Rwanda: Lessons from Applied Intergovernmental Fiscal Equalization Formula

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ABSTRACT: It is a well-known fact that budgetary allocations need to be based on a just formula for balanced service delivery in the modern world. This paper describes the intergovernmental formula designed for Rwanda in 2003 to allocate grants from the central to local governments (LGs). First, the previous criterion, the Local Authority Budget Support Fund, was reviewed. This was followed by a literature review and field visits. Finally, the specifications of the mathematical model are described, followed by the proxy selection, data analysis, econometric evaluation, and estimations used in the study.

In 2003, data analysis revealed that LGs had low fiscal capacities and ubiquitous fiscal needs. These were proxied by mean own source revenues and expenditure needs, respectively, in the proposed formula. The difference between the two was taken as the mean fiscal gap.

This formula corrected the inherent weaknesses in the previous transfer system. It proposed weighting parameters to determine subnational transfer entitlements. Additionally, it constructed and applied welfare poverty and fiscal gap indices that captured the behavior of LGs in terms of wellbeing, fiscal needs, and revenue capacity for the first time in Rwanda.

The study recommendations were entirely adopted by the government. The formula was used to allocate unconditional grants from the central government to LGs to improve service delivery and reduce poverty. The study also highlights that any successful transfer formula design depends on how the following are determined—the transfer pool, weights, proposed variables, and proxy indices—and how they enter the model.

Keywords: Conditional transfers, Fiscal decentralization, Equalization formula, Intergovernmental, Rwanda, Subnational

1. BACKGROUND TO THE STUDY
This article examines the origins of the intergovernmental fiscal equalization formula proposed for Rwanda in 2003 and provides an econometric evaluation of it using 2003 data. Intergovernmental fiscal transfers were introduced as part of government reforms in the early 2000s to drive development through fiscal and financial decentralization.1 On the one hand, the reforms aimed to improve service delivery and reduce ubiquitous poverty; on the other, they intended to strengthen national unity, promote reconciliation and power-sharing, and stimulate participation in decision-making processes that had been dismantled in the period following the 1994 Rwandan genocide.

As part of its reforms, the government introduced a mix of grants that were technically unsound, as discussed elsewhere in this article. These were conditional grants, unconditional subsidies, equalization or common share transfers, and delegated funds.2 Discussions on the effectiveness of these transfer variants are ubiquitous in the literature; for instance, Bird and Smart [3] offer a detailed description. Nevertheless, these were the precursor initiatives that underpinned the transfer system reforms of that period.

This paper is organized into eight sections: Section 2 narrates the approach used to carry out the study. Section 3 describes the data that was used in designing the formula, and their sources and study limitations, while Section 4 provides an assessment of the previous transfer system. Next, Section 5 answers the question of whether grant transfers to subnational governments were necessary for Rwanda at that time. Section 6 explains the new model in detail and its contribution to the literature. In Section 7, the designed system is econometrically evaluated to ascertain its relevancy. Finally, Section 8 presents both the conclusions and caveats.

2. METHODOLOGY
This paper describes the combination of approaches used by the study to accomplish its goals. Initially, relevant documents were gathered from ministries, departments, and agencies


2 See Financial and Accounting Manual [4].
(MDAs), and other stakeholders who were responsible for implementing decentralization at that time. This was followed by a search for theoretical and empirical studies on intergovernmental fiscal transfers, and specifically those on the Rwandan context. The collected documents and literature were subjected to desk review in order to gain an intimate understanding of the pertinent issues.

Simultaneously, secondary actual fiscal and social data were collated and assembled from various sources into a portable data set. The data were cleaned to minimize statistical errors and eliminate bias during the analysis. The formula was mathematically modeled and tested. Thereafter, simulations and analysis were carried out using Statistical Package for the Social Sciences (SPSS). Lastly, the findings were interpreted and presented schematically and in tabular form.

3. DATA SOURCES AND STUDY LIMITATIONS

3.1 Data Related Issues

While designing the formula, we had to rely on secondary data from various sources that were collated into a central data set of fiscal decentralization data (FDD). The data were collected from two main sources—local governments’ (LGs) fiscal reporting systems and the central government’s data, mainly from MDAs.

