

# Spatial Justice in South Asia: A ZIPF'S Curve Approach

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Most conflicts are territorial, nurtured by the rents from natural resources and strategic locations. Struggles over land, water and energy, clashes for control of routes, ports and airports; all these are often implicit in the more broadcast confrontations attributed exclusively to inequalities, culture, religion or ideologies. On the other hand, many of these territorial conflicts are internal to each country and, beyond issues related to the spatial allocation of rents from natural resources and control of strategic locations, there are spatial bargains on taxes and public expenditures that can lead to more enduring distrust. The paper assumes the the spatial profile of land, water and energy influences the spatial pattern of population distribution observed in regularities of the Zipf's Curve that relates the Size and Rank of the Cities of Each Country. It aims to demonstrate how regional governance, mirrored in the spatial allocation of governmental taxes and expenditures, plays a crucial role in urban concentration and spatial justice. The paper presents Zipf's Curve estimates for South Asian countries and maps for various countries, the differences between the estimated curve and the population of various cities. The result analysis indicates that the spatial distribution of rents obtained from natural resources and public transferences play a significant role in the spatial distribution of wealth. Summing up, there are reasons to believe that governance influences spatial justice, specifically through the spatial allocation of property rights over natural resources as well as through the spatial distribution of public spending. Moreover regional conflicts are remarkably associated with places and cities that, according to Zipf's Analytical Scheme, are below the level of what would be expected.

*Keywords:* Regional Science, Regional Development, Spatial Justice, Zipf's Curve, South Asia.

## Introduction

Development, assessed by the expansion of freedom,<sup>1</sup> cannot be detached from the development of places and networks in which people are embedded.<sup>2</sup>

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<sup>1</sup> A. Sen, *Development as Freedom*, Oxford: Oxford University Press, 1999.

<sup>2</sup> M. Castells, *Networks of Outrage and Hope. Social Movements in the Internet Age*, Cambridge, MA: Polity Press, 2012.

Within the analytical framework of spatial justice, we use the concept of space as a central category for understanding different levels of development.<sup>3</sup>

The two criteria to evaluate spatial justice are proposed by Nuno Martins<sup>4</sup> and implicit in<sup>5</sup> vectors of accessibility<sup>6</sup> and capability within a given scale. The combination of the two criteria generates four interaction possibilities: low accessibility and low capability (poor regions); low accessibility and high capability (emergent regions); high accessibility and low capability (dependent regions); and high accessibility and high capability (developed regions).<sup>7</sup>

There are not only exclusively poor or exclusively developed regions. Due to unilateral permanent transferences, it is possible to discern both emergent regions, which may send taxes and rents of external stakeholders outside the region, and dependent areas, which continuously receive from the outside unilateral transferences from rents obtained from natural resources, governmental expenditures and migrant remittances. These unilateral and enduring transferences create persistent multiplier effects accumulating in an uneven concentration of production, expenditure, employment and population.

Regional development results from the social, cultural, human, productive and natural capital of the region and from its relative accessibility to markets. Nevertheless, the location of the ownership of these various types of capital does play a role in regional development, urban concentration and spatial justice. The aim of this paper is to understand how governance influences the spatial profile of regional development and spatial justice, based of an analysis of population distribution in South Asian countries.

Point 2 presents a conceptual model of regional economies covering four regions; our simulation demonstrates that urban concentration and spatial justice are the outcome not only of the availability of different forms of capital and of relative accessibility, but also of public and private interregional transferences. In Point 3, urban population data is used to estimate the Zipf's Curves<sup>8</sup> for each South Asian country and for the region as a whole. The relative dimension of each city and its position on the estimated curves help to identify developed, dependent, emerging and poor cities and, through

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<sup>3</sup> J. Williams, 'Toward a Theory of Spatial Justice', paper presented at the Annual Meeting of the Western Political Science Association, Los Angeles, CA, 2013.

<sup>4</sup> N.O. Martins, 'Spatial dimensions of Antonio Gramsci's contribution', *Regional Science Policy & Practice*, 2017, Vol. 9 (2), pp. 83–99.

<sup>5</sup> P. Krugman, 'Confronting the mystery of urban hierarchy', *Journal of the Japanese and the International Economies*, 1996, Vol. 10, pp. 399–418.

<sup>6</sup> J. Rawls, *Justice as Fairness: A Restatement*, Cambridge, Mass.: Belknap Press of Harvard University Press, 2001.

<sup>7</sup> T.P. Dentinho, 'New Challenges for Sustainable Growth', in R. Capello, T.P. Dentinho (eds), *Networks, Space and Competitiveness: Evolving Challenges for Sustainable Growth*, Cheltenham: Edward Elgar Publishing, 2012, pp. 276–290; T.P. Dentinho, 'Urban Concentration and Spatial Allocation of Rents from Natural Resources: Zipf's Curve Approach', *REGION*, 2017, Vol. 4, pp. 77–86.

<sup>8</sup> G.K. Zipf, *Human Behavior and the Principle of Least Effort*, Cambridge, Mass.: Addison-Wesley, 1949.

geographical interpolation between the city locations, general maps of the countries with their developed, dependent, emerging and poor regions. Point 4 confronts these results with existing literature on the development of various regions. Point 5 proposes some conclusions and recommendations for policy makers.

### Regional Development and Spatial Justice

The world's fastest growing cities are located in Africa and Asia (United Nations, 2014). Nevertheless, urban concentration in the developing world is not necessarily a good thing. On the one hand, it brings congestion, environmental disturbances and social problems; on the other, such concentration can be the result of a biased allocation of rents obtained from natural resources and public spending (Dentinho, 2017), both of which are usually associated with income spatial redistribution and raise concerns of spatial justice.

