A Regional Budget Development Allocation Formula for Tunisia

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Abstract

The purpose of this paper is to recommend a new public resource allocation system for the development budget based on a new allocation process, on the one hand, and allocation formulas on the other. The new process and allocation rules include the role of the State in the implementation of a national development strategy as well as that of the various structural disadvantages/marginalization of the different regions.

This is why we have developed the development budget allocation formula which is based on five principles: Global coherence, effectiveness, equity, transparency and simplicity. These five principles are crucial to ensuring national cohesion and achieving the objectives of the revolution. In addition, the allocation process is designed around three budget “tranches”. One tranche called Global Coherence, a second called Republican and a third called Convergence.

Each tranche has its own rules and objectives. In particular, Convergence allocation between regions takes place according to a distribution formula with the objective of inclusive growth. It is mainly based on a new index of regional development made up of three components; Structural vulnerability, economic vulnerability and the social vulnerability of the different regions.

Keywords: governance, Allocation formula, development, development index, inclusive growth

JEL codes: H7, R1, R5, O22
1. Introduction

Inclusive growth which is both economic and social is crucial for Tunisia. It mainly requires high growth, an overall reduction of unemployment for young people in particular and the reduction of regional inequality through convergence. In fact, the objective of regional convergence, as a pillar of inclusive growth, is not only to allow redistribution from wealthy to poor regions in order to reduce regional inequality. It is also to consolidate the economic structure of the country and to contribute to a dynamic of growth and sustained regional convergence. In order to accomplish this, development budget allocation should take place according to specific rules and a clear process for the purpose of inclusive growth in all its forms, including regional convergence.

At this stage, it should also be noted that development budget allocation should not be seen as a division and redistribution of financial resources between regions. On the contrary, it should be formulated as a determination of budget allocations that the public authorities should allocate by region to finance various projects in order to ensure the development of the country and regional convergence. The size of the allocation by region will no longer be the result of an arbitrary process or at the discretion of public authorities but rather the results of a transparent and objective process, thereby making it possible to appreciate the specific requirements of the different regions in view of achieve inclusive growth. This kind of process is completely compatible with a regional democratic and decentralized leadership.

The purpose of this paper is to recommend a new public resource allocation system for the development budget based on a new allocation process, on the one hand, and allocation formulas on the other. The new process and allocation rules include the role of the State in the implementation of a national development strategy as well as that of the various structural disadvantages/marginalization of the different regions.

This is why we have developed the development budget allocation formula which is based on five principles: Global coherence, effectiveness, equity, transparency and simplicity. These five principles are crucial to ensuring national cohesion and achieving the objectives of the revolution. In addition, the allocation process is designed around three budget “tranches”. One tranche called Global Coherence, a second called Republican and a third called Convergence.
Each tranche has its own rules and objectives. In particular, Convergence allocation between regions takes place according to a distribution formula with the objective of inclusive growth. It is mainly based on a new index of regional development made up of three components; Structural marginalization, economic vulnerability and the social vulnerability of the different regions.

The paper is structured as follows: Section II justifies the need to provide the Government with an allocation formula and Section III defines the principles of the development budget allocation formulas and processes. Section IV sets up a regional development/vulnerability index based on three sub-indexes. Section V breaks down the process and the allocation formula, in particular the one dedicated to regional convergence. Section VI concludes.

2. Rules or Discretion in Budget Allocation

Inclusive growth is a social requirement of Tunisia and is defined by the demand for rapid economic and social inclusive growth for regions and unemployed individuals. From this point of view, as a reduction of the disparity in development levels between the regions, regional convergence is a central concept of inclusive growth. The commitment of public authorities in inclusive growth and regional convergence is one of the objectives of the revolution today. Achieving this requires not only the mobilization of the necessary resources but also the redistribution of available resources towards this objective and a strong commitment to an allocation rule biased towards inclusive growth and regional convergence.

Developing budget allocation rules, between regions in particular, makes it possible for public authorities to show a strong sign of the government’s commitment to reducing regional disparity and to commit to budget allocations oriented towards regional development and convergence. This is even more so when discretionary and arbitrary distribution harms the management of regional development policy and creates an environment of distrust, fueled by difficult economic and social conditions in certain regions. In addition, Tunisia does not have an explicit budget allocation rule which makes it possible to measure the degree of engagement of public authorities even ex-post in the pursuit of regional convergence. From this perspective, the implementation of development budget allocation rules is a mandatory requirement to make it possible to reinforce the credibility of public authorities regarding action taken to achieve regional convergence and to put an end to all arbitrary and discretionary decision making. And finally, and this is very important, the rules must
be democratically chosen and explained, making it possible to end discretionary practices in regional and sectorial arbitration.

2.1 The Principles of Budget Allocation
The process and the development allocation budget formula must be governed by set principles. There are four: global coherence, economic and social effectiveness, equity, transparency and simplicity.

