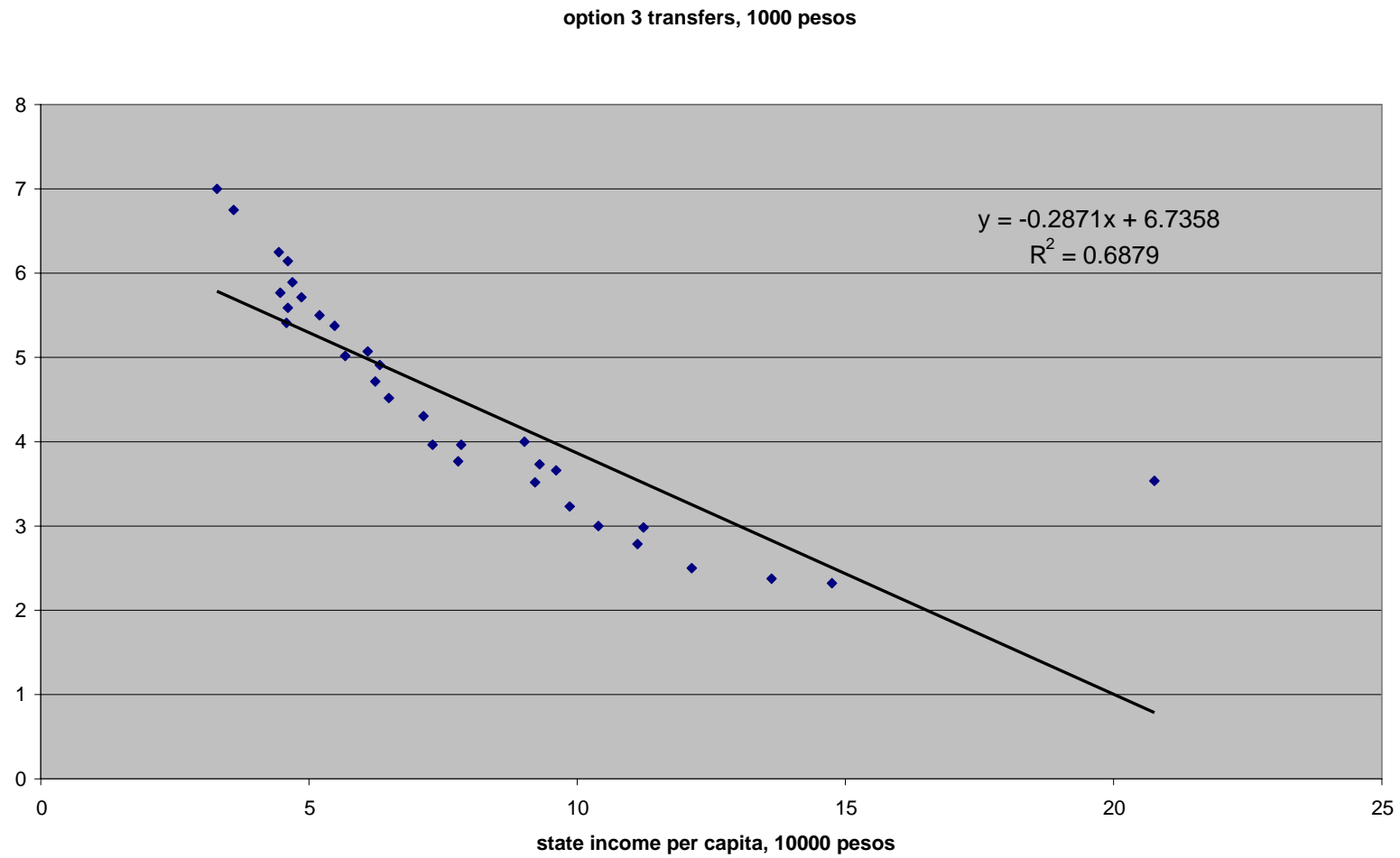
Source: Fund staff calculations.

Figure 6. An Equalization Transfer Based on Fiscal Capacity and Needs Factors (Option 3)



Source: Fund staff calculations.

Figure 7. State Income per Capita and Option 3 Transfers



Source: Fund staff calculations.