The Ministry of Local Government, Information, and Social Affairs (MINALOC) provided data on the Local Authority Budget Support Fund (LABSF) and the other fiscal and financial aspects of LGs. Moreover, the Ministry of Economy and Financial Planning (MINECOFIN) supplied data on district welfare rates obtained from both, the Department of Statistics and the National Census Coordination Unit (NCCU).

Several other government agencies proved to be very supportive and provided the necessary data. First, the Rwanda Revenue Authority (RRA) contributed data on central government revenue collections, which acted as a backup for the district-level data, mainly in terms of ascertaining the revenue generated before and after the decentralization initiative. Secondly, the Central Bank of Rwanda (BNR) furnished data on the country’s macroeconomic parameters such as economic growth rate, the gross domestic product (GDP), and the inflation rate.

3.2 Study Limitations

It is worth mentioning that Rwanda, like any other developing country, faced huge problems with regard to data availability in 2003. The GoR had just started to implement fiscal decentralization, and at that time, it had not implemented systems for data collection to track the progress of its decentralization initiatives. Furthermore, the government’s MDAs lacked adequate resources and personnel for robust accounting and financial management, which are key to implementing fiscal decentralization. This, in turn, led to the fourth problem: it was impossible to design meaningful models to estimate the country’s future fiscal performance and position.

The following section examines the transfer system pre-2003 and explains the new transfer mechanism that required minimum data, was simple to implement, and was contextually relevant to Rwanda at the time.

4. REVIEW OF THE PREVIOUS TRANSFER MODEL

Previously, unconditional transfers were allocated to districts and towns on the basis of four parameters: district population, equity common fund, square area, and revenue capacity.

4.1 Inherent Weaknesses of the Previous System

There was a need to refine the applied proxy parameters as they possessed valid weaknesses. Firstly, the equity common fund proxy (the equalization portion), where each district claimed an equal share of the fund as a ‘balancing factor’, was unjust since it ignored the intended purpose of equalizing the inherent differences between the subnational jurisdictions, i.e., vertical fiscal imbalances. The implication was that this impacted other parameters, including district-specific attributes, which it was expected to address. The only rationale given for the use of this parameter was that each district had to start somewhere to provide basic public goods and services, which required financial resources. In addition, it treated all the towns and districts (urban and rural) equally, thus undermining its intended purposes. The above discussion echoes Mancur’s [8] views.

The parameter weights of the old system were determined subjectively and were highly inflated; as such, they were scaled down in the new model. Surprisingly, district revenue capacity was used, incorrectly, as a proxy for poverty (Table 6). This was unrealistic and inappropriate because it did not capture income distribution; more importantly, it did not account for variations in the population’s well-being. Next, the old transfer system omitted each district’s expenditure needs and its elements or types. Similarly, expenditure on education and health were (and still are) of paramount importance in a country like Rwanda, but were not accounted for in the old transfer system. Therefore, it is clear that this formula was fundamentally flawed, since it did not account for the fiscal gap between districts, which underpins a good transfer system.

Our statistical results showed that the allocation of the LABSF in 2002 and 2003, based on the described criteria of the previous system, led to inequity because of the system’s unreliability and unpredictability. This is demonstrated in

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3 The study recognizes the merits and demerits of using actual data for further discussions [5-7], but for the Rwandan case, this approach was the only feasible option.
4 These data were referred to in the study as fiscal decentralization data (FDD).
5 This was wrongly used as a proxy for district poverty levels.
Table 1, which shows that LABSF transfers were higher in 2002 compared to 2003, because in the latter period, districts and towns realized only three-fourths of their grant entitlement.

<table>
<thead>
<tr>
<th></th>
<th>LABSF 2003 (RWF)</th>
<th>LABSF 2002 (RWF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>8,644,885</td>
<td>14,260,726</td>
</tr>
<tr>
<td>Maximum</td>
<td>13,503,396</td>
<td>22,274,520</td>
</tr>
<tr>
<td>Minimum</td>
<td>3,405,604</td>
<td>5,618,011</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>2,279,404</td>
<td>3,760,084</td>
</tr>
<tr>
<td>Observations</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>

Table 1: LABSF actual allocation for the fiscal years 2003 and 2002 in Rwandese Francs (RWF).