2.1.1 Global coherence
It means that public authorities must have the resources necessary at their disposal to put into place certain projects of national and cross-regional interest, and inclusion development. The government has a duty to reinforce the national development productive system and establish global coherence with different private and regional actions. It should also play a coordinating and initiating role by compensating for market failures and regions shortfalls which are at risk of not having a comprehensive and coherent global view. This is why the development budget allocation must put required resources at the disposition of the central State in order to carry out the role of coordination and global cohesion.

2.1.2 Effectiveness of the investment
The effectiveness is in terms of promoting economic and social inclusion by means of growth and regional convergence. In this regard, it is important to consider the characteristics of the different regions and their comparative advantages in order to ensure the effectiveness of the investment allocated to them. Likewise, the relative economic or social vulnerability as well as the degree of marginalization of a given region are also factors influencing the effectiveness of the investment. Accordingly, the economic or social vulnerability or infrastructure marginalization could be considered, in so far as the principle of effectiveness, as crucial criteria of allocation.

2.1.3 Equity
The purpose of the regional development budget is not simply to carry out a transfer from wealthy regions to poor regions in order to increase the overall well-being of the citizens. It is to contribute to a dynamic of growth and regional convergence. Equity consists of giving each individual equal opportunity so that inequalities only result from differences in effort or performance. If we make decisions at the regional level, equity means giving equal opportunities to escape poverty and unemployment by compensating regions for structural disadvantages which reduce the
effectiveness of their effort. These structural disadvantages are long lasting characteristics of regions and do not result from their regional commitment, but from historic and geographic factors. From this point of view, the lack of infrastructure and economic or social vulnerabilities, are candidates such as criteria for equity in the allocation of the envelope; both reduce the changes of regional convergence over a long period.

2.1.4 **Transparency**

Populations, civil society and regional elected officials should know the relative weight of allocation criteria for their regions, because these reflect a national consensus policy and not one of discretionary arbitration. Each region should be able to calculate the allocation due to it by applying the formula.

2.1.5 **Simplicity**

It means that the formula must be simple. It consists of using indicators that are easily accessible, available and nationally recognized and must integrate the various allocation criteria in a coherent manner.

It is on this foundation of five principles that we propose an allocation formula for the regional envelope. However, to start with, it is necessary to build an indicator which makes it possible to appreciate the development needs of the different regions in order to put an allocation process into place and which takes these requirements into account.

2.2 **Allocation Criteria**

2.2.1 **Level of Structural Marginalization**

The current situation of a disadvantaged region measures the gap which a region must fill in order to catch up to another region. It is synonymous with a need for regional development and is both a criteria for equity and effectiveness. In fact, it is fair to grant the same means to those who are currently significantly behind in relation to the others. This is true because allocation favors those who do not have the means today so they can have the same development opportunities. It is the clearest type of equity. In the same respect, this criteria obeys the principal of effectiveness because generally speaking, the return on investment decreases and the more investment there is in a disadvantaged area, the more beneficial it is in relation to the objective.
2.2.2 Economic Vulnerability

Economic vulnerability factors determine the needs of the various regions. It is the type of dominant economic activities in the region subject to the natural hazards or external shocks, either through foreign production or commerce and especially due to changes in the international prices of primary commodities such as olive oil, phosphates etc. This can be either due to adverse weather events, natural disasters or economic recessions. These events, which undoubtedly reduce the dynamic of the regions, increase the effectiveness of regional investment. In other words, regional public investment is marginally more successful in regions that are economically more vulnerable.

Including economic vulnerability in the formula is in line with the requirements of a principle of equity. As we highlighted in the introduction, equity in relation to assistance could be to compensate for structural disadvantages of different regions in order to level the development playing field. Economic vulnerability is part of this to the extent that it is dependent on geography, history and the international environment. It makes development or regional convergence more difficult.

2.2.3 Social Vulnerability

A low level of human capital combined with extreme social conditions necessarily lead to the creation of significant investment to speed the process of catching up for other regions and therefore convergence. Therefore it is from that point of view of equity that this characteristic should be included as criteria for distribution. By making it possible to increase human capital as it relates to both education and health, regional development can contribute in the long term to help these regions out of a "poverty trap" because the lack of qualified human and access to health care does not make it possible to attract businesses and create jobs. This is why dividing up resources to allow regions to overcome structural, social and educational disadvantages of health care and poverty is a crucial criteria of equity.

Choosing rules to overcome arbitrary decisions requires that the objective of tangible and quantifiable criteria be established. This begins with the search for a measurement indicator for the differences between regions in order to change it into an allocation formula.
3. Building a Regional Vulnerability Index

In order to close the gap of certain regions in relation to others and to ensure regional convergence, it is necessary to build a regional development index, or in other words, a vulnerability index. In fact, we propose taking into account structural disadvantages which certain regions face to help them out of poverty and marginalization and to achieve national convergence. These disadvantages are evaluated on the basis of three criteria which are structural, economic and social. The introduction of these criteria in the allocation formula reduce the distribution instability because the structural disadvantages are by definition relatively stable and require a certain amount of time to be absorbed. They also make it possible to manage the problem of least developed and/or more populated regions within an integrated framework.

