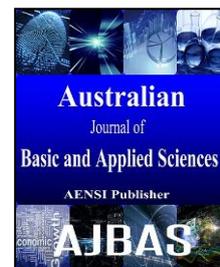




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Alternative Simulations of Equalization Transfers in Sudan

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ABSTRACT

Background: Federal transfers in the Sudan are a key to reducing regional disparities and addressing marginalization. While more resources have been directed to the sub-national levels since the adoption of the federal system in 1991, the lack of transparency and predictability surrounding these transfers has undermined the role of federal transfers to promote regional convergence and reduce financial inequality.

Objective: The objective of this the paper is to contribute to the efforts of designing a transparent transfer formula that enables an efficient and equitable distribution of federal fiscal fund between the states. Accordingly, different approaches for constructing different indexes to account for state expenditure needs and state fiscal capacity, and for equalization of the states' fiscal gap, are outlined. Based on these constructed indexes, the study suggested alternative simulations of equalization transfers using both fiscal needs and fiscal capacity to measure the fiscal gap so as to mitigate the disparities among states. **Results:** The results of the simulations, and Lorenz curve ranking and Gini Coefficient index, suggest that the government should base the transfer program on the fiscal gap measured by the difference between states fiscal needs, approximated by an augmented state needs index, and the state fiscal capacity, approximated by a poverty index. **Conclusion:** The recommended scenario is found to reduce the fiscal inequality between the states to its narrowest and results in conspicuous welfare improvement, compared with the currently used formula distribution.

INTRODUCTION

Fiscal imbalance between different levels of government is quite common in a Federal system, mostly between central and subnational government. As in most federations, in Sudan, the central government collects the revenue. This fiscal imbalance asks for vertical resources redistribution. However, the distribution of revenues from the central government to states is a source of severe conflict. In Sudan, most states consider that they receive less federal support that they should.

In fact, fiscal transfers affect the fiscal behavior of state governments from number of public employees to the amount of provision of public services, which should influence horizontal efficiency and inequality between states (Shah, 2007). In Sudan, the horizontal transfer is the main fiscal instrument to provide vertical transfers from central to states governments.

Developing countries like Sudan often face challenges of designing their transfer's mechanisms in absence of substantial relevant data on states and local level especially fiscal, demographic and socio economic variables, (Ali, 2007). The absence of necessary data to adequately quantify states and local expenditure needs and fiscal capacity in order to allocate formula-based equalization grants in an efficient, equitable and transparent manner, forms an additional hurdle in the implementation intergovernmental fiscal relations in

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Sudan.

The existing expenditure needs formula indicated that there is a large fiscal disparity across states, implying that the population with high demand pressures for local services receives a smaller share compared with those with lesser needs (Maglad and Musa, 2014). However fiscal equalization seeks to reduce fiscal disparities; it should be evaluated on how it achieves that aim. In that regard, Table 5.4 shows the lower inequality of transfer's distribution obtained used difference scenarios of equalization transfers.

In 1991 Sudan adopted a federal system of governance with three tiers – federal, state and local, whereby Sudan was divided into nine states (Wilayat), each having its own government, legislative body and a number of provinces, and local councils administering the affairs at the local level. The 1998 Constitution reaffirmed the federal system and included within its stipulations a map detailing the names, boundaries and capitals of twenty six states (Hamid, 2002). In 2005 the government of Sudan and Sudan People's Liberation Movement signed the comprehensive peace agreement (CPA). Wealth Sharing Agreement is an integral part of this agreement, and it is a further step towards strengthening fiscal decentralization. The wealth sharing arrangements rest on the main following principles: a) the wealth of the Sudan shall be shared equitably, b) all parts of Sudan are entitled to development and wealth sharing, c) revenue sharing should show a commitment to the devolution of power and decentralization of decision-making, d) development will be transparent and accountable and e) best-known practices for utilizing natural resources. However, according to the referendum made in 2010, Sudan was divided into two countries, Sudan with fifteen states and South Sudan with ten states.

Two institutions emerged during the process of arrangement for revenues allocation between the Central Government and the states in Sudan. The National States Support Fund (SSF) (1995 – 2006); the main function of which is to strengthen the fiscal decentralizations through suggesting the principles of fund allocation, that is, the criteria which should govern the grant and transfers and the allocated grants (subsidies) to subnational governments (states), with the objectives of achieving fairness and equity in the sharing of financial resources to ensure balanced growth in the different states, in addition to encouraging the re-allocation of such resources from current to development expenditure.

In 2006 a Fiscal and Financial Allocation and Monitoring Commission (FFAMC) was established by the Government of National Unity (GNU) and Government of Southern Sudan (GOSS) to replace the NSSF. The main function of this commission is to ensure fairness and transparency in the allocation of nationally collected fund to GOSS and to the governments of the states. The FFAMC is considered the most important institution that will enhance the implementation of the CPA clauses regarding wealth sharing agreement. Major terms of the reference of the Commission included ensuring transparency and equity in the allocation of central revenues to the Government of Southern Sudan and to the States, follow-up of the financial support provided by the National Revenues Fund to ensure its equitable sharing, and smooth remittance to the concerned government units (Ali, 2007).

The allocated federal fund to the states comprised two types of transfers; firstly unconditional transfers, that included current transfers, development transfers, Value Added Tax (VAT), which was introduced in 2000 to replace the state sales tax and other similar excise taxes, and agricultural compensation transfers to the states, which are intended to replace the agricultural product tax, abolished in 1999. Prior to that time, farmers paid 15 percent of the value of their crops to the state in the form of an agricultural product tax (Bell and Ahmad, 2005); and an additional transfers for emergency crises on a needs- basis, not based on any transparent criteria, is also included. Secondly, conditional transfers, which included transfers to cover wages and salaries and purchases of goods and services of national institutions, like the Judiciary and higher education. Also included are the transfers of social subsidy and the cost of free health care, and health insurance of certain categories of people. The CPA added several unconditional transfers such as transfers to oil producing states, transfers to the three areas (Abeyia, Blue Nile and South Kordofan State) and transfers to the reconstruction and development funds for the war affected areas.

In 1995 the NSSF identified nine factors which were adopted with the aim of achieving fair and equitable transfers to the different states. These nine factors represented the first horizontal allocation criteria to distribute the current transfers among states in Sudan as follows: 10 percent of transfer fund is to be allocated in proportion to each state's population and 10 percent given for each one of the following factors: human resource, national resources, infrastructure, education, health, security and per capita income, while the remaining 20 percent of total fund is assigned in correspondence with financial performance. Each factor is determined by a number of need indicators which have different weights. In 2006 the NSSF developed a transfer's formula including ten factors, after introduction of the distance from center and port to the criteria. In 2007 FFAMC panel of experts developed a new formula containing only four factors and applied in the 2007 central budget. The criteria gives population size and minimum required for government responsibility an equal weight: 40 percent of fund is to be allocated in proportion to each state's population and 40 percent to be shared equally between states for government responsibility, while fifteen percent of fund goes to development and allocated in proportion to each state's need for the health and education, and the remaining five percent assigned to fiscal efforts (Maglad and Musa, 2014).

The objective of this the paper is to contribute to the efforts of designing a transparent transfer formula that enables an efficient and equitable distribution of federal fiscal fund between the states. Accordingly, different approaches for constructing different indexes to account for state expenditure needs and state fiscal capacity, and for equalization of the fiscal gap, which each state needs, are outlined. In the rest of the paper section 2 reviews some methodological and conceptual issues relating to the theory and practice of equalization transfers design, while section 3 describes the proposed indexes of fiscal needs and fiscal capacity, and provide alternative simulations of the fiscal gap based on these indexes. Gini Coefficient methodology and Lorenz Curve Dominance Criteria were subsequently used in section 4 to compare between the different scenarios of equalization transfers proposed to fill the fiscal gap between states. Section 5 ends up with conclusion and policy implications.

2. Methodological and Conceptual Framework:

The literature on the implications of economic theory for an optimal design of equalization transfers is quite limited and this literature is heavily influenced by Robin Boadway's views on this subject (Boadway (1980), Boadway and Flatters (1982, 1991), Boadway, Flatters and LeBlanc (1983) and Auld and Eden (1984)). Among others, Boadway has given some thoughts to devising an equalization program based on economic theory. Boadway and Flatters (1982), on efficiency grounds, advocate complete elimination of differences in net fiscal benefits across provinces (Shah, 1994).

The specific manner in which a transfer system is developed is often based on a complex mixture of political choice, economic principles, historical reasons and country contextual factors, including the size and structure of the system of local government (Steffensen, 2010). The design of appropriate allocation criteria and formulas, which is the main subject of this paper, is probably one of the most daunting tasks within the field of fiscal finance (Smoke, 1981). A formula grant uses some objective, quantitative criteria to allocate the pool of revenues among states and local units. The most common reason why governments move to formula based distribution is to gain transparency and certainty in the distribution of grants.