In political economy terms, the explicit focus on needs factors provides a mechanism for local governments to be judged, not just by the federal government about their performance in relation to a standard, but also by the electorates of the states and municipalities. In some extreme cases (should this be permitted under constitutions) countries could try and impose minimum standards as constraints in the overall transfer system, and shut down or sanction the lower level governments that fail to meet these standards. This is not likely to be feasible in the Mexican case, however, the explicit focus on needs factors provides a “yardstick” against which state electorates might judge their governments.

The gradual introduction of equalization transfers

Now we turn to the dynamic scenario. Recall that this scenario assumes gradual introduction of the reform option with a “hold harmless” provision. Specifically, this means that in each year following of the reform, every state receives (i) a fixed payment equal in nominal terms to the total transfer from the federal government in the year preceding the reform, plus (ii) a transfer of additional funds based on the new formula. In the years following the reform, it is assumed that there will be a growing pool of additional funds for three reasons: inflation, real economic growth, and increased efficiency of tax collection. In case of a decline in oil revenues, both additional tax measures and adjustments in spending and transfers will have to be considered.

To see how this works, we begin by looking at a simple example, where we abstract from distribution across states. In the simple example, in year 0, the federal government is initially distributing MEX\$1 million of tax revenue via a transfer system that it wants to reform. This tax revenue can grow at rate $g=0.05, 0.075, 0.1$ per year, i.e., low, medium, or high growth.

Suppose that for political reasons, the federal government is obliged to continue distributing MEX\$1 million of tax revenue via the old transfer system to ensure that no state loses (the so-called “hold-harmless” provision). The key question is: *how fast does the new fund (for equalization) grow?*

The key observation is that it does not grow as fast as MEX\$1 million invested in an asset that gives return g , as some of the additional tax revenue must be set aside to “hold harmless” the reform. To see this, suppose that $g=0.1$, i.e., high growth. Then, the total tax revenue (row 4) and the relative share of funds for the new equalization transfer are shown in Table 4 below. It is clear that after 8 years, total tax revenue has more than doubled. But by this date, the funds in the old and new transfer schemes are still just about equal.

Table 4. Phasing in of Equalization Transfers

Years	0	1	2	3	4	5	6	7	8
Hold harmless	1	1	1	1	1	1	1	1	1
Equalization	0	0.1	0.21	0.33	0.46	0.61	0.77	0.949	1.1436
Total	1	1.1	1.21	1.33	1.46	1.61	1.77	1.949	2.1436

The general conclusion is that with a nominal hold-harmless provision, there is more inertia than might be supposed from the simple law of compound interest. The other point is that 10 percent growth is in practice rather optimistic for Mexico: the following table shows that if growth in nominal revenue is only 5 percent, it *takes 15 years* before the funds are of equal size.

Table 5. The Effect of Different Growth Rates

Years	0	5	10	15
Hold harmless	1	1	1	1
Equalization (10 percent)	0	0.61	1.59	3.18
Equalization (7.5 percent)	0	0.44	1.06	1.96
Equalization (5 percent)	0	0.28	0.63	1.08
Equalization (declining oil revenues)	0	0.24	0.60	1.12