The results from both fiscal periods indicate a wide disparity among the values of the entire descriptive statistics imputed. These results confirm that the LABSF transfers did not lead to equalization among subnational jurisdictions.

5. THE NEED FOR TRANSFERS

This section answers the question of whether intergovernmental fiscal transfers were required for subnational governments in Rwanda in 2003. This study makes its case by drawing upon earlier studies on the subject including Ehdaie [9] and Martinez-Vasquez [10]. The econometric evaluation used 2003 actual data, including information on all transfers to LGs, unless mentioned otherwise. Four key aspects of the study are examined below.

5.1 District Mean Revenues

To analyze the revenue capacities of town and districts, we used district mean revenues (MREV) calculated using districts’ own sources revenues (OSRs) for 2003. Using this data, the per capita revenue (PCMREV) was calculated. This showed that districts and towns had low revenue capacities and, therefore, they needed more stringent revenue enhancement strategies. This approach is an alternative to the Australian model, which was designed for a country where data unavailability was not a pressing problem [11]. The study also showed that districts and towns in the same provinces in Rwanda had heterogeneous tax bases that led to differential tax capacities. This gap was more pronounced when considering the urban–rural divide.

Table 2 shows that PCMREV was very low in 2003, at just 88.48 Rwandese Francs (RWF). This was further confirmed by the low maximum and minimum values of 742.63 and 5.27 RWF, respectively. These results implied that districts and towns in Rwanda struggled to generate adequate revenue to meet their expenditure needs, as they worked with relatively narrow tax base.

<table>
<thead>
<tr>
<th></th>
<th>PCMREV (RFW)</th>
<th>MREV (RFW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>88.48</td>
<td>6,208,417</td>
</tr>
<tr>
<td>Maximum</td>
<td>742.63</td>
<td>76,520,613</td>
</tr>
<tr>
<td>Minimum</td>
<td>5.27</td>
<td>548,641.5</td>
</tr>
<tr>
<td>SD</td>
<td>118.97</td>
<td>9,693,552</td>
</tr>
<tr>
<td>Observations</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>

Table 2: PCMREV and MREV comparison in Rwandese Francs (RWF).

This argument was supported by the large standard deviation of 118.97 RWF. Thus, revenue assignment, as shown in table 3, was inadequate—the central government should have empowered LGs with more revenue powers.

Decentralized taxes and other local taxes (revenue assignment) were:

- Taxes and fees of the district or town;
- Funds obtained from certification services rendered by the district or town;
- Funds from movable and fixed assets;
- Profits from investments by the district or town, and interest from their own shares and income-generating activities;
- Fines;
- Loans;
- Government subsidies;
- Legal costs and proportional rights charged by Canton Courts;
- Funds obtained from services rendered by the district or town, or from different public infrastructures;
- Donations and legacies.

The following taxes, formerly collected by the central government, were transferred to districts, towns, and cities:

- Property tax;
- Trading license tax;
- Tax on rent.

Table 3: OSRS assignment for districts and towns of Rwanda in 2003.

On examining the lower part of Box 1, it appears that too few taxes were devolved to LGs during the previous transfer regime.

5.2 District Mean Expenditures

Analogously, district mean expenditures (MEXP) from 2003 data were used to capture information on districts’ and towns’ expenditure needs. Again, when this was used to calculate per capita mean expenditure (PCMEXP), the values were observed to be quite low by all standards and did not suffice to provide the minimum national standard of public goods and services. This reveals that most of the population might have not benefited from the public spending that LABSF intended to finance.

<table>
<thead>
<tr>
<th></th>
<th>PCMEXP (RFW)</th>
<th>MEXP (RFW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>109.00</td>
<td>5,652,265</td>
</tr>
<tr>
<td>Maximum</td>
<td>747.80</td>
<td>56,495,919</td>
</tr>
<tr>
<td>Minimum</td>
<td>16.69</td>
<td>1,090,845</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>118.28</td>
<td>6,22</td>
</tr>
<tr>
<td>Observations</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>

Table 4: PCMEXP and MEXP comparison in Rwandese Francs (RWF).
The expenditure was evidently low, with a mean PCMEXP of 109.00 RWF, and a large standard deviation of 118.28 RWF. In addition, the maximum PCMEXP stood at 747.80 RWF with a very low minimum value of 16.69 RWF, indicating that a large part of the population could not access adequate services. Apart from the two main assigned expenditure responsibilities of health and education, district-specific recurrent obligations were enormous, which led to high degrees of fund fungibility and flypaper effects.