A formula based on the fiscal gap, to address vertical fiscal gap or to measure horizontal equalization, needs to account for both fiscal need (expenditure) and capacity (revenues), and can be identified by the following equation:-

$$\text{Fiscal Gapi} = \text{Fiscal Needs}_i - \text{Fiscal Capacity}_i \quad (2.1)$$

A vertical fiscal gap is defined as the revenue deficiency arising from a mismatch between revenue means and expenditure needs, typically of lower orders of government. A national government may have more revenues than warranted by its direct and indirect spending responsibilities; regional and local governments may have fewer revenues than their expenditure responsibilities ((Bird and Smart, 2001).

Transfers constitute the principal way in which countries achieve the "vertical fiscal balance", ensuring that the revenues and expenditures of each level of government are approximately equal. Such "fiscal gaps" may of course be closed in other ways by transferring revenue-raising power to local governments, by transferring responsibility for expenditures to the central government, or by reducing local expenditures or raising local revenues. In most countries, however, sufficient mismatch in the revenues and expenditures assigned to different levels of government remains for some balancing role to be assigned to intergovernmental fiscal transfers (Boadway and Hobson, 1993).

Starting with fiscal capacity, which is defined as the potential ability of the governments to raise revenues from their own sources in order to pay for standardized basket of public goods and services, it is noted that there are two major approaches to measuring fiscal capacity. One is used to equalize tax rates (Representative Tax System, RTS), the second to equalize tax burdens (income approach, sometimes called macro approach) (Bird and Smart, 2001). Under the RTS, fiscal capacity is defined as the weighted sum of the major tax bases potentially available to the jurisdictions being compared (e.g. Chernick, 1998). Fiscal equality is assumed to be achieved when application of average tax rates to the tax bases of the representative revenue regime produce the same per capita revenues in every jurisdiction. To implement this approach, data is collected on the bases for taxes and other revenues administered by every jurisdiction. Using this information and the national average tax rates, it is possible to compute the amount of revenues that each jurisdiction would collect under the average fiscal effort. This amount measures the fiscal capacity of each jurisdiction.

Alternatively, fiscal capacity may be estimated using regression analysis (Martinez- Vazquez and Boex, 1997). This makes data collection for each separate tax base unnecessary and instead only requires data on total revenue collections and proxies for tax bases. In this approach, jurisdictions' revenue collections are regressed on variables representing proxies for a set of tax bases. The parameter estimates are used to predict the amount of revenue each jurisdiction would collect under average fiscal effort.

In practice, applying RTS is difficult because jurisdictions make different choices with respect to tax structures, tax mixes and tax rates (Barro, 2002; Courchene, 1984). In some countries, even statutory bases are

not well defined due to the existence of many miscellaneous tax bases. Sometimes, certain tax bases are only used in few jurisdictions. On the other hand, implementation of the representative tax system in Sudan will not be feasible because of limited tax decentralization, very large vertical fiscal gaps and poor tax administration.

In the income approach macro measures like gross regional product (GRP) or personal income are assumed to be better indicators of the ability of jurisdictions to raise revenue (Barro, 2002; Smart, 2002). The most prominent measures of the approaches following the income approach are the ones developed by Bradbury and Ladd (1985) and Ferguson and Ladd (1986). The income approach measures revenue raising capacity as the per capita amount of revenue a jurisdiction's residents could raise if they imposed a standard tax burden on themselves. One problem to be faced here is that macro measurement such as State Gross Production do not reflect the ability of subnational governments to raise revenues from own sources. Another difficulty in the use of macro indicators is unavailability of accurate and timely data at subnational levels.

Fiscal needs, on the other hand, may be used as the only determinant of equalization transfers, or may be used in conjunction with fiscal capacity, to calculate the fiscal gap. Expenditure is a factor to estimating and determining fiscal needs. Here, two methods emerge as determinants of fiscal needs of subnational government (Shah, 1994). One method involves estimating the cost for each service. The total fiscal need of a subnational government is the sum of the estimated need for all these categories. This method to calculate a local body's fiscal needs require subnational information on variety of different factors that affect the costs of providing public services. Unfortunately Sudan does not have such detailed information, and so this method cannot be employed to estimate expenditure needs in our case. Also this approach uses actual spending as an indicator of spending needs, which may work in countries where states are financed to large extent by own revenue. In Sudan states are financed mainly through transfers.

An alternative approach is to estimate a state body's fiscal need on the basis of certain proxies and weights assigned to them. Most common proxies are population, income level, and area. Other variables that can be considered for this formula include population density, tax effort (revenue/ GDP ratio) etc. This paper utilizes a number of both socioeconomic and demographic variables to calculate different types of expenditure- based formula scenarios.

3. The Empirical Results:

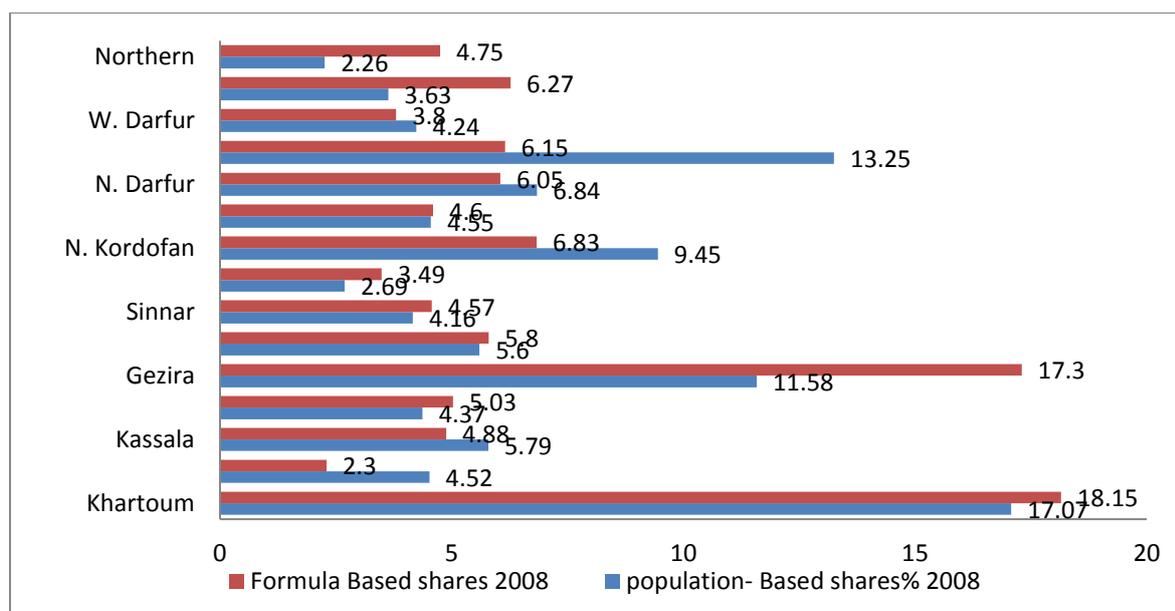
In the following different indexes are suggested for expenditure needs and fiscal capacity of the states by employing the factors that influence expenditure needs and revenue raising capabilities directly, and their estimates are then reported accordingly, to arrive at the implied fiscal gap . Then the estimated distributions are compared to actual distribution of transfers to judge the welfare impacts resulting from proposed-formula's changes. The study uses socio-economic and demographic variables collected from various sources, important among them are, States Support Fund (SSF), Fiscal and Financial Allocation and Monitoring Commission (FFAMC), reports by Central Bureau of Statistic (CBS), Ministry of Finance and National Economy, Central Bank of Sudan, the ministries of education and health, National Assembly, as well as Sudan Baseline Household Survey (2009).

3.1 Expenditure needs:

A good proxy for expenditure needs is population size, since more people means more services needs to be produced; for example Pakistan formula-based grant system uses population size for distributing grant to provinces. However, the backward provinces are provided with special grants (Steffensen, 2010). Using population size as an index for needs, grant transfers to the fifteen states in Sudan are estimated based on population size shares of the states using last population census conducted in Sudan 2009, and then compared with the formula shares of the years 2008 and 2010 as shown in appendix (1).

Figure (3.1) shows the population, the formula-based shares for the year 2008. From the figure eight states enjoyed shares in equalization transfers that exceeded their corresponding population shares: Khartoum, Northern, Nile, Gezira, Blue Nile, Gadarif, White Nile and Sinnar. The states enjoying the highest shares were Gezira, Nile and Northern, respectively, while the remaining seven states, Red sea, Kassala, N. Kordofan , S. Kordofan, N. Darfur, S. Darfur and West Darfur) suffered.