3.1 Measuring structural marginalization

The proposed structural index is a weighted mathematical mean using Principal component analysis of a series of indicators for social infrastructures, equipment and geography. It is made up of a social marginalization indicator (Unemployment Rate, Higher Education Unemployment Rate and Percentage of households with a computer), and indicator of infrastructure marginalization (Percentage of households connected to the sewer system, Coverage rate for drinking water, Number of hospital beds per 1000 inhabitants, Industrial Zone equipped for 1000 inhabitants) and a geographic indicator (Number of private businesses with 6 & +/hab).

Figure (1) shows the degree of structural marginalization of regions measured between 0 and 1. Regions are classified descending from the most to the least marginalized. The regions of Sidi Bouzid, Kasserine, Gafsa and Tataouine appeared to be the most structurally marginalized whereas the capital, Tunis and the large cities are far from being the least infrastructurally marginalized. There are three distinct groups: The first group of regions with only small scale infrastructures can be grouped in the following order starting with Sidi Bouzid, Kasserine, Gafsa, Tataouine, Jendouba, Kebili, Kairouan, Medenine, Siliana, Kef, Mahdia, Beja, Gabes and Tozeur. The second cross-section groups together Bizerte, La Manouba and Nabeul. In this group, La Manouba can play the role of the mean which divides all the regions in two. The third group has the advantage of having the least marginalization includes the following in order Zaghouan, Sfax, Sousse, Monastir, L’Ariana, Ben Arous and by far the least being Tunis.
The proposed regional economic vulnerability index is a weighted mathematical mean of two indicators: Survival rate for 2005 generation businesses in 2010 and a Hirschman index of business market concentration by governorate. Concentration by sector is considered a disadvantage because the lack of diversification makes the region dependent on the prosperity of certain activities on one hand, and makes it more vulnerable to shocks experienced by the various sectors in question on the other. The survival rate for businesses is both an indicator of employment vulnerability and the weak economic performance of retention for businesses in the region. By introducing the economic vulnerability index into the distribution formula, we can capture problems which behind the aggravation of the situation in various regions, pushing them into poverty and unemployment.
Figure 2: Regional Economic Vulnerability Index

Figure (2) classifies the regions in a descending order. The governorate of Gafsa and Kebili are by far the two most economically vulnerable regions, whereas Tunis and Ariana are by far the least vulnerable. A group of regions composed of Tozeur, Kairouan and Beja are the mean regions dividing all the regions in half. The large cities and coastal regions are classified as the most favored in relation to the other regions in the country.

3.3 Measuring Social Vulnerability

Measuring social vulnerability is a weighted mathematical mean of a series of indicators concerning health, education and income. The infant mortality rate is an indicator related to health which makes it possible to measure the vulnerability of populations concerning health beginning in early childhood. It is preferred to the life expectancy indicator which does not allow us to measure the unequal opportunities and public effort regarding health. An education sub-index calculated as a linear combination of adult literacy rates, the high school completion rate for those reaching the “Bac” (final exam) and the dropout rate in secondary school is added. These two indicators measure the vulnerability of human capital in regions to which the national poverty rate is added in as an income indicator.
In fact, measuring the standard of living must be integrated into the distribution formula. The region having the highest poverty rate is therefore a candidate for receiving a greater allocation to allow convergence and social inclusion there. Introducing an income variable for the level of income per capita should be useful but the national statistics do not allow us to get this indicator. This concern led us to include poverty indicators as a proxy for the income level in the social vulnerability indicator.

**Figure 3: Regional Social Vulnerability Index**

Figure (3) ranks the regions in descending order depending on social vulnerability. Two regions, Kasserine and Sidi Bouzid are the most vulnerable whereas 4 regions are clearly the least vulnerable, including Tunis, Sfax, Sousse and Monastir where the index levels are very low. The index mean is 0.4 and Bizerte appears to be the median governorate. The vulnerability of Kasserine, the most socially vulnerable governorate, is approximately 9 times the level of Monastir, the least socially vulnerable governorate.
Box 1. Structure of the Regional Development Index

I. Structural Vulnerability index

A. Social index
   1. Unemployment rate
   2. Skilled unemployment rate
   3. % of households having computers

B. Infrastructure index
   1. Rate of connecting households to the sewerage network
   2. Rate of access to drinking water
   3. Number of hospital beds per 1000 hab
   4. Industrial areas per / 1000 inhabitants