First, some MFG results were negative, which implied that districts’ expenditure responsibilities fell short of their revenue assignments. We recommended that these districts and towns not donate to the transfer pool; instead, that they should attract zero transfers [12]. Secondly, the MFG could be zero, where MREV and MEXP were exactly found to be equivalent; however, we did not find such a case in our study. Thirdly, in most of the districts we studied, districts’ expenditure responsibilities were in excess of their revenue capacity, which resulted in positive MFGs. This was expected, and highlighted the need for transfers from the central government to districts and towns. The results from the analysis showed that only in 27 of the 106 districts (25 percent), MEXP was lower than MREV. As such, these districts had a less pressing need for intergovernmental fiscal transfers. Table 4 shows that per capital mean fiscal gap (PCMFG) was about 48.25 RWF, while the maximum and minimum values were 395.03 and 0.86 RWF in 2003, respectively. This meant that districts and towns in Rwanda had insufficient revenue generation and lacked the spending power to effectively deliver social services.

Table 6: PCMFG and MFG in Rwandese Francs (RWF).

<table>
<thead>
<tr>
<th></th>
<th>PCMFG (RWF)</th>
<th>MFG (RWF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>48.25</td>
<td>2,977,072</td>
</tr>
<tr>
<td>Maximum</td>
<td>395.03</td>
<td>1,813,039.5</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.86</td>
<td>80,787.2</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>56.35</td>
<td>2,848,348</td>
</tr>
<tr>
<td>Observations</td>
<td>79</td>
<td>79</td>
</tr>
</tbody>
</table>

Statistically, it is evident from Table 6 that the minimum values were set to equal zero by construction. This was accomplished after we had allowed for LGs with negative MFGs to imply that they can finance all their expenditure assignments using hard budget constraints and did not need transfers. Therefore, mean fiscal revenue, mean expenditure needs and mean fiscal gaps were the main rationale for intergovernmental fiscal transfers in Rwanda.

5.4 Central Government Transfers and Entitlements

Given districts’ meager revenue assignment and their narrow local tax bases, the need for transfers to subnational governments was enormous. A comparison of the contents of Table 5 to the statistics in Table 4 revealed that both expenditure responsibilities and spending power were not

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Table 5: Districts’ and towns’ expenditure responsibility assignments in 2000.

Table 5 reveals that LGs were assigned huge expenditure responsibilities, which partly accounted for the colossal fiscal gaps observed in the next section. Those fiscal gaps showed wide disparities—horizontal fiscal imbalances at the inter- and intra-provincial jurisdictional levels. Finally, poor expenditure prioritization had led to a surge in fiscal needs, which translated into a huge mean fiscal gap (MFG) for subnational governments, as shown below.

5.3 Mean Fiscal Gap

Nevertheless, the assigned expenditure responsibilities in many occasions exceeded districts’ and towns’ ability to finance them via their OSRs. This situation caused vertical imbalances—in our study, this was reflected by a substantial district MFG. Three scenarios could explain this.

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6 MFG is the difference between MEXP and MREV.
sufficiently addressed under the previous system, and that most of the population lived in abysmal poverty.

Table 7 shows that the maximum welfare poverty index (WPI) rate from 2002 census data was 96.2 percentage points and the minimum was 9. The mean district poverty rate was very high, at 79 percentage points. The table demonstrates that with such high population density, the provision of public goods and services posed significant problems. Imposing expenditure reducing policies in these districts would only hurt the poor more.