The states with the lowest shares are S. Darfur, N. Kordofan and Red Sea. The South Darfur deficit from population needs share is 7.10%.



Source: own construction based on data in the appendix, table 1.

Fig. 3.1: Equalization Transfer: Formula and Population Shares for 2008 (%)

Comparison between the 2008 formula shares and actual transfer shares (data in appendix) reveal that Khartoum received in 2008, 25 percent above its approved share, while Gadarif received 24 percent less than approved share in the same year. The table shows that Khartoum, Gezira, North Kordofan and North Darfur received more than 50 percent of total actual transfer in 2008.

Figure (3.2) shows the hypothesized population size shares and the formula shares for 2010. From the figure five states enjoyed shares in equalization transfers that exceeded their corresponding population shares: Khartoum Northern, Nile, Gezira, and Blue Nile. The states with the highest shares were Gezira, Northern, and Khartoum. The remaining states suffered from having shares less than their population shares: Red Sea, Gadarif, White Nile, Kassala, Sinner, N. Darfur, S. Kordofan, S. Darfur and West Darfur. The lowest shares states were S. Darfur, N. Kordofan and Red Sea.

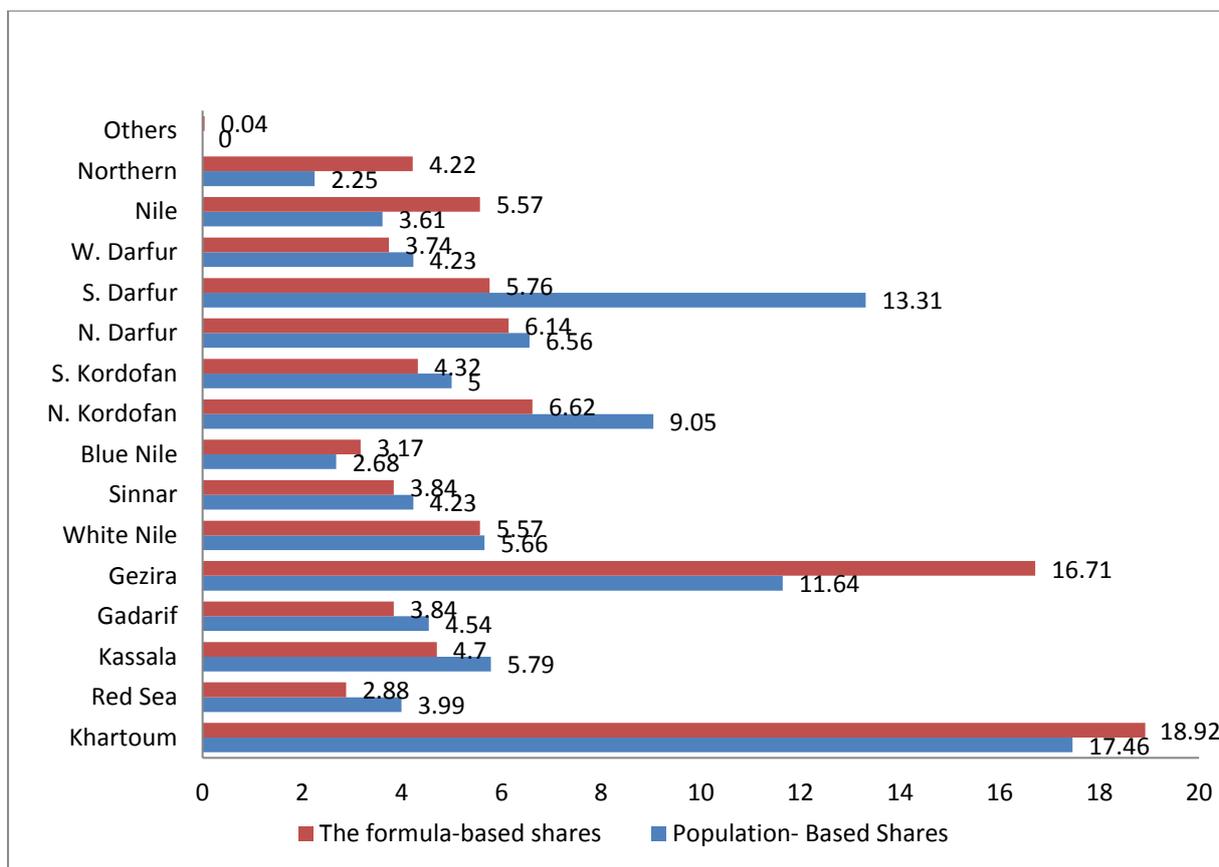
As the figure shows a 4 percent in 2010 formula shares is denoted for others, which is unexplained, raising concerns about transparency and equity of this formula.

Thus the population size scenario simulation for the years 2008 and 2010 gives quite similar finding e.g. Khartoum Northern, Nile, Gezira and Blue Nile having shares more than their population size share in 2008 and 2010, while Red sea, N. Kordofan, N. Darfur S. Kordofan, S. Darfur and West Darfur having shares less than their population size share. Gezira is the most benefiting from the formula distribution, compared on a population size distribution assumption in 2008 and 2010, receiving 5.61 and 5.08 percent, respectively over its population share. On the other hand South Darfur and North Kordofan are the losers, receiving less than their population size share; for example South Darfur loses 7.1 and 7.55 percent of an assumed population share, in 2008 and 2010, respectively.

But, since provision of services to sparsely populated area is not the same as for a population clustered in a densely populated small region, an area size factor need to be included in the share formula for simulating purposes, as it accounts for differences in the cost of providing many public services, such as roads, schools and health facilities. The practice of accounting for population size and area of subnational government to measure expenditure needs is followed by many countries e.g. Uganda district share is based on 85 percent to population and 15 percent area, (Uganda Local Government Finance Commission Report, 2003).

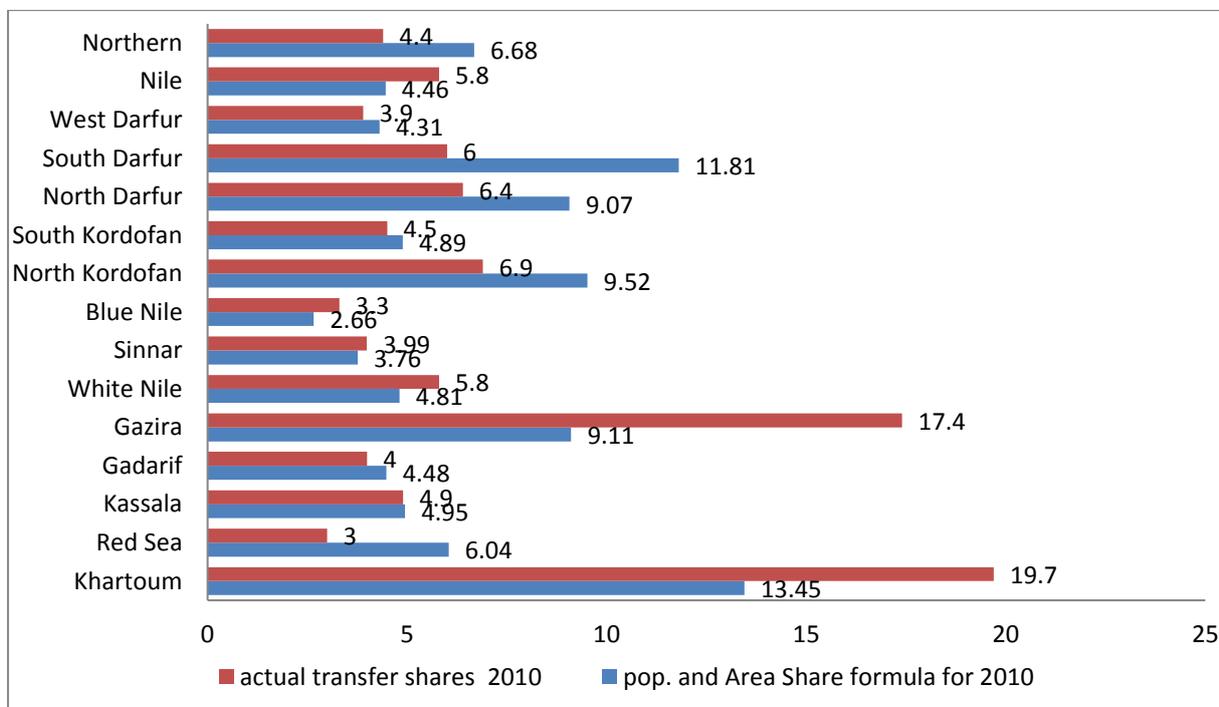
In constructing an index on size of population and area, 75 percent weight is given for population size while area size gets 25 percent weight. The population is given three times the weight of area, because of importance of using the population in expenditure needs criteria. Based on these factors, and as figure 5.3 reflect for year 2010 (no significant change in population is expected between 2008 and 2010 to change the comparison), Khartoum and Gezira lost in this scenario compared with South Darfur, North Kordofan.