C. Geographic vulnerability
   1. Private Firms more than 6 employees per inhabitants

II. Social Vulnerability

A. Education index
   1. Alphabetization rate
   2. Success rate in secondary school
   3. High school dropout rate

B. Health
   1. Infantile mortality rate

C. Revenue
   1. Poverty rate

III. Economic Vulnerability

1. Sectoral Concentration rate
2. Firms survival rate
4. The Regional Index of Human Development

The regional index of human development is as follows:

\[ I_i = (\alpha Ist_i + \beta Iec_i + \delta Iso_i) \]

With,

- \( I_i \) as the indicator of human development in Region \( i \);
- \( Ist_i \) represents the degree of structural marginalization of Region \( i \);
- \( Iec_i \) is the economic vulnerability of Region \( i \);
- \( Iso_i \) is the index of social vulnerability in Region \( i \) and \( \alpha, \beta, \delta \) are the weighting parameters for each indicator in the distribution formula, obtained using the method of Principal component analysis.

**Figure 4: The Regional Development Index**

The Regional development index or regional vulnerability ranks the regions from the most vulnerable to the least vulnerable. Figure 4 shows that including the three elements (structural, economic and social), ranking them creates a certain combination depending on the region in question. A group of governorate including Kasserine, Gafsa, Sidi Bouzid, Kebili, Tataouine and Kairouan are the most in need and having high scores for the three elements - structural, economic and social. The governorate of Tunis which is the most developed is also characterized by low...
scores on the three sub-indexes. For the other regions, the development index obtained is related to a balance between the three other sub-indexes. Therefore, Gafsa is dominated by economic and structural vulnerability whereas Kasserine is dominated by social vulnerability.

The relevance of the index is that it reproduces the development map of the country by taking into account all of the criteria. Likewise, the fact that one region performs in a field does not put it at a disadvantage if it under performs in another field. Therefore, the regions that record the best (poor) performances in the three areas will automatically find themselves at the bottom (top) of the development index.

![Figure 5: Indexes Statistical Distribution](image)

**Table 1: Statistical Characteristics of Indexes**

<table>
<thead>
<tr>
<th></th>
<th>mean</th>
<th>p50</th>
<th>max</th>
<th>min</th>
<th>sd</th>
<th>skewness</th>
<th>kurtosis</th>
<th>count</th>
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</thead>
<tbody>
<tr>
<td>Economic Vulnerability Index</td>
<td>0.5</td>
<td>0.6</td>
<td>0.9</td>
<td>0.0</td>
<td>0.2</td>
<td>-0.6</td>
<td>2.4</td>
<td>24.0</td>
</tr>
<tr>
<td>Social Vulnerability Index</td>
<td>0.4</td>
<td>0.4</td>
<td>0.9</td>
<td>0.1</td>
<td>0.3</td>
<td>0.2</td>
<td>2.1</td>
<td>24.0</td>
</tr>
<tr>
<td>Structural Vulnerability Index</td>
<td>0.6</td>
<td>0.6</td>
<td>0.8</td>
<td>0.2</td>
<td>0.2</td>
<td>-0.5</td>
<td>2.3</td>
<td>24.0</td>
</tr>
<tr>
<td>Regional Development Index</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.1</td>
<td>0.2</td>
<td>-0.4</td>
<td>2.0</td>
<td>24.0</td>
</tr>
</tbody>
</table>

The statistical distribution study in Table (1) and Figure (5) of the four indexes shows that their distribution is relatively strong because the Kurtosis$^1$ coefficient is positive in all four cases. Nevertheless, the economic and structural distributions in the index are asymmetrical to the left
because the Skewness\textsuperscript{2} coefficients are negative whereas that of the social index is slightly asymmetrical towards the right. This means that the dividing line between the 50% of the most and least structurally and economically vulnerable regions is at a higher level and that the development requirements in terms of economic infrastructure are significant. However, social vulnerability appears to be divided between the regions and the dividing line between the two halves is 50% of these regions are to the left, which means that vulnerability is more or less shared by the regions. The social vulnerability variance around the mean is the highest in relation to other indicators.

These characteristics are in the global index which has asymmetric distribution to the left and which indicates that 50% of the regions are at high levels of vulnerability which requires a development budget allocation biased towards these regions and which takes vulnerabilities into account.

\begin{itemize}
  \item The Kurtosis statistic measures the degree of flattening/non-linearity of a distribution. The definition is used in such a way that Kurtosis of normal standard distribution is zero. What is more, a positive Kurtosis indicates a strong distribution and a negative Kurtosis indicates a flat distribution.