The hierarchy of cities seminally proposed by Gibrat<sup>9</sup> is quite resilient (Black and Henderson,<sup>10</sup> Loannides and Overman,<sup>11</sup> Nitsch,<sup>12</sup> Newman,<sup>13</sup> Anderson and Ying,<sup>14</sup> Bosker et al.,<sup>15</sup> Jiang et al.,<sup>16</sup> Giesen et al.,<sup>17</sup> Gómez-Déniz et al.,<sup>18</sup> Shujuan,<sup>19</sup> Morudu,<sup>20</sup> Luckstead and Devadoss<sup>21</sup>). Nevertheless, the particular shape of the Zipf

<sup>9</sup> R. Gibrat, *Les inégalités économiques*, Paris: Librairie du Recueil Sirey, 1931.

<sup>10</sup> D. Black, V. Henderson, 'Urban Evolution in the USA', *Journal of Economic Geography*, 2003, Vol. 4, pp. 343–372.

<sup>11</sup> Y.M. Loannides, H.G. Overman, 'Zipf's law for cities: an empirical examination', *Regional Science and Urban Economics*, 2003, Vol. 33, pp. 127–137.

<sup>12</sup> V. Nitsch, 'Zipf zipped', *Journal of Urban Economics*, 2005, Vol. 57, pp. 86–100.

<sup>13</sup> M.E.J. Newman, 'Power laws, Pareto distributions and Zipf's law', *Contemporary Physics*, 2005, Vol. 46, No. 5, pp. 323–351.

<sup>14</sup> G.T. Anderson, G. Ying, 'The size distribution of Chinese cities', *Regional Science and Urban Economics*, 2005, Vol. 35, pp. 756–776.

<sup>15</sup> M. Bosker, S. Brakman, H. Garretsen, M. Schramm, 'A century of shocks: The evolution of the German city size distribution 1925–1999', *Regional Science and Urban Economics*, 2008, Vol. 38, pp. 330–347.

<sup>16</sup> B. Jiang, J. Yin, Q. Liu, 'Zipf's law for all the natural cities around the world', *International Journal of Geographical Information Science*, 2015, Vol. 29, No. 3, pp. 498–522.

<sup>17</sup> K. Giesen, A. Zimmermann, J. Suedekum, 'The size distribution across all cities – Double Pareto lognormal strikes', *Journal of Urban Economics*, 2010, Vol. 68, pp. 129–137.

<sup>18</sup> E. Gómez-Déniz, M.A. Sordo, E. Calderín-Ojeda, 'The Log-Lindley distribution as an alternative to the beta regression model with applications in insurance', *Insurance: Mathematics and Economics*, 2014, Vol. 54, No. C, pp. 49–57; E. Gómez-Déniz, E. Calderín-Ojeda, 'On the use of the Pareto ArcTan distribution for describing city size in Australia and New Zealand', *Physica A: Statistical Mechanics and its Applications*, 2015, Vol. 436, pp. 821–832.

<sup>19</sup> L. Shujuan, 'Rank-size distributions of Chinese cities: macro and micro patterns', *Chinese Geographical Science*, 2016, Vol. 26, No. 5, pp. 577–588.

<sup>20</sup> H. D. Morudu, 'Developing annual population and gross domestic product estimates for local municipality development models in South Africa: applications of Zipf's rule from 2001 to 2013', *South African Geographical Journal*, 2016, Vol. 98, No. 2, pp. 367–385.

<sup>21</sup> J. Luckstead, S. Devadoss, 'Pareto tails and lognormal body of US cities size distribution', *Physica A*, 2017, Vol. 465, pp. 573–578.

functions can be influenced by various factors, many of which are manageable at governmental level. Ades and Glaeser<sup>22</sup> found that political factors do influence urban concentration. Krugman<sup>23</sup> suggests that cities rooted in natural capital also present a strong hierarchy. Duranton<sup>24</sup> associates city hierarchies with a set of indicators related to innovation. Bertinelli and Strobl<sup>25</sup> show that there might be an optimal level of urban concentration which can be influenced by policy makers (Henderson,<sup>26</sup> Brühlhart and Sbergami<sup>27</sup>), thus opening the connection between urban concentration and spatial justice. In a recent work<sup>28</sup> we demonstrated that there is a close relationship between urban concentration and the distribution of rents obtained from natural resources and other unilateral transferences.

The analytical formulation proposed in this essay, which relates regional development with the Zipf's Curve of the model, starts with a simple Solow-type growth model for each one of the four regions using a single production function:

$$(1) Y_{it} = A_i (N_{it}X_t)^\alpha K_{it}^{(1-\alpha)} L_i^p$$

Where  $Y_{it}$  = product of region (i) in time (t);  $N_{it}$  = labour of region (i) in time (t);  $X_t$  = technological progress associated with labour in time t;  $K_{it}$  = capital of region (i) in time (t);  $1 - a$  = product/capital elasticity;  $a$  = product / labour with technical progress elasticity;  $L_i$  = land of region (i). Technological progress grows at a constant rate (g):  $X_{t+1} = g X_t$ . Capital evolves according to the net investment from capital depreciation (d):  $K_{t+1} = I_t + (1 - d)K_t$ . And investment is equal to savings which are a portion  $s$  of the product:  $I_t = sY_t$ .  $A_i = \sum_j \exp(-\beta d_{ij}) / \text{Max}_i (\sum_j \exp(-\beta d_{ij}))$  is the economic potential depending on the relative accessibility of each region, so being that  $\beta$  = parameter for attrition and  $d_{ij}$  = distance between region (i) and region (j). It is possible to design different accessibility topologies: Circular, Linear, Weighted (calibrate to lead to a Zipf's coefficient = 1).

<sup>22</sup> A. Ades, E. Glaeser, 'Trade and circuses: explaining urban giants', *Quarterly Journal of Economics*, 1995, Vol. 110, pp. 195–228.

<sup>23</sup> P. Krugman, 'Confronting the mystery of urban hierarchy', *Journal of the Japanese and the International Economies*, 1996, Vol. 10, pp. 399–418.

<sup>24</sup> G. Duranton, *City size distribution as a consequence of the growth process*, 2002, Department of Geography and Environment, London School of Economics.