Note that population weighted index transfers may be misleading if the migration cross different jurisdiction is taken in consideration. However, as mentioned in our analysis the time is constant. Also, for the area-based indexes, many studies used a single proxy with others proxies e.g. (Uganda Local Government Finance Commission Report, 2003).



Source: own construction based on data in appendix.

Fig. 3.2: Equalization Transfer: Formula and Population Shares for 2010(%)



Source: Own construction based on data in appendix.

Fig. 3.3: Proposed Population and State Area Share (%), 2010:

Secondly, a measure of expenditure needs, suggested by Martinez-Vazquez and Boex (2006), is a “local needs index”, similar to Human Development Index, which takes into account the weighted average of three variable needs measures (poverty, water access and infant mortality). The relative weights are arbitrarily assigned to equal one-third for each of the three factors in estimating the local expenditure needs. In the proposed simulations it is decided, firstly to experiment with a needs index that incorporate poverty and infant mortality, and secondly to expand the index by, using population under fifteen years instead of water access, since the former variable may reflect needs more accurately than actual water access, of which large segments of population may be deprived, particularly in rural settings. The variables are weighted equally in each version of the index. According to this construction states with high index should receive a greater share of transfers from the center and vice versa.

The incidence of poverty (population below poverty line) is based on household survey of 2009 (NBHS 2009), and infant under 5 mortality per 1000 live births is based on the study undertaken by Central Bureau of Statistics (2008). Population below the poverty line in 2009 is estimated at 46.5. Incidence of poverty for the different states is shown in figure (3.4), and the constructed states’ needs index and augmented states’ needs index are shown in table 3.1.

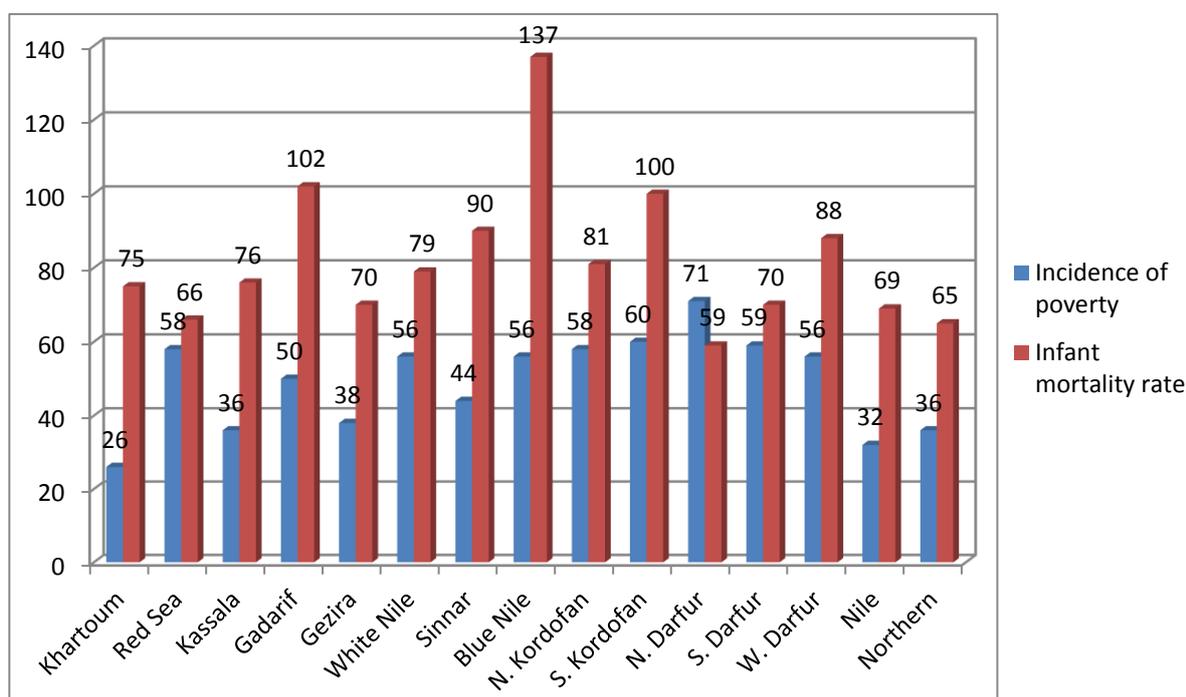


Fig. 3.4: Incidence of poverty and infant mortality under 5 years in 2009

Table 3.1: State Needs Index and the Augmented State Needs Index in 2009

state	State needs index	Augmented State needs index
Khartoum	4.82	8.02
Red Sea	6.63	6.09
Kassala	5.54	6.08
Gadarif	7.55	6.42
Gezira	5.43	7.26
White Nile	7.02	6.48
Sinnar	6.66	5.76
Blue Nile	9.39	7.07
N. Kordofan	7.24	7.75
S. Kordofan	8.15	6.88
N. Darfur	7.23	7.31
S. Darfur	6.86	9.55
W. Darfur	7.39	6.72
Nile	4.99	4.46
Northern	5.10	4.15
total	100	100

Source: Own calculation using data of Central Bureau of Statistics, household survey 2009.

The more beneficial states according to the state’s need index, compared with the other NSSF and FFAMC formulas, are Blue Nile, South Kordofan, Gadarif, West Darfur, North Kordofan, North Darfur, South Darfur,

respectively (i.e. region with marginal development and conflict states) while the central states Khartoum, Nile, Northern and Gezira, respectively, would receive much less.

On the other hand, according to the calculated augmented states need index, South Darfur, Khartoum, North Kordofan, North Darfur, Gezira, Blue Nile received the highest weights, while Northern, Nile and Sinaar have the lowest weights. Only 5.5 percent is the difference between the high index weights (South Darfur) and low index weights (Northern state). All marginalized states will receive more than 6 percent, and this preference is in line with their needs in highly indispensable areas in social development.

The FFAMC share formula in 2008 gives a difference between high weight (Khartoum) and low weight (Red Sea) state of about 16 percent while in the 2010 the difference between the high and low weighted states is 16.04 percent. Using the state needs index the difference in 2009 is only 4.6 percent between the high index weight (Blue Nile) and low index weight (Khartoum), a very interesting result, because all the share formulas based on expenditure needs gives a high weight to Khartoum and low weight to Blue Nile or Red Sea. These state need indexes reflect the actual needs of those poor states.

3.2 Fiscal Capacity:

The current intergovernmental transfer system in Sudan does not take difference in fiscal capacity into account. As a result, state governments in rich areas are able to generate considerably more revenue per capita than those in poor areas as has been confirmed by regression analysis (Maglad and Musa, 2014). The following sections propose different indexes of fiscal capacity.

One measure of fiscal capacity used in many studies employed poverty. For instance, Allers and Ishemoui (2010) in Tanzania employed the poverty data to measure fiscal capacity by constructing an index. Sudan is a poor developing country, about 50 percent of total population under poverty line according to the 2009 Household Survey undertaken by CBS. A suitable indicator of fiscal capacity could be the share of inhabitants with enough income to be able to pay tax at all at the state level. As a result people below poverty line cannot be expected to pay a high tax. The index of fiscal capacity based on this premise is constructed as follows:-

$$FC_i = P_i/p \quad (3.1)$$

Where P_i is proportion of the population above the poverty line in state i and P is the national average of this proportion. The underlying assumption is that inhabitants below the poverty line do not pay tax, and those inhabitants above the poverty line are able to pay the same (positive) amount of tax.

Another suggested measure of fiscal capacity is to obtain an index for every state by calculating per capita revenue divided by average per capita revenue in the country i.e.

$$FC_i = R_i/R \quad (3.2)$$

Where R_i is per capita tax revenue collected in state i , and R average per capita revenue from this tax (Allers and Ishemoui, 2010). The study employed the formula to calculate a fiscal capacity index per state in Sudan, where R_i is per capita own tax revenue collected in state i , and R average per capita revenue from this tax. The average per capita is calculated and equal to 0.27 SDG and 0.25 SDG in 2008 and 2010 respectively, using the data from Central Bureau of Statistics and Taxation Chamber. The average of fiscal capacity is equal one for the country as a whole, thus states whose per capita index above one should receive no transfer from center, whereas the states whose per capita index is below one should receive transfers from center.