  \item The Skewness statistic measures the degree of symmetry of a distribution. The Skewness of the distribution of the normal standard distribution is zero. In addition, a positive Skewness indicates an asymmetric distribution to the right and a negative Skewness indicates an asymmetric distribution to the left.
\end{itemize}
5. **Allocation Formula for Regional Development Budget**

The development budget allocation formula is based on the five principles described above, including global coherence, equity, effectiveness, transparency and simplicity. It essentially uses the regional vulnerability index as an allocation indicator. The direct use of this index is not equitable when the size of the population is not taken into account. In fact, two regions with the same regional vulnerability level must not receive the same allocation if they differ in terms of population size. The most populated region must get more resources allocated to it than the least populated region for equal vulnerability levels. This is how the equity principle is applied. In order to do this, we need to correct the regional vulnerability index by the size of the population.

5.1 **Including Population Size**

To begin with, despite the fact that the marginalization and vulnerability indicators include the size of the different regions, using it is not enough to prevent a convergence allocation independent from the number of vulnerable individuals. Similarly, it is important to prevent it from concentrating on the most populated regions.

In fact, the regional vulnerability index is adjusted by the population as follows:

\[
I_{c_i} = (\alpha I_{st_i} + \beta I_{ec_i} + \delta I_{so_i}) P_i^\sigma
\]

With,

- \(I_{c_i}\) as the adjusted indicator of human development in Region \(i\),
- \(P_i\) is the population of Region \(i\) based on the latest estimate of the NIS (National Institute of Statistics)

Parameter \(\sigma\) which varies from 0 to 1 makes it possible to control the population dispersion effect between regions. The closer to \(\sigma\) is to 1, the greater the convergence is biased towards vulnerable regions and those that are the most populated. The public authorities must make a choice on this subject. We propose that the population of each region be included while reducing the weight given to the population. This is the solution adopted by the Asian Development Bank (ADB) given the wide dispersion of population figures of the countries eligible for these funds. The exponent selected by the Asian Development Bank is 0.6 because the dispersion in population size is significant in Asia whereas the World Bank uses an exponent equal to one.
5.2 The Allocation Formula for Convergence

The convergence allocation formula is as follows,

\[ C_i = \frac{Ic_i}{\sum Ic_i} \]

The convergence allocation of regional budget amount \( A \) will be:

\[ A_i = \frac{Ic_i}{\sum Ic_i} * A = C_i * A \]

With \( A_i \) as the allocation indicator based on the adjusted regional allocation index for Region \( i \).

The resources allocated to each region are equal to the allocation indicator according to the requirements of each region being considered and multiplied by the ratio of available resources related to the total for the indicators of all the regions. Applying the distribution formula makes it possible to calculate the share of resources due to each region based only on regional development index. Figure (8) shows the results from applying the convergence formula for each of the different governorates in Tunisia by varying the coefficient of the population from 0, 0.5 to 1. Table (2) shows the statistics of the various distributions according to the sigma value. Figure (7) shows the empirical distribution of the various results.

<table>
<thead>
<tr>
<th>sigma</th>
<th>mean</th>
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<th>skewness</th>
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<td>4.6</td>
<td>7.0</td>
<td>0.9</td>
<td>1.7</td>
<td>-0.3</td>
<td>2.1</td>
<td>24</td>
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<td>4.2</td>
<td>4.6</td>
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<td>1.0</td>
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<td>2.2</td>
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<td>3/10</td>
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<td>7.2</td>
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<td>2.3</td>
<td>24</td>
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<td>4/10</td>
<td>4.2</td>
<td>4.4</td>
<td>7.4</td>
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<td>0.5</td>
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</table>

It is important to note that no matter what the population size is, convergence allocation always favors the governorates with the highest regional vulnerability indexes. By doing this, a group of 10 of the most disadvantaged governorate always show up at the top of the list with a change in the order due to the inclusion of the population. The graph with sigma= 0 is the extreme case where
the size of the governorate is not taken into account. In this case, the order and the percentages correspond exactly to those obtained from the unadjusted index. As the weight of the population is increased, vulnerable governorates that are more populated will get a bonus in comparison to vulnerable governorates that are less populated. In reality, including the population does not change the distribution mean, but instead, increases the percentages to the distribution extremum. Therefore, the governorate rank within the distribution changes in favor of those that are the most vulnerable and most populated. There is also a tendency by governorates to change the order at the bottom of the ranking. Distribution levels off and moves towards the extremes, but in a non-linear manner. This is why Kairouan, a vulnerable governorate, receives the greatest conversion allocation starting at sigma=0.6. Similarly at the bottom of the Table, Tunisia being the least vulnerable and the most populated becomes the second to last starting at sigma=0.6.