<sup>25</sup> L. Bertinelli, E. Strobl, 'Urbanisation, Urban Concentration and Economic Development', *Urban Studies*, 2007, Vol. 44, No. 13, pp. 2499–2510.

<sup>26</sup> J.V. Henderson, 'The urbanization process and economic growth: The so-what question', *Journal of Economic Growth*, 2003, Vol. 8, pp. 47–71.

<sup>27</sup> M. Brühlhart, F. Sbergami, 'Agglomeration and growth: Cross-country evidence', *Journal of Urban Economics*, 2009, Vol. 65, pp. 48–63.

<sup>28</sup> T.P. Dentinho, 'Urban Concentration...', op.cit.

$$\text{Dij (Circular)} = \begin{vmatrix} 0.3 & 1.0 & 1.0 & 1.4 \\ 1.0 & 0.3 & 1.4 & 1.0 \\ 1.0 & 1.4 & 0.3 & 1.0 \\ 1.4 & 1.0 & 1.0 & 0.3 \end{vmatrix} \quad \text{D (Linear)} = \begin{vmatrix} 0.3 & 1.0 & 2.0 & 3.0 \\ 1.0 & 0.3 & 1.0 & 2.0 \\ 2.0 & 1.0 & 0.3 & 1.0 \\ 3.0 & 2.0 & 1.0 & 0.3 \end{vmatrix} \quad \text{Dij (Weighted)} = \begin{vmatrix} 0.1 & 3.8 & 4.8 & 5.3 \\ 3.8 & 2.1 & 3.4 & 4.3 \\ 4.8 & 3.4 & 2.2 & 3.3 \\ 5.3 & 4.3 & 3.3 & 2.4 \end{vmatrix}$$

Nevertheless, land rents ( $L'_{ti}$ )(2) can be distributed through a distribution matrix [V]; the same can happen with wages ( $N'_{ti}$ )(3) through [W] – associated with remittances – creating redistribution effects if those matrices differ from identity matrices (while keeping the sum of each line equal to the unity).

$$(2) L'_{ti} = (\rho A_i (N_{it} X_t)^\alpha K_{it}^{(1-\omega)} L_i^{(\rho-1)}) L_{ti}$$

$$(3) N'_{ti} = (\alpha A_i (N_{it}^{\alpha-1} X_t)^\alpha K_{it}^{(1-\alpha)} L_i^\rho) N_{ti}$$

$$(4) K'_{ti} = ((1 - \alpha) A_i (N_{it}^\alpha X_t)^\alpha K_{it}^{(-\alpha)} L_i^\rho) K_{ti}$$

The Disposable Income  $Yd_{ti}$  of each region (i) in time (t) is equal to the product of the region (i)  $Y_{ti}$  plus the net rent transferences obtained from land and net transferences obtained from wages.

$$(5) Yd_{ti} = Y_{ti} + [L'_{ti}]V - L'_{ti}V_i + [N'_{ti}]W - N'_{ti}W_i$$

$$V = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix} \quad W = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix}$$

Each disposable income generates savings (5) that are targeted toward investment in the different regions according to the weight of the region’s capital productivity in the total capital productivity (6).

$$(6) S = \sum_i s_i \cdot Yd_{ti}$$

$$(7) I_{ti} = S (K'_{ti} / \sum_i K'_{ti})$$

Finally, each year, a proportion ( $\mu$ ) of labour can migrate, being attracted to the various regions according to the weight of the Disposable Income per capita of the region within the total Disposable Incomes per capita.

$$(8) N_{(t+1)i} = N_{ti}(1 - \mu) + (\mu \sum_i N_{ti}) [(Yd_{ti}/N_{ti}) / (\sum_i Yd_{ti}/N_{ti})]$$

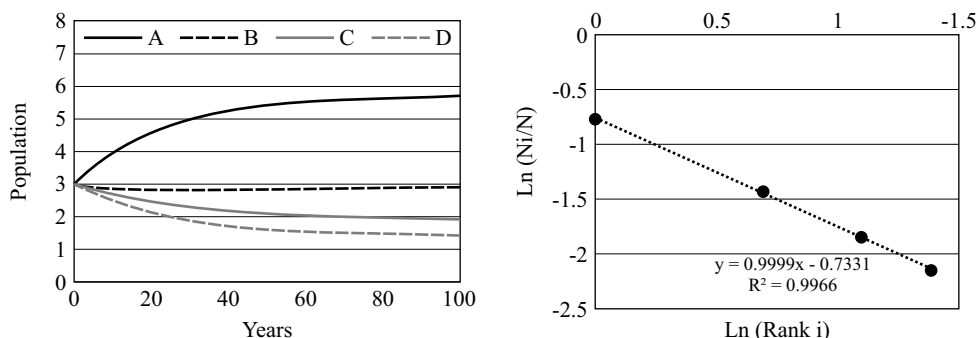
Connecting to the Zipf’s Curve, the population of each region(i) is divided by the total population of the country (N), thus obtaining the weight of each city in the total population of the country. The coefficient of the Zipf’s Curves by Country is then estimated by regressing the Logarithm of the Weight of the City Population with the Logarithm of the rank order of the city (9).

What is interesting to observe is that different spatial income redistributions lead to completely different Urban Hierarchies, even assuming similar technologies. This is shown in four numerical derived scenarios.