A Third measure of fiscal capacity attempts to measure revenue raising ability relative to the state average. The fiscal capacity index is computed by states per capita ability to raise revenue in all area of the state. Fiscal Research Center at Georgia state university used three major revenue sources to measure fiscal capacity in counties in Georgia: property taxes, sales total taxes, and other revenues (e.g. business license fees, building permit fees, etc.) (Policy brief report N.O 103, 2005). The potential revenue for each county is divided by the population of the county. Following this methodology one can measure fiscal capacity at the state level in Sudan by using VAT collection by states. The (VAT) was introduced in Sudan in 2000 to replace the state sales tax and other similar excise taxes. The other taxes such as property and business license fees, building permit fees were not available for several state. The fiscal capacity is therefore constructed as:-

$$FC_i = AVAT_i/A P_i \quad (3.3)$$

Where FC_i is the fiscal capacity index, $AVAT$ the average value added tax per state i to the total collection of the taxes and the AP is population size at state i relative to the total population.

Table 3.2 shows calculation of the suggested indexes. Based on the poverty- index of capacity, North Darfur is the lowest fiscal capacity index (0.54.) which is 0.46 percent below the average, while Khartoum (1.38) is the highest state fiscal capacity, which is 0.38 percent above the average. The low fiscal capacity index

states should receive a greater share of equalization transfers from center, because low capacity means this state can raise little tax revenues. The table shows that North Darfur, South Darfur, South Kordofan, Red Sea, and North Kordofan have low capacity, and should be the ones receiving more funds from the center, respectively. The high fiscal capacity index states that should receive a smaller share of fund from the center are Khartoum, Nile, Northern, Kassala, and Gezira.

Table 3.2: Measures of Fiscal Capacity

State	Poverty-based Fiscal capacity index 2009	Per capita Tax Revenue Fiscal capacity 2008	Per capita Tax Revenue Fiscal capacity 2010	VAT capacity index 2008	VAT capacity index 2009	VAT capacity index 2010	VAT capacity index 2011
Khartoum	1.38	3.312	3.313	2.98	2.88	2.31	2.27
Red Sea	0.79	3.021	3.036	6.55	8.09	9.60	8.18
Kassala	1.20	0.501	0.512	0.19	0.18	0.24	0.36
Gadarif	0.93	1.782	1.436	0.38	0.38	0.31	0.51
Gezira	1.16	0.915	0.863	0.57	0.52	0.58	0.68
White Nile	0.82	0.590	0.602	0.60	0.41	0.56	0.66
Sinnar	1.05	0.740	0.590	0.22	0.19	0.18	0.26
Blue Nile	0.82	0.460	0.534	0.09	0.08	0.11	0.25
N. Kordofan	0.79	0.556	0.610	0.18	0.17	0.30	0.43
S. Kordofan	0.75	0.378	0.427	0.02	0.02	0.03	0.05
N. Darfur	0.54	0.189	0.203	0.05	0.03	0.05	0.08
S. Darfur	0.77	0.347	0.592	0.06	0.05	0.07	0.08
W. Darfur	0.82	0.119	0.187	0.03	0.03	0.03	0.06
Nile	1.27	0.595	0.664	0.42	0.32	0.59	0.77
Northern	1.20	1.486	1.422	0.26	0.29	0.31	0.38
Average	1	1	1	1	1	1	1

Source: Own calculation using data of Central Bureau of Statistics and Taxation Chamber reports.

In Canada, regions with below-average capacities receive transfers from the central government, and regions with above-average capacities receive no transfer, but are not required to contribute to the pool for transfers (Dafflon, 2007). To apply the Canadian approach, the states with above-average capacities are Khartoum, Nile, Kassala, Northern, and Gazira. Accordingly those states should receive no transfer from center, while the 10 other states should receive transfers according to their fiscal capacity ratio. The most needy states would be North Darfur, South Darfur, Red Sea, North Kordofan and Blue Nile, respectively. Note that there are ten states whose fiscal capacity is below the average and five states above the average.

From table (3.2), Khartoum, Red Sea, Gadarif and Northern would receive no transfer in the 2008 and 2010 as their per capita tax revenue indexes indicate. While the remaining eleven states would receive transfers according to their index ratio. For instance West Darfur and North Darfur will receive more than White Nile and Sinnar according to the per capita index ratio. These results based on per capita tax index assumption is similar to that of Elbadawi and Suliman (2007), which suggest that fewer transfers will be allocated to Khartoum State but more to Western Darfur.

Table (3.2) shows also the capacity index of different states based on value added tax in the period 2008-2011. Khartoum and Red sea are the highly extreme cases in VAT collection, because most of the industrial, commercial, and services sectors are located in those two states. Khartoum dominated in VAT collection but the value added tax index decreased from 2.98 in 2008 to 2.31 and 2.27 in 2010 and 2011 respectively, while the value added tax index increased in Red Sea from 6.55 in 2008 to 9.60 in 2010. Khartoum average population to the total population is equal 17 percent in 2008 to 2011, while the average population in Red Sea equal 4 percent in 2008 to 2011(as shown in Appendix). This explains why the value of VAT capacity index in the Red Sea is greater than in Khartoum although the collection of VAT tax in Khartoum is second to none. The main reason behind high VAT index value in Red Sea is the existence of the main port of Sudan and collection of transportation VAT. S.Kordofan, North Darfur, South Darfur and West Darfur value added capacity index are less than one as shown in the table.

3.3 Measuring the Fiscal Gap:

The most obvious way to reduce fiscal disparities is to provide transfers to states that have a significant fiscal gap. The expenditure needs and fiscal capacity scenarios equalize the differences in needs and capacity separately between states; however using both of them would provide a measure of the fiscal gap. The fiscal gap could be defined as the difference between fiscal needs and fiscal capacity. This fiscal gap could be filled by equalization transfers:-

$$FG_i = N_i - C_i \quad (3.4)$$

Where N_i is the fiscal need of the i th state, and C_i is the fiscal capacity of the i th state. $N_i - C_i$ measures the gap between the fiscal need and fiscal capacity (own sources of revenue). This type of formula considers not only the equalization of fiscal capacities, but also adjusts for the expenditure needs of different states. And the $\sum FG$ is equal the equalization transfers to the fifteen states.

To equalize the fiscal gap, or to estimate the amount of equalization which could be transferred to each state, the following steps are indicated (Martinez-Vazquez and Boex, 2001):

Step 1: Measure fiscal capacity and fiscal (Expenditure) needs

Step 2: Define the fiscal gap for each state government:

If fiscal capacity greater than fiscal needs, then fiscal gap = zero

If fiscal capacity less than fiscal needs, then

Step 3: Define the transfer to each state government:

$Transfer\ to\ state\ government\ i = (Fiscal\ gap_i / \sum Fiscal\ gap_i) * Fund \dots (3.5)$.

For example in table (3.3) for Khartoum in 2009 fiscal gap scenario (1) should be equal: $86.026 = (3.44/85.71) * 2143.4$, while Blue Nile fiscal gap should be $214.31 = (8.57/85.71) * 2143.4$.

It is assumed that the state needs and augmented state needs indexes which represents the expenditure side, and the poverty index and per capita tax revenue index, are the most appropriate measures for fiscal needs and fiscal capacity respectively, especially in absence of the relevant data.

The central government should fill the fiscal gap by providing more equalization grant to the states which have a weaker fiscal capacity. Thus the state whose fiscal capacity is less than fiscal needs require transfers to fill the state's fiscal gap. A negative sign therefore indicated that the state's actual equalization transfers are less than what it should have received, and the positive sign indicated that the state received more than should be transferred.

Accordingly, based on calculated gap difference between "state needs" and "fiscal capacity poverty index" (scenario (1) table (3.3)), twelve states received less than fiscal gap share and three states received more fiscal gap share. The Red Sea, Gadarif, Kassala, Sinnar, White Nile, Blue Nile, North Kordofan, South Kordofan, North Darfur, South Darfur, West Darfur and Northern, received less than the share based on computed gap, these twelve states received only about 57% of the equalization transfers in 2009. Khartoum, Gezira, and Nile received more than fiscal gap transfers; they received about 43% of equalization transfer in 2009.

In scenario (2), based on calculated gap of the difference between augmented state needs index and poverty based index state capacity, eleven states received less than equalization transfers except Khartoum, Gezira, Nile and Northern, e.g. Khartoum received about one and have times more than equalization transfers and Gezira received 1 times more than fiscal gap transfers. These four states received about 47% of total equalization transfer in 2009, however, if the fiscal gap approach (2) is applied to the equalization transfer in 2009 those states would have received only 22% of total equalization transfer in 2009.