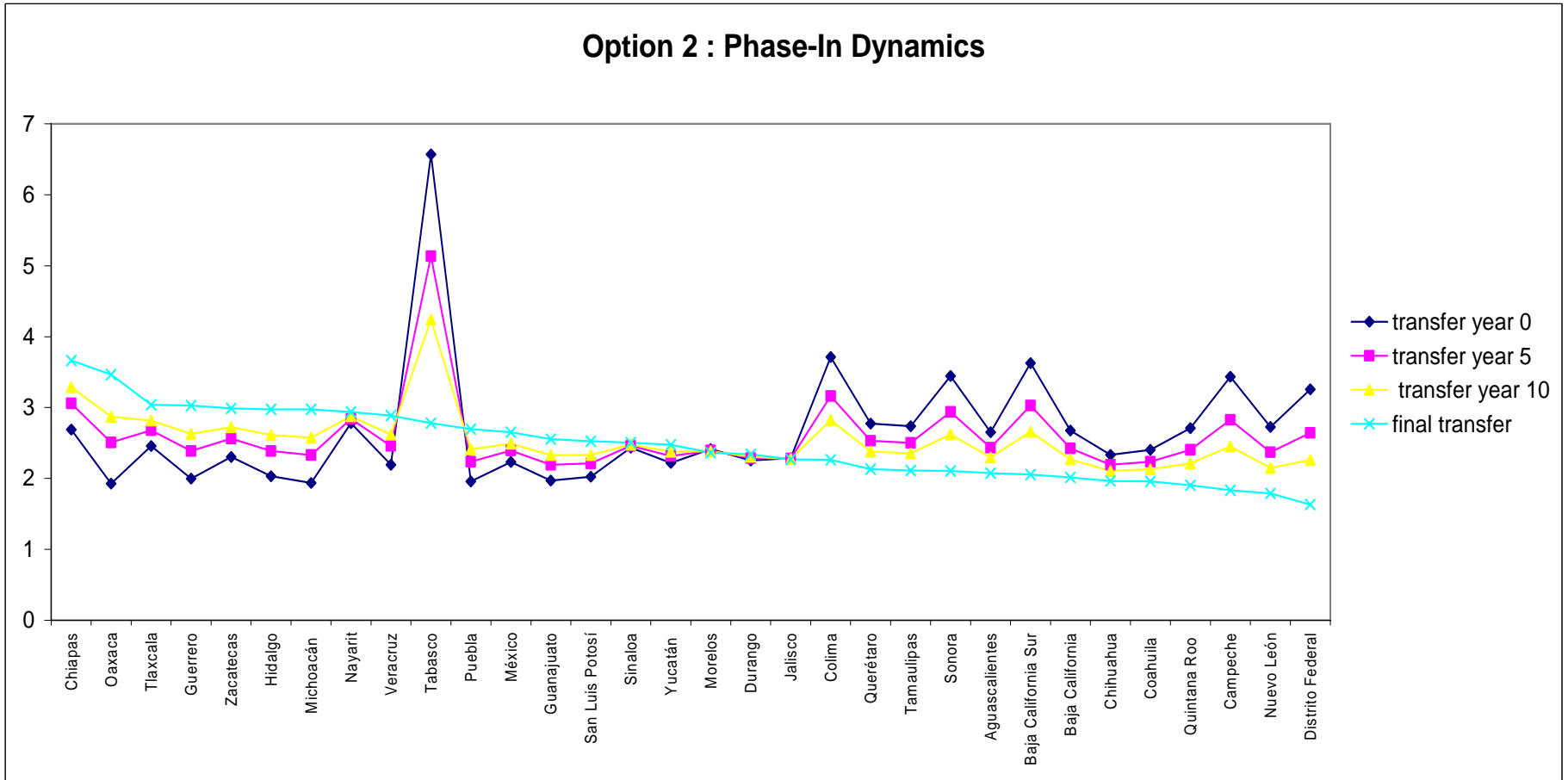
Which of these growth scenarios is more realistic? In recent years, nominal income growth has averaged around 8 percent, coming more or less equally from inflation and real income growth. But, around 40 percent of government revenues ultimately derive from oil revenues. Suppose, therefore, that these revenues decline by 1 percent in nominal terms, approximately reflecting the authorities' assumption about oil production volume, and an assumption that oil prices stay constant in nominal terms. Moreover, suppose that growth in the remaining 60 percent of revenue is at the 7.5 percent rate of the medium scenario. Then, the size of funds for equalization is shown in the last row of Table 5. In the first 10 years, the outcome is even worse than with 5 percent growth. Of course, this is a worst-case scenario, as it assumes that the federal government passes on the full impact of falling oil revenues to the regions.

So far, we have abstracted from the question of how the hold-harmless provision affects the redistributive power across Mexican states of a given equalization transfer. We now turn to this issue, and we consider option 2 for this exercise. The reason for this is twofold. First, it is a very simple and highly equalizing transfer, so if this grant fails to equalize much across regions after 5 or 10 years, options 1 and 3 will perform even worse. Second, it is based on a variable (GSP per capita) that is unlikely to change very much in relative terms across states over a 5 or 10 year horizon, so a dynamic simulation has some meaning in this case.