From a statistical point of view, it is difficult to opt for one choice to the detriment of another. On the other hand, it is clear that not including the population skews the distribution to the left because the skewness coefficient is negative and the median is significantly higher than the mean. This case is also to be excluded because it leads to a very asymmetrical allocation driven mainly by the weight of vulnerability and neglecting the weight of the vulnerable population. The other extreme case of sigma=1 is also to be excluded for opposite reasons because including all the population skews distribution to the right because the skewness coefficient is positive and the median is significantly lower than the mean. This case is point is also to be excluded because it leads to an asymmetric allocation mainly due to the weight of the population and neglects the weight of vulnerabilities, whereas the weight of the population is already taken into account in the Republican allocation. Therefore, the farther from 0.5 that you are, the more asymmetrical it becomes in both directions and the median moves further away from the mean. The case of sigma equal to 0.5 and 0.6 shows that that we are close in the both cases to an acceptable distribution which takes both components into account.
It is therefore judicious to find the appropriate balance where distribution is more or less asymmetrical given both the requirement index and the number of people included in the requirement of each region. It is clear that the statistical study of distributions opts for the choice of $\sigma=0.54$ because this is the distribution where the mean coincides with the median. As the median is the value which divides the regions into two equal groups, it is prudent to base the choice of $\sigma$ on when the mean coincides with the median.
Figure 7: The % of Convergence Allocation According to Population Weight
6. The Development Budget Allocation Process

In order to prevent the available funds from concentrating excessively in only some regions or that big governorates be penalized, and with careful attention to the respect of the five principles of global coherence, effectiveness, equity, transparency and simplicity, resource allocation is designed as a three step process separating three main tranches.

6.1 Allocation in Terms of Global Coherence

In order to establish a centralized tranche, percentage Y% of the overall Budget is deducted at the start and put into a centralized pool dedicated to infrastructure projects of national and cross-regional interest to improve access, interconnections or common interests such as airports, hospitals, stadiums, ports, industrial areas, electric power plants, etc. This shared common tranche makes it possible to have a coherent development policy of the country’s economic structure.

Using this tranche differs depending on the “sectoral” priorities determined by the public authorities and is in some respects, the discretionary part of the Budget allocation. There is no explicit rule in regional percentage for its distribution. The main criteria are economic and social effectiveness in efforts to achieve global coherence of the country’s economic system. The allocation choices will be the result of negotiations at the Ministry of Economic Development and International Cooperation (MDCI/CND) and Ministers of the various sectors.

It goes without saying that the bigger this tranche is, the more the discretionary part of the budget is increased which is why this tranche must be limited to a reasonable percentage based on the historic and future levels of the country’s large public works projects. Likewise, the exclusive use of this tranche in projects of national and cross-regional interest reduces the concern about it being arbitrary and discretionary. It is even possible to design a system where the regions submit large projects of national or cross-regional projects and for which the financing exceeds their allocations.

6.2 Republican Allocation

This development Budget tranche is divided up according to a Republican citizenship formula based on the right of all citizens to economic growth. This is why the distribution formula regarding this tranche must lead the government to spend the same amount for the welfare of each citizen. This is therefore one allocation per person according to which the overall amount of the Republican portion (X% of the budget) is divided by the total population by basing it on the Republican principle of the right of each citizen to economic growth, this rule is fair/equitable because each Tunisian is
treated in the same way. On the contrary, this region gets allocated an amount proportional to its population. This is a principle of equity and even of justice.

**Figure 8: Republican Allocation in %**

![Bar chart showing Republican Allocation in % for various governorates.](image)

Source: Author calculation

Application of this rule using 2010 population estimates (see figure 6) show that the most populated governorates - Tunis, Sfax, and Nabeul will get the highest republican allocations. In the same respect, less populated governorates such as Tozeur and Tataouine will get smaller republican allocations. Note that the governorate of Kairouan is in the well-populated tranche of the population and receives a corresponding Republican allocation. It is interesting to note that the most vulnerable governorates are intermediately populated and receive significant allocations of approximately 4% which leads us to think they benefit overall from the budget distribution when we add the convergence allocation based on the vulnerability index.

The Republican allocation get by each governorate will depend on the amount of the Republican allocation tranche that public authorities must choose by setting the % X of the overall Budget from the start, to devote it to this tranche. In the absence of regional inequality, the public authorities could maximize this tranche in order that this rule be enough to allocate the development budget.
However, the existence of inequalities and the concern for convergence leads to the development of a third tranche handling questions regarding structural disadvantages in the different regions.

### 6.3 Convergence Allocation

An amount $Z\%$ from the global budget is allocated according to an allocation formula which includes structural disadvantages of different regions weighted by population size. Its purpose is to allow the rebalancing/convergence/inclusion of the different regions. The convergence allocation formula is used based on the established formula shown above.

### 6.4 An Example of Global Allocation

The allocation of a region is the sum of its Republican allocation and its Convergence allocation. The first depends on amount $X\%$ of the budget allocated to the Republican allocation and the size of its population whereas the second depends on the amount $Z\%$ allocated to the Convergence allocation and its regional index.