In scenario (3), based on the calculated gap difference between state needs index and per capita revenue index, Khartoum and Gezira repeatedly are the most benefiting states e.g. Khartoum received ten times more than the fiscal gap equalization, while Blue Nile, South Kordofan and West Darfur are most suffering states, Blue Nile received two times less than the fiscal gap.

In scenario (4) based on the calculated gap difference between augmented state needs index, and per capita revenue index, eleven states received less than their equalization transfers fiscal gap transfers except Khartoum, Gezira, Nile and Northern. This result is similar to the results which obtained in scenario (2) and scenario (3).

Table 3.3: Calculated Fiscal Gap Scenarios of Equalization Transfers in 2009¹

State	Actual equalization in 2009 in million SDG	Fiscal gap Scenario (1)	Divergence	Fiscal gap Scenario (2)	Divergence	Fiscal gap Scenario (3)	Divergence	Fiscal gap Scenario (4)	Divergence
Khartoum	422.5	3.44	336.47	6.64	256.44	1.507	384.5	4.70	303.81
Red Sea	64.2	5.84	-81.84	5.30	-68.34	3.594	-26.43	3.05	-12.81
Kassala	105	4.34	-3.53	4.88	-17.03	5.028	-21.79	5.56	-35.41
Gadarif	85.7	6.62	-79.85	5.49	-51.59	6.114	-68.47	4.98	-39.98
Gazira	373.1	4.27	266.31	6.10	220.55	4.567	257.94	6.39	211.79
White Nile	124.3	6.20	-30.74	5.66	-17.24	6.418	-37.54	5.87	-23.92
Sinnar	85.7	5.61	-54.592	4.71	-32.08	6.07	-67.36	5.17	-44.67
Blue Nile	70.8	8.57	-143.51	6.25	-85.49	8.856	-152.5	6.53	-94.01
N.Kordofan	147.8	6.45	-13.49	6.96	-26.25	6.63	-19.39	7.14	-32.25
S.Kordofan	96.4	7.40	-88.65	6.13	-56.89	7.723	-98.35	6.45	-66.32
N.Darfur	137.1	6.69	-30.21	6.77	-32.20	7.027	-40.1	7.10	-42.11
S.Darfur	128.6	6.09	-23.69	8.78	-90.96	6.268	-29.46	8.95	-97.29
W.Darfur	83.6	6.57	-80.69	5.90	-63.94	7.203	-98.03	6.53	-81.14
Nile	124.4	3.72	13.02	3.19	44.62	4.326	15.314	3.79	28.67
Northern	94.2	3.90	-3.32	2.95	20.42	3.678	1.4538	2.728	25.40
Total	2143.4	85.71	0	85.71	0	85.71	0	85.71	0

1. Details of calculation of Fiscal Gap scenarios are shown in the Appendix Tables (4), (5), (6) and (7).

Divergence is difference between actual equalization transfers in 2009 and proposed equalization transfers based on the calculated fiscal gap.

Source: Own calculation using data of Central Bureau of Statistics and Taxation Chamber Reports.

3.4 Measuring Inequality and Disparities of Transfers:

Measuring states disparities within country is difficult, and various measurements are therefore used in the literature such as economic indicators, state levels and concentration measures, namely, Lorenz curve and Gini coefficients.

Lorenz curve is a popular graphical tool for examining inequality. It is a plot of the cumulative fraction of the population on the X-axis starting from the poorest, against the cumulative fraction of resources (income/expenditure) on the Y-axis. Thus it gives the shares of total income or per capita expenditure held (consumed) by corresponding fraction of the population. If resources are equally distributed, everyone will be in the 45⁰ line (the diagonal); the greater the level of inequality, the farther away the Lorenz curve is from the diagonal.

Gini coefficient, on the other hand, is defined as an area between the line of equality (the diagonal) and Lorenz curve divided by the area of the triangle below this line (see figure below). Perfect equality occurs when the distribution coincides with the diagonal, and Gini coefficient is therefore zero, and absolute inequality is obtained with a Gini equal to one. Gini Index is the Gini coefficient expressed as percentage.

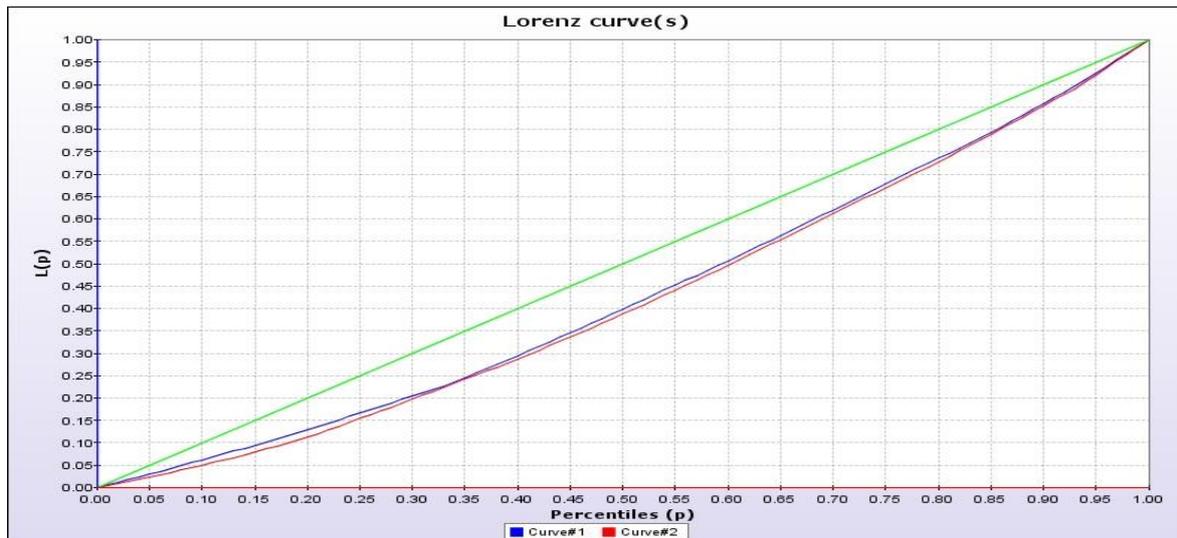
The Lorenz curves and Gini Coefficients were used to compare between equalization transfers and total transfers for the periods of the study, the preferable curve is the dominating curve, or the nearest curve to the diagonal; Gini Coefficient is used to compare the situation in case of two Lorenz curves crossing each other.

Table 3.4: The corresponding computed Gini coefficients of proposed fiscal gap scenarios:

Scenario	Scenario (1)	Scenario (2)	Scenario (3)	Scenario(4)
Gini Coefficient	0.14	0.13	0.17	0.16

Figure (3.5) shows the comparisons between two Lorenz fiscal gap scenarios, the Lorenz curve of fiscal gap scenario (1) lies above that of scenario (4); therefore the Lorenz curve of fiscal gap scenario (1) dominates Lorenz curve fiscal gap scenario (4). This result is confirmed with Gini coefficient which is less in scenario (1) than in scenario (4). Figure (3.6) shows also comparisons between two Lorenz fiscal gap scenarios, Lorenz curve of fiscal gap scenario (3) lies below that of scenario (2) so Lorenz curve of fiscal gap scenario (2) unambiguously dominates Lorenz curve fiscal gap scenario (3). This result is confirmed with Gini coefficient which is less in scenario (2) than in scenario (3). Finally figure (3.7) which compares between the two dominating Lorenz curves fiscal gap in figure (3.5) and figure (3.6), shows that the Lorenz curve scenario (2) crosses the Lorenz curve of scenario (1) at the bottom 20% of population, and stays above curve 1 up to the share of the top 30% when the two curve coincides; in which case resort is made to Gini coefficient, which indicates a lower inequality of transfers distribution in case of scenario 2.