**Scenario 1: Similar geographical conditions and no transferences**

With constant returns on scale, without technological progress and without population growth, population will increase more in the more central regions. In the steady state, and through the calibration of Dij, we obtained a Zipf’s Curve with elasticity = 1.00 (Figure 1) and a total income = 8.5. This is the basic scenario which will be used to analyse what will happen when some spatial measures organizing redistribution are introduced.

$$Dij \text{ (Weighted)} = \begin{vmatrix} 0.1 & 3.8 & 4.8 & 5.3 \\ 3.8 & 2.1 & 3.4 & 4.3 \\ 4.8 & 3.4 & 2.2 & 3.3 \\ 5.3 & 4.3 & 3.3 & 2.4 \end{vmatrix} \quad V = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix} \quad W = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix}$$



**Figure 1.** Similar geographical conditions and no transferences

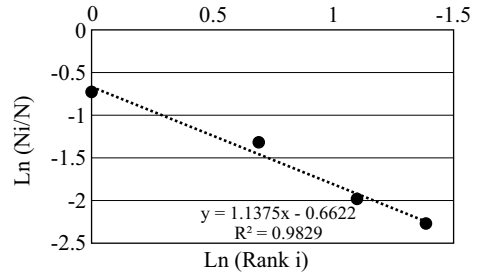
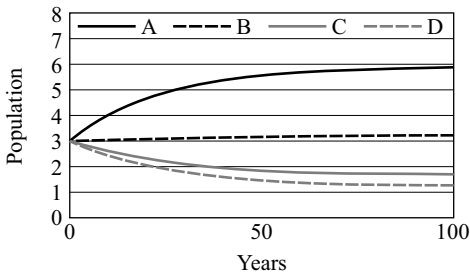
Source: Own study.

**Scenario 2: Similar geographical conditions and concentration of rents in region A**

With constant returns on scale, without technological progress, without population growth, and assuming the concentration of rents in Region A, the population in Region

A and B will increase; the Zipf’s Curve elasticity will also increase to 1.13 (Figure 2). Total Income will also be bigger than in the basic scenario and equal to 8.8.

$$Dij \text{ (Weighted)} = \begin{vmatrix} 0.1 & 3.8 & 4.8 & 5.3 \\ 3.8 & 2.1 & 3.4 & 4.3 \\ 4.8 & 3.4 & 2.2 & 3.3 \\ 5.3 & 4.3 & 3.3 & 2.4 \end{vmatrix} \quad V = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{vmatrix} \quad W = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix}$$



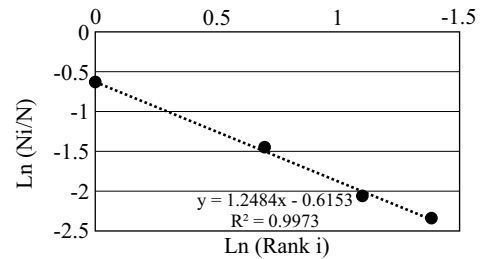
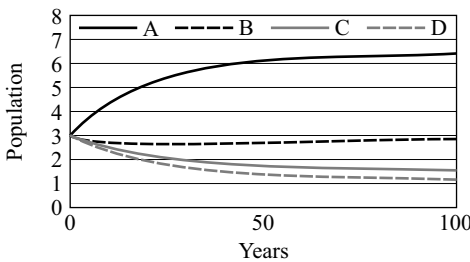
**Figure 2.** Similar geographical conditions and concentration of rents in region A

Source: Own study.

**Scenario 3: Similar geographical conditions and 50% of Income Transference to Region A**

With constant returns on scale, without technological progress, without population growth and assuming 50% income transference to Region A, the population in Region A will increase; the Zipf’s Curve elasticity will also increase to 1.24 (Figure 3). Total Income will also be bigger than in the basic scenario and equal to 9.2.

$$Dij \text{ (Weighted)} = \begin{vmatrix} 0.1 & 3.8 & 4.8 & 5.3 \\ 3.8 & 2.1 & 3.4 & 4.3 \\ 4.8 & 3.4 & 2.2 & 3.3 \\ 5.3 & 4.3 & 3.3 & 2.4 \end{vmatrix} \quad V = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix} \quad W = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0,5 & 0,5 & 0 & 0 \\ 0,5 & 0 & 0,5 & 0 \\ 0,5 & 0 & 0 & 0,5 \end{vmatrix}$$



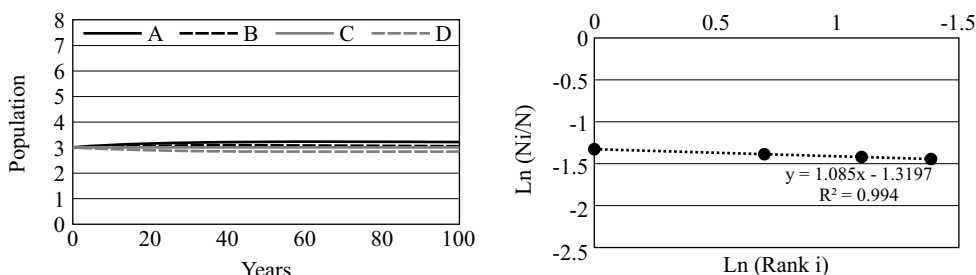
**Figure 3.** Similar geographical conditions and no transferences

Source: Own study.

**Scenario 4: Similar geographical conditions and redistribution scenario**

With constant returns on scale, without technological progress, without population growth and assuming strong redistributive policies, the populations of all regions will stay at around 3; the Zipf’s Curve elasticity will decrease to 0.08 1.24 (Figure 4) and the Total Income will be reduced to 6.3.

$$Dij \text{ (Weighted)} = \begin{vmatrix} 0.1 & 3.8 & 4.8 & 5.3 \\ 3.8 & 2.1 & 3.4 & 4.3 \\ 4.8 & 3.4 & 2.2 & 3.3 \\ 5.3 & 4.3 & 3.3 & 2.4 \end{vmatrix} \quad V = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix} \quad W = \begin{vmatrix} 0.47 & 0.12 & 0.15 & 0.21 \\ 0 & 0.90 & 0 & 0.10 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix}$$



**Figure 4.** Similar geographical conditions and redistributive scenario

Source: Own study.