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual RRA Revenues (RWF)</th>
<th>LABSF Allocations to Districts (RWF)</th>
<th>LABSF Entitlement from MINECOFIN (RWF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>79,514,756,964</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2002</td>
<td>93,949,100,000</td>
<td>1,331,500,000</td>
<td>1,192,721,354</td>
</tr>
<tr>
<td>2003</td>
<td>111,201,700,000</td>
<td>1,243,500,000</td>
<td>2,818,473,000</td>
</tr>
<tr>
<td>2004</td>
<td>-</td>
<td>800,694,316</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 8 reflects the actual allocation of LABSF grants to districts and towns. In 2002, LABSF allocations to districts were 12 percentage points more than the entitlement. In 2003, it was 56 percentage points less than the expected legal entitlement. In 2003, the actual entitlement was only 43 percentage points of the legally expected entitlement. This showed that the grant system was unpredictable and had significant delays—less than the mandatory amounts were released from both the MINECOFIN and MINALOC to the towns and districts in the period between 2002 to 2004.

6. DEVELOPING THE PROPOSED TRANSFER SYSTEM

6.1 Features of the Designed Transfer System

The new transfer system featured a model different from those found in countries like the USA [13]; Indonesia [14-16]; China [17]; Canada [18]; and Australia [19]. Jun Ma has given special treatment to the alternative approach applied in Korea and Japan. This study avoided replicating those models and imposing them on the GoR for three main reasons.

First, they were mathematically complex and did not offer statistical gains in terms of robustness or accuracy. Secondly, the data demands of these models were extremely high and this level of statistical analyses was unnecessary in the Rwandan context at the time. Thirdly, estimations of the two sides of the formula—i.e., expenditure needs and revenue capacity—used proxy of proxies that were applied in addition to the estimated figures. In Rwanda, it was very difficult to make accurate estimates, especially at the local level. The main concern was identifying factors specific to expenditure needs and revenue capacity; for instance, population and area were factors considered while estimating expenditure needs, but ideally, both could fit in either side.

The new model for calculating intergovernmental transfers used information on revenue capacity and expenditure needs in a plausible manner. In addition, the model was participatory—districts and towns were consulted at each stage of development, and the final formula was discussed with them before it was applied; there was transparency in the implementation.

6.2 The Study’s Contribution to Knowledge and the Literature

Any new transfer system should aim to overcome the weaknesses of its precursors [20]. The designed formula aimed to allocate grants from the central government to the provinces (intara), as the previous transfer system seemed to promote inequality among jurisdictions. For instance, statistical data analyses revealed that “resource endowed” provinces, such as Ruhengeri and Gitarama, attracted more resources in the period under consideration.

The reformed transfer formula incorporated all the attributes of the previous transfer system, but it addressed them in a more comprehensive way. For example, it included additional information on the districts’ fiscal performance by incorporating the fiscal performance index (FPI). The index introduced elements of fiscal gap in the analysis, which captured expenditure needs and revenue capacity. The FPI considered the difference between the mean district expenditure and mean district revenue as a proportion of mean district expenditure. As noted previously, the difference between the two means was defined as the MFG.

Next, we introduced the WPI derived from the census data to capture the actual living conditions of households in various

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8 There are four variants of the equalization formulae found in the literature, depending on what they aim to equalize: (a) some seek to equalize the fiscal gap, (b) others to equalize fiscal needs, (c) still others equalize fiscal capacity, (d) and the remaining aim to equalize the regional per capita output.

9 The views of the then minister for MINALOC were very important, since at the intara-level, there was devolution by de-concentration.

10 The welfare poverty index comes from the 2002 GoR census and does not include income or expenditure measures; rather,
LGs. In the literature, poverty has a myriad of facets, and it is variously defined [21]. Intuitively, the poverty index allowed for variations in the transfer amount based on the percentage of the district population considered to be poor; this rate was district-specific.

confirmed through sensitivity analyses or by conducting regression analyses.13

6.3 Mathematical Construct of the Proposed Transfer Formula

Analytically, let the symbols used be defined as:

\[ \eta_i = \text{district } i\text{'s population, } N = \text{total population of all districts, } \]
\[ m = 106, \text{ that is, the total number of districts that were included in the analysis, } \gamma_i = \text{district } i\text{'s square area, } \Omega = \text{total transfer pool derived from the previous year’s mobilized domestic revenues, } \]
\[ \Omega_i = \text{total transfer funds available for the } i\text{th district, } \lambda_i = \text{fiscal capacity for the } i\text{th district that captures the mean of all OSRs, } \chi_i = \text{fiscal expenditure needs for the } i\text{th district, and } \Phi_i = \text{poverty incidence of the } i\text{th district imputed from the census data.} \]

Then let \( \alpha_k \) stand for the shares of the five parameters used; and “k” take values from 1 to 5, reflecting the proposed five parameter model.