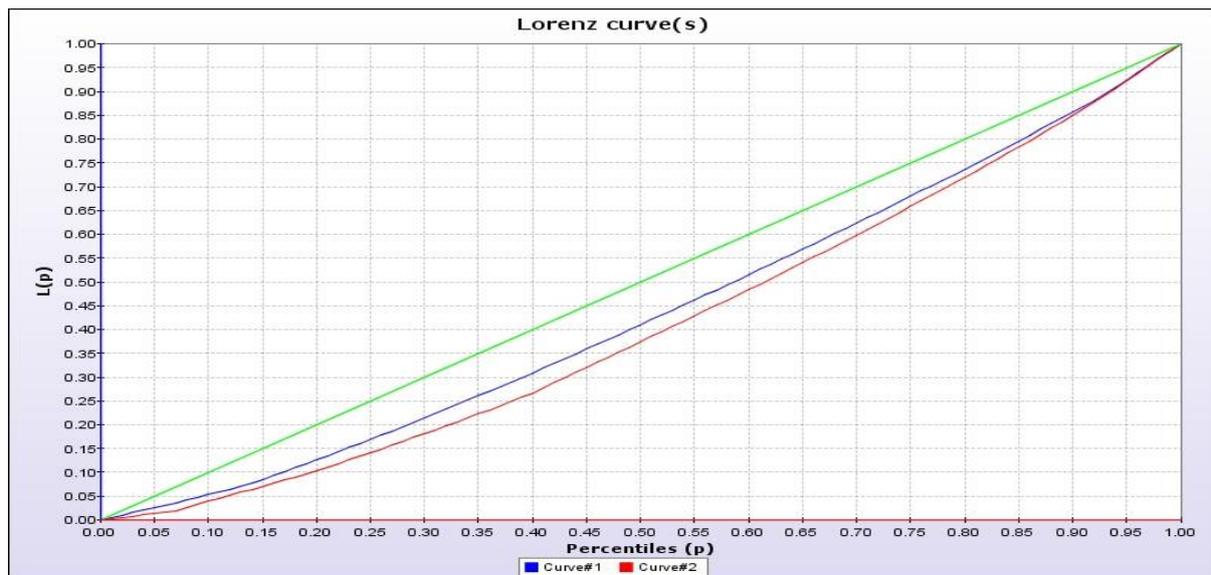
Accordingly scenario (2) in which the fiscal gap is represented by the divergence of augmented state needs index and fiscal capacity poverty index, is the preferred one in all these scenarios. This result can be compared to the result obtained by Maglad and Musa (2014), which found the value of Gini coefficient is equal 0.29 to the equalization transfers for the year 2009 in Sudan. Also this result can be compared to the average Gini coefficient to the impact of decentralized redistribution on income inequality by country groups in Sub-Saharan African countries, which lies between 0.30 and 0.35, in a study conducted by IMF (Antonia Goerl and Seiferling, 2014)



Curve (1): shows distribution of fiscal gap transfers of difference between state needs and poverty based fiscal capacity

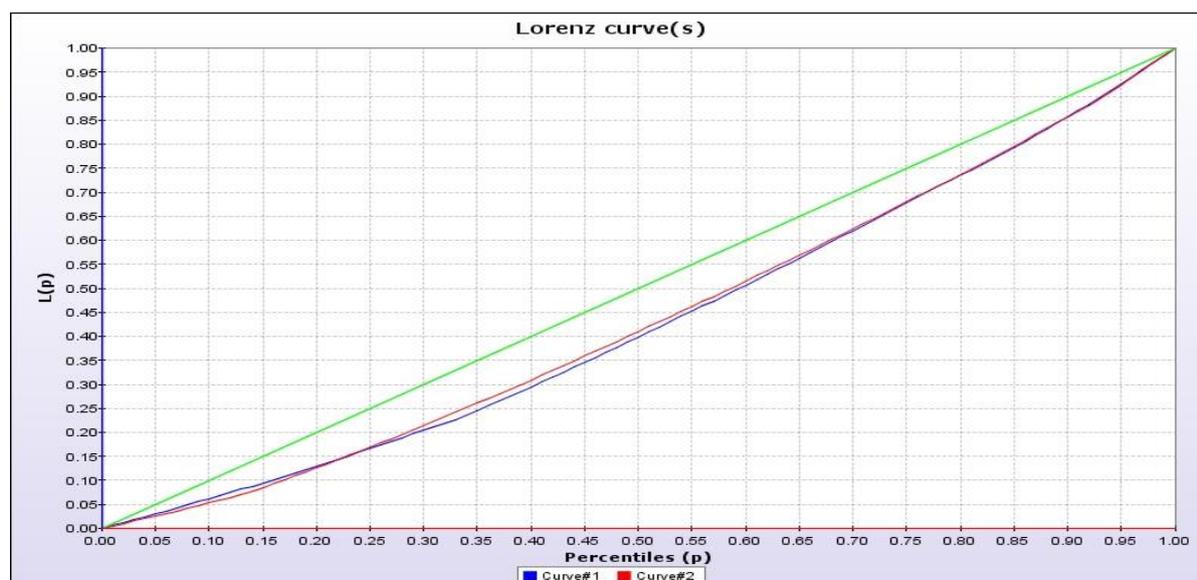
Curve (1): shows distribution of fiscal gap transfer of difference between augmented state needs and per capita tax revenue fiscal capacity.

Fig. 3.5: Lorenz Comparison between Scenario (1) and Scenario (4)



Curve (1): shows distribution of fiscal gap transfers of difference between augmented state needs and poverty based fiscal capacity. Curve (2): shows distribution of fiscal gap transfer of difference between state needs and per capita tax revenue fiscal capacity.

Fig. 3.6: Lorenz Comparison between Scenario (2) and Scenario (3)



Curve (1): shows distribution of fiscal gap transfers of difference between state needs and poverty based fiscal capacity

Curve (2): shows distribution of fiscal gap transfers of difference between augmented state needs and poverty based fiscal capacity.

Fig. 3.7: Lorenz Comparison between Scenario (1) and Scenario (2)

Conclusion:

This study attempted to fill the gap in the empirical literature in public policy in Sudan, by raising the issue of how federal equalization transfers are allocated across state governments, and in proposing different indexes for measuring the allocation of federal transfers between different states in Sudan. Most of the developed countries face difficulties of how to measure both states fiscal capacity and their spending needs. Due to these difficulties, some of these countries allocate intergovernmental transfers to state governments on ad hoc basis and usually these allocations are largely dependent on expert opinions. As result, intergovernmental transfers may lead to inequality in the provision of public services across sub-national jurisdictions.

Sudan equalization transfers aims to compensate states with higher spending needs. However, no attempts have been made before to incorporate fiscal capacity measures in the allocation of resources to states and emphasis was on a needs-based formula. Sothe study proposed some indexes that could be used to measure the expenditure needs and fiscal capacity to arrive at the states' fiscal gaps. On the basis of different scenarios measurement of fiscal needs and fiscal capacitythe fiscal gaps were simulated. The simulated alternative of the gap that is recommended is the one in which fiscal capacity is measured by a poverty index, and expenditure needs are measured by an augmented state needs index. This alternative is found to reduce the fiscal inequality among the states to its narrowest, as shown by Lorenz curve and Gini coefficient analysis, and results in conspicuous improvement in welfare compared with the currently used formula for distribution.

The factors which were used here to determine needs and capacity are of course tentative and dictated by the most relevant and available data. As more data on states' tax bases and disaggregation of GDP by state become available future studies could be carried on to arrive at better measures of capacity. However, the lesson learned from the exercise of this study is clear, that the reform of the system of transfers may not be effective if carried without regard to the necessary reforms of other important elements of intergovernmental fiscal relations, in particular revenue and expenditure assignments.

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Appendixes

Appendix 1: Transfer Shares Based on Population Size Compared with the Formulas of 2008 and 2010

States	population- Based shares% 2008	Formula Based shares 2008	actual Transfer shares 2008	Population- Based Shares% 2010	The formula shares% 2010	actual transfer shares% 2010
Khartoum	17.07	18.15	22.73	17.46	18.92	19.70
Red Sea	4.52	2.30	3.42	3.99	2.88	3.00
Kassala	5.79	4.88	4.84	5.79	4.70	4.90
Gadarif	4.37	5.03	3.79	4.54	3.84	4.00
Gezira	11.58	17.30	17.70	11.64	16.71	17.40
White Nile	5.60	5.80	5.18	5.66	5.57	5.80
Sinnar	4.16	4.57	3.74	4.23	3.84	3.99

Blue Nile	2.69	3.49	2.96	2.68	3.17	3.30
N. Kordofan	9.45	6.83	6.03	9.05	6.62	6.90
S. Kordofan	4.55	4.60	4.14	5.00	4.32	4.50
N. Darfur	6.84	6.05	6.58	6.56	6.14	6.40
S. Darfur	13.25	6.15	5.86	13.31	5.76	6.00
W. Darfur	4.24	3.80	3.77	4.23	3.74	3.90
Nile	3.63	6.27	5.03	3.61	5.57	5.80
Northern	2.26	4.75	4.23	2.25	4.22	4.40
Others	-	-	-	-	4.00%	-
Total	100	100	100	100	100	100

Source: Own calculation using data of Central Bureau of Statistics and FFMAC Reports

Appendix 2: State Tax Collection 2006 – 2010(in %)