**Summary**

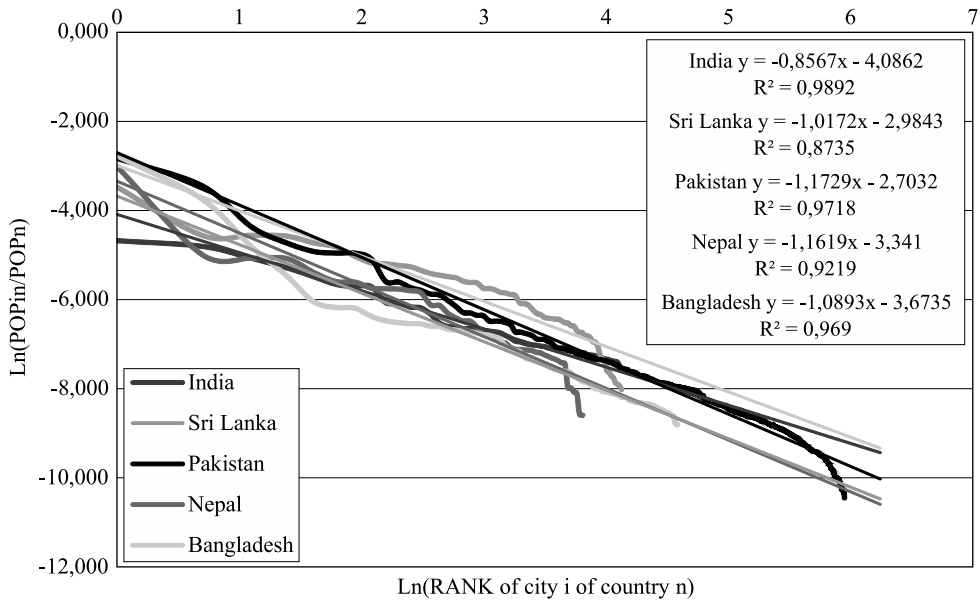
Based on this model, it is possible to better understand how human, productive and natural capital observed in different regions as well as differences in accessibility between them both influence the spatial profile of regional development and spatial justice. Nevertheless, these profiles can be influenced both by the location of the ownership of the various types of capital and by unilateral transferences, both private and public. In the next point we will use this understanding to further analyse spatial profiles in South Asia.

**Spatial Justice in South Asia**

The Zipf’s Curves for South Asian Countries show tails in the distribution of cities, indicating that parts of the countries are very depopulated due to mountain areas (Pakistan and Nepal) or due to long-lasting conflicts (Sri Lanka) (Figure 5).

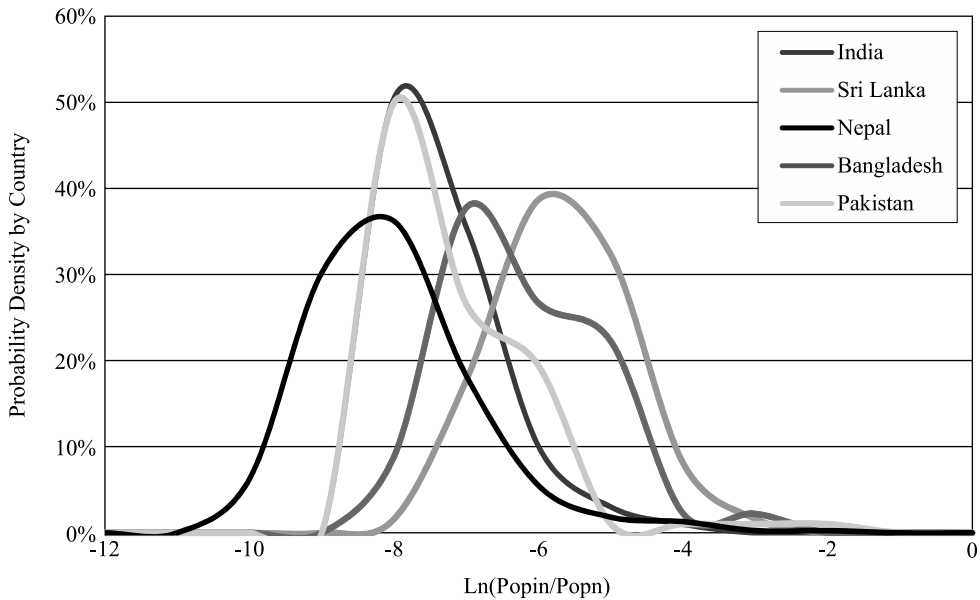
The Zipf’s Curve coefficients indicate that Pakistan and Nepal are countries with a much higher concentration of population than the other countries in the region. This is associated with a higher dependence on rents from natural resources as well as with





**Figure 5.** Zipf 's Curve by Country (South Asia)

Source: Own study.

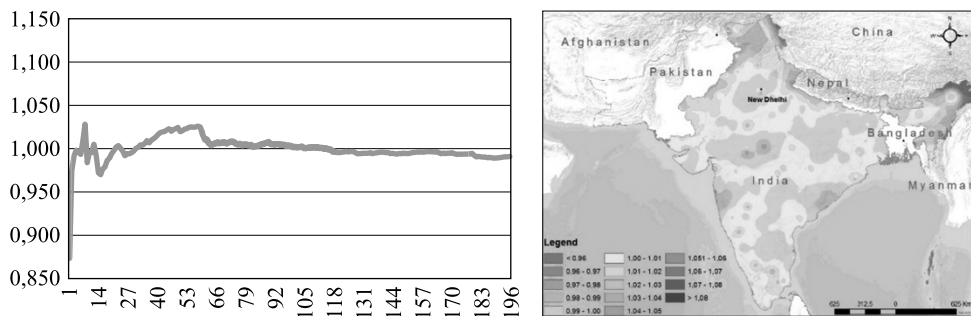


**Figure 6.** Kernel Density of the Logarithm of the Relative Size of Cities by Country (South Asia)

Source: Own study.

governmental concentration of fiscal resources. Figure 6 shows the Kernel Density of the Logarithm of the Relative Size of Cities by Country. A closer look makes it possible to identify various groups of countries. Some Asian countries such as India and Bangladesh behave like European and North American countries, where we find more small cities than big ones. A second group of countries does not have more cities of lower size; this happens with countries such as Sri Lanka, Pakistan and Nepal, all of which have some remote and detached small cities.