Figure 8 shows the option 2 transfer to each state after 5 and 10 years of the reform with a hold-harmless provision in place. In Figure 8, we also show the initial transfer before the reform, and the final transfer, i.e., the transfer after a "big bang" reform without any loser compensation. Our growth assumption is the optimistic one that nominal resources for redistribution grow at 10 percent a year. To make the comparison easy, we have rescaled all the transfers, so that they have the same mean in every year following the reform, which is also the mean value of the initial transfer. It shows very clearly that the "hold harmless" provision generates considerable inertia, even under an optimistic growth assumption.

Given the uncertainty about future oil revenues or Mexico, the assumption of 10 percent growth is probably overoptimistic. But, from Table 5 above, note that lower rates of growth will simply increase the inertia due to the "hold harmless" provision. So, the degree of inertia shown in Figure 8 is probably an underestimate.

Figure 8. Phasing in of Transfers with “Hold Harmless” Grants



Source: Fund staff calculations.

Another caveat of the analysis is that states may grow at different rates, for example with rich states growing somewhat faster than poor ones. We did not allow for differential growth rates in our analysis as it adds an additional level of complexity that obscures the basic points. But, qualitatively, the effect would be the following. Assuming that rich states grow faster than poor ones, as time passes, the option 2 transfer becomes more redistributive i.e. the blue line in Figure 8 tilts and becomes steeper. So, in this case, the hold-harmless provision would then be slowing down adjustment to a **moving** redistribution target. The obverse holds if poor states grow faster than rich ones.

D. Conclusions

This paper argues that it is desirable to move toward the use of needs based factors for both special purpose transfers (*aportaciones*) as well as general transfers (*participaciones*) in the Mexican case. In both cases, there has to be a careful sequencing, building on the political economy and administrative constraints. An additional consideration is that transfers cannot in general be adjusted in isolation of the basic assignments—particularly the own-source revenues available to the states and municipalities. This is a medium-term agenda.

In particular, it will not be possible to move special purpose programs (SPPs) to a needs-based formulation without (1) significant own-source revenues, and/or (2) an equalization framework from which the SPPs are deducted.

The equalization formulation with both needs factors and capacity estimates is essential in “cementing” the subnational marginal responsibilities in areas of sole or joint jurisdiction. These will provide incentives for subnational governments to raise own-revenues effectively and also manage spending efficiently.

As with any other significant transfer changes, the political economy constraints have to be recognized, and for this purpose the “hold harmless clause” may help. The main advantage of the “hold harmless” clause is that it ensures that there are no losers in the process of introducing a new transfer system. This may ensure the “political economy acceptability” of the package, and also moves it toward a coherent equalization framework. Note however, that the full equalization framework that is based on responsibilities and accountability is an essential element in changing the “incentives” inherent in the current system of transfers—without these interactions, the “hold harmless clause” in isolation may not be very effective.

The introduction of needs factors in equalization systems plays an important signaling role—that helps to focus attention of the recipient administrations on the efficiency elements in relation to assignments that are under their jurisdiction. This could also help to provide a “yardstick” in the Mexican case to inform the local electorates that ultimately exercise political power over their elected representatives. Whether or not the Federation might be able to withhold participaciones for failure to provide basic public services may require a more stringent legal test.

REFERENCES

- Ahmad, Ehtisham and Giorgio Brosio, 2006a, *Handbook of Fiscal Federalism*, (Cheltenham: Edward Elgar Publishing).
- , and Bob Searle, 2006b, “On the Implementation of Transfers to Subnational Governments,” in Ahmad and Brosio (op cit).
- , Jun Ma, Bob Searle, and Stefano Piperno, 2002, “Intergovernmental Grants Systems and Management: Applications of a General Framework to Indonesia,” (with Jun Ma.), IMF Working Paper 02/128 (Washington: International Monetary Fund).
- , 1998, *Financing Decentralized Expenditures—Grants in an International Context*, Edward Elgar.
- Dafflon, Bernard, 2007, “Fiscal Capacity Equalization in Horizontal Fiscal Equalization Programs,” in Robin Boadway and Anwar Shah, *Intergovernmental Fiscal Transfers* (Washington: The World Bank Group).
- Reschovsky, Andrew, 2007, “Compensating Local Governments for Differences in Expenditure Needs in a Horizontal Fiscal Equalization Program,” in Boadway and Shah (op cit.).