The study begins by defining how to derive the total transfer pool:

\[ \Omega = \tau \beta_{i-1} \]  

(1)

Where \( \tau \) stands for the predetermined percentage of the central government’s previous year’s mobilized domestic revenues, which is legally binding. Analogously, \( \beta_{i-1} \) is the central government mobilized domestic revenues lagged one year,

\[ \alpha_{ik} = \omega_k(\Omega)k_i \]  

(2)

Where \( \alpha_{ik} \) = the \( i\)th district poverty incidence share, \( \alpha_{ik} = \) the district \( i\)th balancing or lump-sum share, \( \alpha_{ip} = \) district \( i\)th land area share, \( \alpha_{il} = \) district \( i\)th fiscal gap share, and \( \alpha_{ip} = \) district \( i\)th population share.

Mathematically, the proposed formula can be modeled as follows:

Equation (2) represents the funding available for all the districts:

\[ \sum_{k=1}^{5} \alpha_{ik} \]

11 The correlation is significant at the 1 percent level (2-tailed). The implication is that poor districts that were unable to finance their needs were heavily counted, which is good for a poor country like Rwanda.

12 Refer to RRA annual reports for the years 2001, 2002, and 2003 (Table 8).
$$\Omega = \sum_{i}^{m} \Omega_i$$  \hspace{1cm} (3)

Where the individual district receives an average:

$$\bar{\Omega} = \frac{\Omega}{m} \text{ or } \bar{\Omega} = \frac{1}{m} \sum_{i}^{m} \Omega_i$$  \hspace{1cm} (4)

Recall that \( m = 106 \)

Let district \( i \)th fiscal gap be denoted as \( \Pi_i \)

Hence, \( \Pi_i = \mathcal{F}_i - \mathcal{R}_i \)  \hspace{1cm} (5)

Therefore, summing up, it can be written as:

$$\Pi = \sum_{i}^{m} \left( \mathcal{F}_i - \mathcal{R}_i \right)$$  \hspace{1cm} (6)

Where, Equation (6) is the entire district fiscal gap.

It follows then, if “full equalization” is anticipated, then the social planner should set \( \Omega = \Pi \)  \hspace{1cm} (7)

Equation (7) above says that if each district/town is to attain the minimum national standard of expenditure, then it should be given LABSF just equivalent to its fiscal gap.

It follows the \( i \)th district proportionate fiscal gap, also known as fiscal gap ratio, can be denoted as \( \hat{\Pi}_i \) and we can write

$$\hat{\Pi}_i = \frac{\mathcal{F}_i - \mathcal{R}_i}{\mathcal{F}_i}$$  \hspace{1cm} (8)

Equation (8) captures the fiscal performance behavior of district officials and acts as a basis for monitoring and evaluating the management’s decision-making in districts and towns.

Rearranging and using Equation (8), we can specify the mean fiscal gap ratio as:

$$\bar{\Pi} = \frac{1}{m} \sum_{i}^{m} \left( \mathcal{F}_i - \mathcal{R}_i \right)$$  \hspace{1cm} (9)

Recall the five parameters for this model, specified elsewhere in this paper, i.e., fiscal gap index, poverty incidence index (WPI), population, district land area, and equal lump-sum amount. At this juncture, weights are assigned to each parameter “\( k \)” and denoted as \( \omega_k \), where “\( k \)” takes values from 1 to 5, as shown earlier.

\[ . . . \omega_\eta = 0.3; \omega_\gamma = 0.1; \omega_\phi = 0.4; \omega_\Pi = 0.1; \omega_\zeta = 0.1 \]

Notwithstanding the foregoing mathematical representation, we imputed the transfer shares of each individual district from the predetermined grant pool via Equation (2):

District \( i \)th population share;
i.e., FPI, WPI, AREA, and POP. The findings indicated that all variables’ signs turned out as expected and coefficients were significant at the 1 percent level. In addition, the standard errors were very small, confirming that the newly designed system was highly equalizing. The results showed that when the district surface area increased by 1 percent, then the total transfer claims rose by 35 percentage points. This was because large area districts required more resources to work on their vast lands. Population carried a high level of importance, with the largest coefficient contribution to the transfer demand—if it increased by 1 percent, transfer needs increased by 45 percentage points. This is because higher population growth leads to a greater demand for public goods and services.