Figures 7 to 11 present the profile of the deviation from the estimated Zipf's function. Interestingly, patterns appear for each one of the countries of South Asia.



**Figure 7.** Indian cities deviations from the standard distribution

Source: Own study.

In India (Figure 7), beyond very stable coefficients of Spatial Justice, when compared with neighbouring countries, there are some specificities that it important to note:

- a) First, the urban sprawl of Mumbai and the administrative shape of the neighbouring cities justify the reduced importance of Mumbai's centre in favour of the surrounding urban areas. The problem is that the infrastructures required for the efficient functioning of the conurbation may not be in place, leading to a less competitive region with increased social problems because poor people would have more difficulty in finding accessible jobs.<sup>29</sup>
- b) Second, there seems to be some degree of relative spatial injustice in the mountainous regions bordering China and Myanmar, contrary to what happens in the plane border regions between India and Pakistan or Nepal, which can be explained by orographic factors. Actually, why increase spending on borders naturally protected by nature? In fact the population density of Arunachal Pradesh in the disputed

<sup>29</sup> M.G. Badami, G. Tiwari, D. Mohan, 'Access and Mobility for the Urban Poor in India: Bridging the Gap Between Policy and Needs', paper presented at the Forum on Urban Infrastructure and Public Service Delivery for the Urban Poor, organized by the Woodrow Wilson International Center for Scholars, Washington, DC, and National Institute of Urban Affairs, New Delhi, 24-25 June 2004, New Delhi, India.

territories between India and China is only 17 inhabitants per square kilometre,<sup>30</sup> mostly populated by Tibetan and Thai tribes plus a few migrants from India and Bangladesh, where the major issues do not concern population but water resources for faraway consumers.<sup>31</sup> The same happens with the other disputed land between India and China, the almost depopulated Aksai Chin whose main interest is the road passage from Tibet to Xinjiang,<sup>32</sup> but where the long term presence of military personnel in peacetime does not make sense for a scarcely populated territory.

- c) Thirdly, it is clear that there are internal differences at state level in the south of India, where some cities do have a centripetal attraction toward rural areas. This confirms the study conducted by Azam and Bhatt<sup>33</sup> which demonstrated that for India, most of the district income differences in urban India are due to domestic factors.
- d) Finally, the relative poverty of the Ganges Valley and the wealth of the southern regions, highlighted by authors like Khomiakiva,<sup>34</sup> seem reinforced by national and international redistributive policies that benefit southern states with more migrants abroad and reduce the expectations of more populated states in the north.

Pakistan (Figure 8) is a very different case when compared with India. The particular characteristics of the country's profile of spatial justice are as follows:

- a) First, there is the situation of Kashmir in the north of the country which experienced an enormous exodus due to the continuing conflict that has opposed Pakistan and India for control of the region.<sup>35</sup>
- b) Karachi is the former capital of Pakistan and located in the south. It is Pakistan's richest and, simultaneously, most violent city.<sup>36</sup> Like in many former capitals around the world, it lacks the necessary public investments to accommodate in suitable conditions the population left behind when capital moved to other places, in addition to the population attracted by a large city.
- c) Quetta in the west of the country specializes in cattle production. Market failures reduce the capacity to capture most of the value added of cattle production, which

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<sup>30</sup> M. Chaturvedi, T. Ghosh, L. Bhandari, 'Assessing Income Distribution at the District Level for India Using Nighttime Satellite Imagery', *Proceedings of the Asia-Pacific Advanced Network*, 2011, Vol. 32, pp. 192–217.

<sup>31</sup> B.A. Dar, S. Ahmad, 'Major Bilateral Issues between China and India', *Arts Social Sciences Journal*, 2014, Vol. 5, No. 1, pp. 1–3.

<sup>32</sup> K. Guha, 'Sino-Indian Relations. History, Problems and Prospects', *Harvard International Review*, 19 October 2012.

<sup>33</sup> M. Azam, V. Bhatt, 'Spatial Income Inequality in India, 1993–2011: A District Level Decomposition', Discussion Paper No. 9892, 2016, IZA. P.O. Box 7240. 53072 Bonn, Germany.

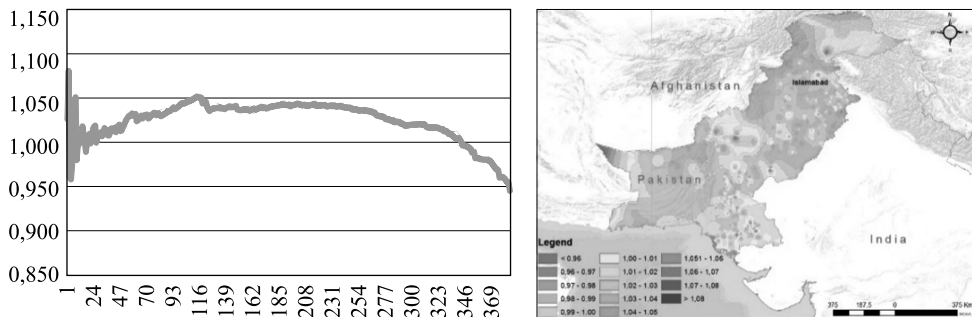
<sup>34</sup> T. Khomiakiva, 'Spatial Analysis of Regional Divergence in India: Income and Economic Structure Perspectives', *The International Journal of Economic Policy Studies*, 2008, Vol. 3, Art. 7, pp. 137–161.

<sup>35</sup> N. Blarel, H. Ebert, 'Explaining the evolution of contestation in South Asia', *International Politics*, February 2015, Vol. 52, No. 2, pp. 223–238.