This allocation can be seen in two ways: We dedicate the same Republican allocation to each individual no matter where the individual resides and the republic allocation of the region is the sum of individual allocations of the inhabitants of the region or the region itself is allocated a part of the Republican allocation in proportion to its population. In both cases the result is the same. The more populated the region, the more it gets a significant part of the Republican allocation. However, the convergence allocation of each region depends on the population and the vulnerability/development index. The higher the vulnerability index is, the more it gets a significant part of the Convergence allocation. The final result for one region depends on both these mechanisms simultaneously.

This raises two questions: They are relative to the part of each allocation in the total budget and the management to carry out for the sigma parameter concerning the weight of the population in the convergence allocation. Regarding the second question, we have set the tranche percentages as follows: 20% for the Republican, 30% for coherence and 50% for convergence, then we have varied the weight of the population from 0 to 1 by intervals. The annex contains the various total allocations according to weight given to the population in the convergence allocation. It is clear that if we do not include the population in the convergence allocation, Tozeur would have about the same total allocation as Tunis, whereas if we include the entire population, the large cities benefit to the detriment of the regional convergence objective.
As shown before, we have opted for a sigma value of $\sigma=0.54$. Figure (9) shows the total allocation generated when $\sigma=0.54$ with tranches distributed as follows: Coherence=20%, Republican=35%, Convergence=35% such that amount to be distributed according to the convergence formula is the same as that to be distributed according to the Republican formula.

It is clear that this type of allocation will give priority to populated regions first and vulnerable regions second. Therefore, the top five regions are predominantly populated and vulnerable such as Kairouan, Sfax, Kasserine, Nabeul, Tunis and Sidi-Bouzid. The fact that in this group, the most vulnerable clearly demonstrate that the convergence mechanism plays its role effectively in this allocation formula. It is clear that Tunis and Sfax appear at the top because they are going to benefit from the Republican allocation and compensate those that lose the convergence allocation.
It should be pointed out that when the convergence tranche is greater in relation to the Republican tranche, for a constant coherence tranche, the bonus will be given to the most vulnerable regions. The result will be a change in the total allocation in favor of vulnerable regions and vice-versa. In fact the Coherence= 30%, Republican=20%, Convergence=50% allocation of Figure (10) sets Sfax and especially Tunis back in the order and brings up those that are most vulnerable like Medenine, Gafsa, Jendouba.

Figure (12) upsets the balance in favor of the Republican allocation at the expense of the Convergence allocation which strengthens large cities but still favors the vulnerable regions despite the distortion.
The choice of weights relative to each tranche is at the discretion of the public authorities and depends on government priorities and political balances. We have selected several examples which are shown in the annex. The lessons to be taken away from this are as follows:

1. The scenario of Convergence only or Republican only are extremes that should be avoided.
2. A scenario that is biased towards Republican does not allow the inclusive growth and disadvantages regional convergence.
3. The public authorities must skew the allocation toward Convergence at the expense of Republican.
4. A greater % for convergence in relation to republican is in conformity with the objectives of the revolution and does not disadvantage populated regions, and
5. The public authorities can modify the % from one year to another based on the objectives.
7. Conclusion:

This paper intends to establish a development Budget allocation formula between regions which meet the objective of inclusive growth in its economic and social aspects and therefore the pillars are regional convergence, poverty and unemployment reduction. In this respect, the process obtained and the formulas established have taken this objective into account and are built on five principles: Coherence, effectiveness, equity, transparency and simplicity.

In view of the objective and the principles put forward, application of the propositions on fictional cases showed the pertinence of this formula in view of the objective and the principles put forward. Public authorities are called upon to respond to the following questions in order to put this allocation formula into practice: What is the X% of the Republican allocation tranche? What is the Y% of the Coherence allocation tranche? What is the Z% of the Convergence allocation tranche?

The choice is political but guided by the elements developed upon in this document.
Bibliography:


National Statistics Institute (different Statistical references)
## Annex I

### Table 3: List of Variables

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<tr>
<th>Variable</th>
<th>Significance</th>
</tr>
</thead>
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<tr>
<td>1. Number of hospital beds per 1000 inhabitants</td>
<td>Lack of health infrastructure</td>
</tr>
<tr>
<td>2. Alphabetisation rate</td>
<td>Measuring the potential of the stock of human capital in the region</td>
</tr>
<tr>
<td>3. Unemployment rate</td>
<td>Measure the social structural employment handicap</td>
</tr>
<tr>
<td>4. higher unemployment rate</td>
<td>Measure the marginalization of human capital of young generations</td>
</tr>
<tr>
<td>5. Rate of connecting households to the communal sanitation network</td>
<td>Measure the lack of sanitation infrastructure</td>
</tr>
<tr>
<td>6. Rate of access to drinking water</td>
<td>The lack of urban infrastructure</td>
</tr>
<tr>
<td>7. Industrial area arranged for 1000 inhabitants</td>
<td>Measure the existence of infrastructure of corporate hospitality</td>
</tr>
<tr>
<td>8. Percentage of households that have a computer</td>
<td>Measuring the lack of equipment and household access to the NTI</td>
</tr>
<tr>
<td>9. Rate of admitted to the bac in 2010</td>
<td>Measuring the quality of education in the region and reflects the quality of the educational infrastructure and the standard of living of the parents</td>
</tr>
<tr>
<td>10. 2010 High school dropout rate</td>
<td>Measuring the quality of education and the weight of social and economic pressure on young people</td>
</tr>
<tr>
<td>11. Infant mortality rate 2009</td>
<td>Measuring the vulnerability of population health. It reflects the lack of basic service of access to care for children and mothers</td>
</tr>
<tr>
<td>12. Private companies from 6 &amp; + / hab</td>
<td>Measures the degree of attractiveness and employability in the region</td>
</tr>
<tr>
<td>13. Extended poverty rate</td>
<td>Measuring the economic and social condition of the region</td>
</tr>
<tr>
<td>14. Survival rates of the businesses. generation 2005 in 2010</td>
<td>Measure the job instability in the region and the attractiveness and the economic viability of the region</td>
</tr>
<tr>
<td>15. concentration index calculated from the number of enterprises by sector</td>
<td>Measuring the lack of sectoral opportunities employment</td>
</tr>
<tr>
<td>16. Population by region</td>
<td>Measures the size of the population</td>
</tr>
</tbody>
</table>
Figure 12: Different Harmonized Variables

- Concentration index
- Firms survival rate
- Alphabetisation
- Success rate in secondary school
- Secondary school uncompletion rate
- Poverty rate
- Infantile mortality
- Unemployment rate
- Skilled unemployment rate
- % of households having computers
- Sanitation facilities imposed
- Water facilities access
- Number of bed per hospital
- Industrial areas per inhabitant
- Number of enterprises
Figure 13: The different sub-indexes by region

- Education sub-index
- Infrastructure sub-index
- Social sub-index
- Economic Vulnerability Index
- Social Vulnerability Index
- Structural Vulnerability Index
- Regional Development Index
Table 4: Statistical properties of weighted variables and coefficients in the indexes

| Index of Economic Vulnerability | 24 | 0.49 | 0.24 | 0.02 | 0.87 | 0.41 |
| Economic Concentration Index | 24 | 0.49 | 0.28 | 0 | 1 | 0.48 |
| Rate of Survival Enterprises | 24 | 0.49 | 0.26 | 0 | 1 | 0.52 |
| Social Vulnerability Index | 24 | 0.41 | 0.25 | 0.07 | 0.89 | 0.28 |
| Education | 24 | 0.46 | 0.26 | 0.09 | 0.88 | 0.35 |
| Adult Alphabetization rate | 24 | 0.46 | 0.34 | 0 | 1 | 0.29 |
| Success rate in Secondary school | 24 | 0.44 | 0.29 | 0 | 1 | 0.36 |
| Rate of incompletion in secondary | 24 | 0.47 | 0.30 | 0 | 1 | 0.35 |
| Poverty rate | 24 | 0.38 | 0.28 | 0 | 1 | 0.34 |
| Infantile mortality | 24 | 0.38 | 0.27 | 0 | 1 | 0.3 |
| Structural Marginalization Index | 24 | 0.57 | 0.18 | 0.17 | 0.84 | 0.31 |
| Social Sub index | 24 | 0.48 | 0.21 | 0.12 | 0.90 | 0.32 |
| Unemployment rate | 24 | 0.39 | 0.22 | 0 | 1 | 0.4 |
| Skilled unemployment rate | 24 | 0.47 | 0.28 | 0 | 1 | 0.37 |
| % of households having computers | 24 | 0.62 | 0.29 | 0 | 1 | 0.23 |
| Infrastructure sub-index | 24 | 0.53 | 0.15 | 0.24 | 0.84 | 0.41 |
| Sanitation facilities access | 24 | 0.24 | 0.24 | 0 | 1 | 0.27 |
| Water facilities access | 24 | 0.36 | 0.33 | 0 | 1 | 0.19 |
| Nber of bed/1000 inhabitants | 24 | 0.59 | 0.21 | 0 | 1 | 0.22 |
| Industrial area arranged for 1000 inhabitants | 24 | 0.83 | 0.22 | 0 | 1 | 0.32 |
| Nber private firms/inhabitants | 24 | 0.76 | 0.26 | 0 | 1 | 0.27 |
| Global Regional Development Index | 24 | 0.50 | 0.20 | 0.10 | 0.81 |
Annex II

Figure 14: Coherence= 30%, Republican=45%, Convergence=25% (Budget=2000)

Figure 15: Coherence= 30%, Republican=40%, Convergence=30% (Budget=2000)
Figure 16: Coherence= 30%, Republican=30%, Convergence=40% (Budget=2000)

Figure 17: Coherence= 30%, Republican=25%, Convergence=45% (Budget=2000)
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