Similarly, the WPI and FPI indices portrayed the same trend: that is, if they increased by 1 percent, both triggered increases in LABSF3 of 41 and 40 percentage points, respectively. Interestingly, all the variables together by construction explained 100 percent of the variations observed in all the transfers. These findings agreed with the Indonesian analysis [22].

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>19.80</td>
<td>19.80</td>
</tr>
<tr>
<td>PCMREV</td>
<td>-0.166</td>
<td>-0.166</td>
</tr>
<tr>
<td>PCMEXP</td>
<td>0.259</td>
<td>0.259</td>
</tr>
<tr>
<td>Adjacent R²</td>
<td>0.371</td>
<td>0.371</td>
</tr>
<tr>
<td>Observations</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>

Table 10: OLS Regression. Dependent Variable: PCMFG Unstandardized Coefficients.

The two independent variables explained about 37 percentage points of the total variations observed in the PCMFG. These results were intuitive, since the only way for districts to minimize their fiscal gaps was to simultaneously implement policies geared towards enhancing OSR generation, while imposing hard budget constraints.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>5.990</td>
</tr>
<tr>
<td>LPCMREV</td>
<td>-0.204</td>
</tr>
<tr>
<td>LPCMEXP</td>
<td>0.142</td>
</tr>
<tr>
<td>Adjacent R²</td>
<td>0.628</td>
</tr>
<tr>
<td>Observations</td>
<td>106</td>
</tr>
</tbody>
</table>

Table 11: OLS Regression. Dependent Variable: LABSF3 Unstandardized Coefficients.

The implication was that enhancing the capacities of districts for revenue generation and imposing policies that reduce expenditure, as proposed, would have an equalizing effect. On the one hand, a 1 percent increase in revenue would lower transfers from the central government by 20 percentage points, holding districts’ spending levels constant. On the other, when districts increased their expenditure by 1 percent, their transfer levels would also increase by 14.2 percentage points.

8. CONCLUSIONS AND CAVEATS

The study corrected the anomalies of the grant transfer system practiced in Rwanda. First, the study explained why the suggested approach was better suited to Rwandan needs during that period (2003), instead of the generic approaches applied in other developed and developing countries. Several
notable lessons should be remembered while designing equalization transfer formulae for countries in the initial stages of implementing decentralization:

1. Determine the transfer pool using some kind of formula, perhaps as a proportion of the central government’s domestically mobilized revenues from the previous year.
2. It is hard to estimate revenue capacity with limited data sources, especially for countries in the initial stages of implementing fiscal decentralization; apply mean of actual own revenues at both levels of government.
3. Analogous to the above two points, capture expenditure needs through mean of actual expenditures. This is useful until sectoral data become available.
4. Apply the derived mean revenues and mean expenditures to reflect revenue capacity and expenditure needs, respectively, to establish a mean fiscal gap, which is an important parameter to ensure equalization.
5. Worry about how the various parameters and indices are derived and combined, and enter the model. Determine the effects based on tests using actual data, about whether these parameters should enter the model multiplicatively, additively, divisibly, or in a subtractive way.
6. Use the poverty measure from household budget surveys, calculated by most countries while formulating their poverty reduction policies. This is the most plausible proxy, since it captures the country’s poverty incidence for a given subnational government, which the formula intends to minimize.

In conclusion, we suggested a pragmatic model that was successfully implemented to address previous intergovernmental inequities. Apart from other structural problems, the findings helped to consolidate the political gains from implementing fiscal decentralization in Rwanda. Furthermore, the study advanced several policy recommendations, which were all adopted.

**REFERENCES**