State	2006	2007	2008	2009	2010	Average
Khartoum	49.12	47.13	47.91	45.98	48.15	47.66
Red Sea	10.77	14.23	11.57	11.85	10.09	11.70
Kassala	2.05	2.18	2.46	2.49	2.47	2.33
Gadarif	7.82	6.54	6.59	6.57	5.42	6.59
Gazira	7.14	7.37	8.98	8.47	8.38	8.07
White Nile	2.92	2.97	2.80	2.91	2.84	2.89
Sinnar	2.39	2.36	2.61	2.78	2.08	2.44
Blue Nile	1.14	0.86	1.05	1.29	1.19	1.11
North Kordofan	4.35	4.47	4.46	4.29	4.60	4.43
South Kordofan	1.52	1.77	1.46	1.61	1.78	1.63
North Darfur	0.82	0.95	1.10	1.08	1.11	1.01
South Darfur	5.12	3.67	3.90	4.87	6.57	4.83
West Darfur	0.43	0.53	0.43	0.59	0.66	0.52
Nile	2.17	2.2	1.83	2.53	2.00	2.14
Northern	2.24	2.77	2.85	2.69	2.66	2.64
Total	100	100	100	100	100	100

Source: Own calculation using data of Central Bureau of Statistics and Taxation Chamber Reports

Appendix 3: Socio-economic and Demographic Variables used in measurement of Need Indexes

States	Population size 2008	Population size in 2010	Actual Transfer 2008 in million SDG	Actual current transfers 2010 in million SDG	Incidence of poverty	population below poverty line	Infant mortality rate	Under 15s
Khartoum	5274	5758	427.49	489.46	26	1433.9	75	110094
Red Sea	1396	1317	64.25	74.51	58	758.64	66	37459
Kassala	1789	1910	91.05	121.58	36	655.56	76	54379
Gadarif	1348	1495	71.38	99.34	50	709.5	102	31223
Gezira	3575	3845	333.01	432.29	38	1409.8	70	82900
White Nile	1730	1867	97.53	144.1	56	1005.76	79	40539
Sinnar	1,285	1396	70.39	99.34	44	589.6	90	30003
Blue Nile	832	882	55.6	82.01	56	480.48	137	18308
N. Kordofan	2,920	2986	113.44	171.26	58	1713.32	81	66260
S. Kordofan	1,406	1649	77.96	111.76	60	958.8	100	32580
N. Darfur	2,113	2163	123.76	158.84	71	1519.4	59	55689
S. Darfur	4,093	4392	110.23	149.02	59	2484.49	70	113283
W. Darfur	1,308	1393	70.96	96.76	56	755.44	88	40567
Nile	1,120	1192	94.54	144.1	32	370.56	69	25824
Northern	699	741	79.61	109.18	36	259.56	65	16759
Total	30888	32986	1881.2	2483.55	465	14832.57	82	755867

Source: Own calculation using data of Central Bureau of Statistics, household survey 2009

Appendix 4: Calculation of Fiscal Gap 2009

State	State Needs Index	Fiscal Capacity Poverty Index	Fiscal Gap Index	Fiscal Gap (transfers)	Actual Equalization Transfers in 2009	Difference of Actual from Calculated
Khartoum	4.82	1.38	3.44	86.02	422.5	336.47
Red Sea	6.63	0.79	5.84	146.04	64.2	-81.84
Kassala	5.54	1.20	4.34	108.53	105	-3.53
Gadarif	7.55	0.93	6.62	165.55	85.7	-79.85
Gazira	5.43	1.16	4.27	106.78	373.1	266.31
White Nile	7.02	0.82	6.20	155.04	124.3	-30.74
Sinnar	6.66	1.05	5.61	140.29	85.7	-54.592
Blue Nile	9.39	0.82	8.57	214.31	70.8	-143.51
North Kordofan	7.24	0.79	6.45	161.29	147.8	-13.49
South Kordofan	8.15	0.75	7.40	185.05	96.4	-88.65

North Darfur	7.23	0.54	6.69	167.31	137.1	-30.21
South Darfur	6.86	0.77	6.09	152.29	128.6	-23.69
West Darfur	7.39	0.82	6.57	164.29	83.6	-80.69
Nile	4.99	1.27	3.72	93.02	124.4	13.02
Northern	5.10	1.20	3.90	97.52	94.2	-3.32
Total	100	14.26	85.71	2143.4	2143.4	0

Source: Own calculation using data of Central Bureau of Statistics, household survey 2009

Appendix 5: Calculation of Fiscal Gap 2009

state	Augmented State Index	needs	Fiscal Capacity Poverty Index	Fiscal Gap Index	Fiscal gap (transfers)	Actual Equalization Transfers in 2009	Difference of Actual from Calculated
Khartoum	8.02		1.38	6.64	166.05	422.5	256.44
Red Sea	6.09		0.79	5.30	132.54	64.2	-68.34
Kassala	6.08		1.20	4.88	122.03	105	-17.03
Gadarif	6.42		0.93	5.49	137.29	85.7	-51.59
Gazira	7.26		1.16	6.10	152.54	373.1	220.55
White Nile	6.48		0.82	5.66	141.54	124.3	-17.24
Sinnar	5.76		1.05	4.71	117.78	85.7	-32.08
Blue Nile	7.07		0.82	6.25	156.29	70.8	-85.49
North Kordofan	7.75		0.79	6.96	174.05	147.8	-26.25
South Kordofan	6.88		0.75	6.13	153.29	96.4	-56.89
North Darfur	7.31		0.54	6.77	169.30	137.1	-32.20
South Darfur	9.55		0.77	8.78	219.56	128.6	-90.96
West Darfur	6.72		0.82	5.90	147.54	83.6	-63.94
Nile	4.46		1.27	3.19	79.77	124.4	44.62
Northern	4.15		1.20	2.95	73.77	94.2	20.42
Total	100		14.26	85.71	2143.4	2143.4	0

Source: Own calculation using data of Central Bureau of Statistics, household survey 2009

Appendix 6: Calculation of Fiscal Gap 2009

state	State Needs Index	Per capita Tax Revenue Index	Fiscal Gap Index	Fiscal gap (transfers)	Actual Equalization Transfers in 2009	Difference of Actual from Calculated
Khartoum	4.82	3.313	1.507	38.00	422.5	384.5
Red Sea	6.63	3.036	3.594	90.62	64.2	-26.43
Kassala	5.54	0.512	5.028	126.78	105	-21.79
Gadarif	7.55	1.436	6.114	154.17	85.7	-68.47
Gazira	5.43	0.863	4.567	115.16	373.1	257.94
White Nile	7.02	0.602	6.418	161.83	124.3	-37.54
Sinnar	6.66	0.59	6.07	153.06	85.7	-67.36
Blue Nile	9.39	0.534	8.856	223.31	70.8	-152.5
North Kordofan	7.24	0.61	6.63	167.18	147.8	-19.39
South Kordofan	8.15	0.427	7.723	194.74	96.4	-98.35
North Darfur	7.23	0.203	7.027	177.19	137.1	-40.1
South Darfur	6.86	0.592	6.268	158.05	128.6	-29.46
West Darfur	7.39	0.187	7.203	181.63	83.6	-98.03
Nile	4.99	0.664	4.326	109.08	124.4	15.314
Northern	5.1	1.422	3.678	92.74	94.2	1.4538
Total	100	15	85	2143.4	2143.4	0

Source: Own calculation using data of Central Bureau of Statistics, Taxation Chamber Reports

Appendix 7: the Calculation of Fiscal Gap2009

State	Augmented State index	needs	Per capita tax revenue Index	Fiscal Gap	Fiscal gap (transfers)	Actual equalization transfers in 2009	Difference of Actual from Calculated
Khartoum	8.02		3.31	4.70	118.6	422.5	303.81
Red Sea	6.09		3.03	3.05	77.0	64.2	-12.81
Kassala	6.08		0.51	5.56	140.4	105	-35.41
Gadarif	6.42		1.43	4.98	125.6	85.7	-39.98
Gazira	7.26		0.86	6.39	161.3	373.1	211.79
White Nile	6.48		0.60	5.87	148.2	124.3	-23.92
Sinnar	5.76		0.59	5.17	130.3	85.7	-44.67
Blue Nile	7.07		0.53	6.53	164.8	70.8	-94.01
North Kordofan	7.75		0.61	7.14	180.0	147.8	-32.25
South Kordofan	6.88		0.42	6.45	162.7	96.4	-66.32
North Darfur	7.31		0.20	7.10	179.2	137.1	-42.11
South Darfur	9.55		0.59	8.95	225.8	128.6	-97.29

West Darfur	6.72	0.18	6.53	164.7	83.6	-81.14
Nile	4.46	0.66	3.79	95.7	124.4	28.67
Northern	4.15	1.422	2.728	68.7	94.2	25.40
Total	100	15	85	2143.4	2143.4	0

Source: Own calculation using data of Central Bureau of Statistics, Taxation Chamber Reports