<sup>36</sup> D. Esser, 'The city as arena, hub and prey – patterns of violence in Kabul and Karachi', *Environment & Urbanization*, 2004, Vol. 16, No. 2.

can explain the region's relative deprivation.<sup>37</sup> On the other hand, there is overexploitation of water that has led to water scarcity.<sup>38</sup>

- d) In the case of Peshawar, Islamabad and Lahore, more resources appear to be dedicated to the border regions in Peshawar and Lahore rather than to the capital city, Islamabad. Since public expenditure has been the driving force behind the new city of Islamabad,<sup>39</sup> it is natural that problems arise when public funds move elsewhere.
- e) Finally, contrary to what happens in India, provincial cities seem to be poorer than the surrounding countryside. Although the distribution of land, leading to the establishment of small farms, is beneficial,<sup>40</sup> the remittances of rural-urban migrants do not have major impact on rural development, but rural development programs<sup>41</sup> and conflicts reveal the real value of rural land.<sup>42</sup>



**Figure 8.** Pakistani cities deviations from the standard distribution

Source: Own study.

Results in other countries are also quite interesting, with Bangladesh showing an exploitation of others cities to the benefit of the capital, Dhaka, and Chittagong, where people migrate in hopes of a better life at the expense of suffering transitional poverty.<sup>43</sup> In fact, there is evidence that urban growth in Dhaka and Chittagong has

<sup>37</sup> A. Rodríguez, I. Ali, M. Afzal, N. Shah, U. Usman Mustafa, 'Price expectations of sheep and goats by producers and intermediaries in Quetta market, Pakistan', *Agricultural Economics*, 1995, Vol. 12, No. 1, pp. 79–90.

<sup>38</sup> A.S. Khan, S.D. Khan, D.M. Kakar, 'Land subsidence and declining water resources in Quetta Valley, Pakistan', *Environmental Earth Sciences*, 2013, Vol. 70, No. 6, pp. 2719–2727.

<sup>39</sup> A.Z.K. Mahsud, 'Achieving a dynamic urban form: A multi-scalar synthesis of landscape and urbanism in Doxiadis' plan for Islamabad', Athens Centre of Ekistics, Jan-Dec 2007, pp. 149–171.

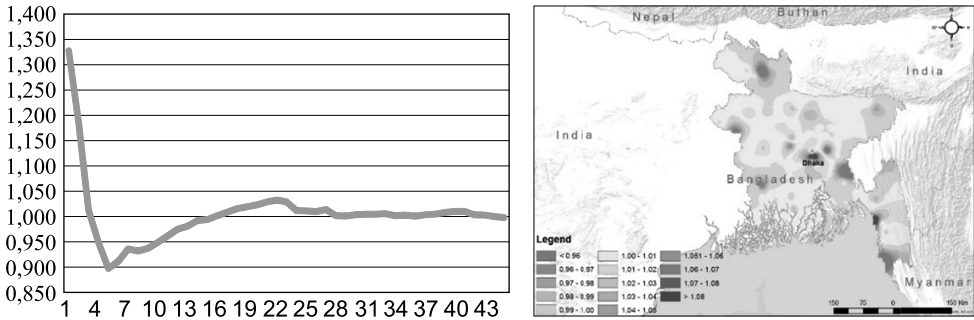
<sup>40</sup> H. Rempel, R.A. Lobdell, 'The role of urban-to-rural remittances in rural development', *The Electronic Library Pages*, pp. 324–341, Published online: 23 November 2007.

<sup>41</sup> S.S. Khan, *Rural development in Pakistan*, Vikas Publishing House PVT Ltd., Sahibabad, 1980, p. 157.

<sup>42</sup> H. Magsi, 'Land use conflicts in developing countries: framing conflict prevention and management strategies to ensure economic growth and human welfare. The case of Chotiari water reservoir from Pakistan,' Ph.D. thesis at Agriparistech, Paris, 2014.

<sup>43</sup> N. Islam, 'Urban and Regional Development in Bangladesh: Past Trends and Future Prospects', in M. Chatterji et al. (eds), *Regional Science in Developing Countries*, Manas Chatterji and Yang Kaizhong, 1997, pp. 224–242.

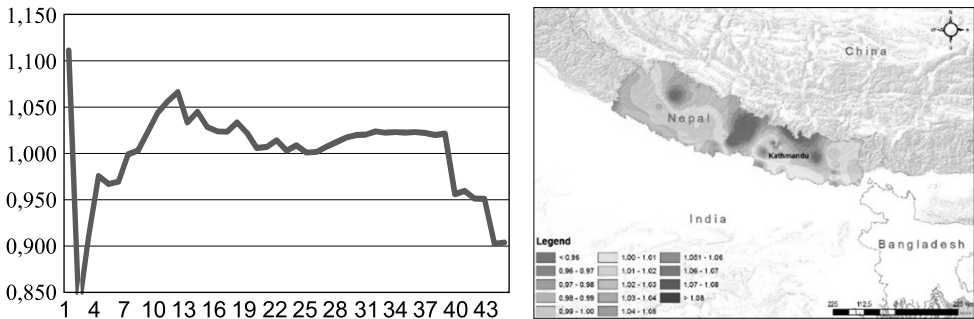
been highly pushed by the diversion of financial resources from rural to urban areas through the banking system.<sup>44</sup> This has given rise to social tensions and imbalances associated with serious limitations in infrastructure and land for urban residences and employment.<sup>45</sup>



**Figure 9.** Bangladesh cities deviations from the standard distribution

Source: Own study.

Nepal shows urban concentration in the capital and some provincial areas along the border with India, compensated for by the relative deprivation of second-rank cities and remote places. This is due both to the intrinsic lack of connectivity within the country<sup>46</sup> and to a development strategy in favour of the more accessible parts of the country.<sup>47</sup>



**Figure 10.** Nepalese cities deviations from the standard distribution

Source: Own study.

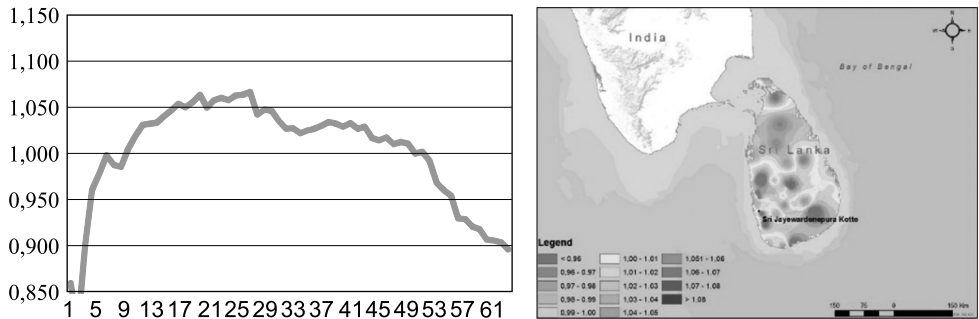
<sup>44</sup> H. Bahar, ‘Banks and Regional Development in Bangladesh’, paper presented at the 19th Biennial Conference of the Bangladesh Economic Association, 20–22 November 2014, Dhaka, Bangladesh.

<sup>45</sup> Asian Development Bank, *Final Report of Project Preparatory Technical Assistance, Preparing the City Region Development Project*, Manila, 2008.

<sup>46</sup> H. Gurung, ‘Nepal Regional Strategy for Development. Working Paper of the Asian Development Bank’, Series No. 3, Nepal Resident Mission, June 2005.

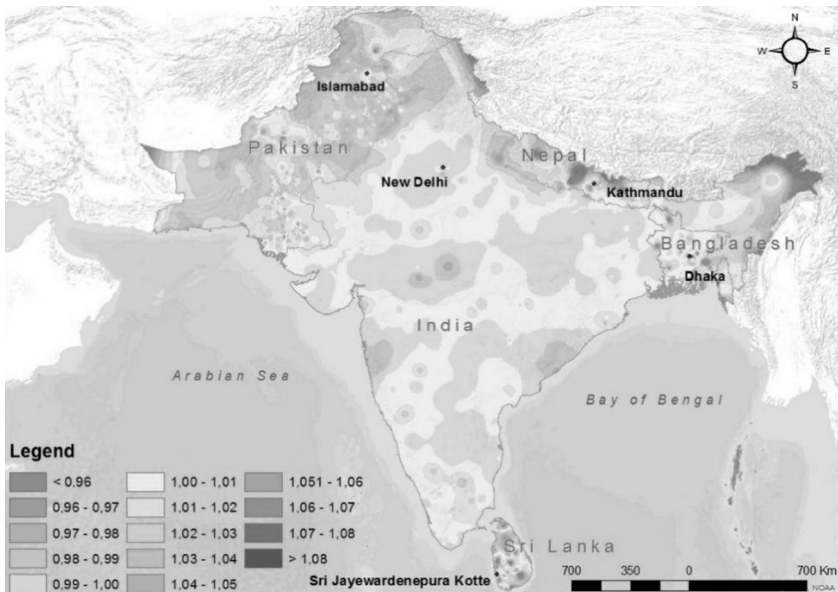
<sup>47</sup> K. Dahal, ‘Revitalization of the Regional Development Agenda in Nepal: Lessons from the British Model’, *Contributions to Nepalese Studies*, 2005, Vol. 32, No. 2 (July), pp. 277–297.

Sri Lanka shows the capital with a more reduced population than expected, at the expense of second-rank cities which are often located near the capital but also in the border area with the Tamil region. However, like in Nepal and Pakistan, there is a tail of remote, deprived regions. Regional imbalances in Nepal are confirmed by studies like the one produced by Wijerathna et al.<sup>48</sup>



**Figure 11.** Sri Lanka cities deviations from the standard distribution

Source: Own study.



**Figure 12.** Spatial Justice by Country in South Asia

Source: Own study.

<sup>48</sup> D. Wijerathna, J.S. Bandara, C. Smith, A. Athula Naranpanawa, ‘Regional Disparities in Sri Lanka: An Empirical Analysis’, *Asia-Pacific Development Journal*, 2014, Vol. 21, No. 2, December.

This is even more important when maps indicate that areas of conflict are also the regions distant from the estimated Zipf's curve. This can happen either up the curve (when there is extra public spending associated with military expenditures, as may happen in Peshawar and Lahore in Pakistan and India-administrated Kashmir) or down the curve (when conflicts lead to emigration, as seems to be the case in Pakistan-administrated Kashmir).

Looking at the global picture of spatial justice by country in South Asia (Figure 12), it is clear that there are much more spatial differences within Pakistan, Nepal or Sri Lanka than in India or Bangladesh. There are also signs, that whereas India tries to restrain the development of major hubs like Mumbai, countries like Bangladesh stimulate the growth of their major towns. Finally, border regions can be abandoned, as has happened in the border between India and China, or reinforced, as seems to occur between Pakistan and India and India and Nepal.

## Conclusion

Dentinho (2017) shows that the spatial allocation of property rights over territorial resources has strong effects on the spatial profile of the urban network. The relation occurs through the multiplier effects of income associated with rents from natural resources which travel from the places where those resources are located to the places where their owners reside. The test relates the urban concentration within each country, assessed by the elasticity of the respective Zipf Curve, with the percentage of income from rents obtained from natural resources. These results confirm what Ades and Glaeser (1995) observed: institutions, namely those created by the spatial distribution of property rights over natural resources and by the geographical allocation of public spending, do play a role in the urban concentration in space.

The objective of the present essay was to show that there is a spatial profile of justice in South Asian countries, which very much relates to governance, namely how policies may influence urban concentration and spatial justice. The paper calculates the Zipf's Curve estimates for South Asian countries and maps various city regions in relation to the estimated Curve. The result analysis indicates that the spatial distribution of rents obtained from natural resources and from public transferences may have a role in the spatial distribution of wealth. In other words, there are signs that governance influences spatial justice, specifically through the spatial allocation of property rights over natural resources and through the spatial distribution of public spending. The issue is very relevant since the maps of spatial justice produced in this essay are also maps of conflicts.