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Governance in Indian States: An Inter and Intra State Analysis

Hindistan Eyaletlerinde Yönetişim: Eyaletler Arası ve Eyalet İçi Analizi

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ABSTRACT

Good governance structures can enhance policy making, but the outcomes of such policies differ at the state level as compared to the national level. While there are abundant international and nation level studies on governance, there are few studies on sub-national analysis. Numerous comprehensive indices of governance exist in the literature, but the need to harmonize conceptualization and operationalisation of governance remains. This paper takes principles of good governance categorized into sub-dimensions comprising 75 variables to construct governance index for three Indian states for the time period from 2002 to 2016. The three states i.e. Haryana, Andhra Pradesh and Bihar are selected to represent high, middle and low per capita Gross State Domestic Product (GSDP) respectively and an inter-state and intra-state analysis of their governance performance is done using one-way Analysis of Variance (ANOVA) and Tukey and Games-Howell post-hoc tests for pair-wise comparisons. Results show that governance performance of Andhra Pradesh exceeds that of high GSDP state Haryana, while that of least GSDP state Bihar is the worst. This suggests a stronger link between poor governance and low GSDP compared to good governance and high economic growth. Policies for improving governance and economic growth for low growth states should follow a comprehensive and unified approach, while for high growth states, policies to improve governance should follow a targeted approach towards separate governance parameters.

Keywords: Governance Index, Economic growth, ANOVA, Service delivery, Sub-national
Jel Code: H11, H70, O43

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ÖZ

İyi yönetişim yapıları politika oluşturmayı geliştirebilir, ancak bu tür politikaların sonuçları, ulusal düzeyle karşılaştırıldığında eyalet düzeyinde farklılık gösterir. Yönetişim üzerine uluslararası ve ulusal düzeyde çok sayıda çalışma varken ulus altı düzeyde az sayıda çalışma bulunmaktadır. Literatürde çok sayıda kapsamlı yönetişim endeksi mevcuttur ancak yönetişimin kavramsallaştırılmasını ve operasyonelleştirilmesini uyumlu hale getirme ihtiyacı devam etmektedir. Bu çalışma, iyi yönetişim ilkelerini (Birleşmiş Milletler Kalkınma Programı (UNDP, 1997) tarafından verildiği şekliyle), 2002-2016 dönemini içerecek şekilde üç Hindistan eyaleti için yönetişim endeksi oluşturmak üzere, 75 değişken içeren 8 alt-boyutta ele almaktadır. Üç eyalet, yani Haryana, Andhra Pradesh ve Bihar sırasıyla yüksek, orta ve düşük kişi başına Gayri Safi Eyalet Hasılasını (GSDP) temsil edecek şekilde seçilmiş ve yönetişim performanslarının eyaletler arası ve eyalet içi analizi ANOVA ile yapılmıştır. Sonuçlar, Andhra Pradesh'in yönetişim performansının yüksek GSDP'ye sahip Haryana'nınkini aştığını, en az GSDP eyaleti Bihar'ın yönetişim performansının ise en kötü olduğunu göstermektedir. Bu, iyi yönetişim ve yüksek ekonomik büyümeye kıyasla zayıf yönetişim ile düşük GSDP arasında daha güçlü bir bağlantı olduğunu göstermektedir. Düşük büyüme gösteren eyaletler için yönetişim ve ekonomik büyümeyi iyileştirmeye yönelik politikalar kapsamlı ve bütünleşik bir yaklaşım izlemeli, yüksek büyüme gösteren devletler için ise yönetişimi iyileştirmeye yönelik politikalar ayrı yönetişim parametrelerine yönelik hedefli bir yaklaşım izlemelidir.

Anahtar Kelimeler: Yönetişim endeksi, Ekonomik büyüme, ANOVA, Hizmet sunumu, Alt ulusal
Jel Kodları: H11, H70, O43

1. Introduction

Every nation has a distinctive path to economic development due to numerous historical and natural factors. But what is common in their growth stories is the role played by their governments, and the difference in their levels of economic development can be linked to the differences in their governance approaches. At the sub-national level in India, governance performance of different states has varied over time and so has their pace and pattern of economic growth.

This paper studies governance performance of three Indian states, selected to represent high, middle and low per capita GSDP over the period of study viz. 2002 to 2016 (based on data availability). The statistical tool of one-way ANOVA has been used to analyze the inter-state and intra-state temporal governance performance variations. An index has been constructed to measure overall governance performance of these states. The index comprises 8 sub-dimensions representing principles of good governance given by United Nations Development Programme (UNDP, 1997). These consist of (a) participation, (b) rule of law, (c) transparency and accountability, (d) responsiveness, (e) consensus, (f) equity and inclusiveness, (g) effectiveness and efficiency, (h) strategic vision. The role of each of these on governance (outcomes) and how they have been quantified is explained separately.

For the first sub-dimension of governance index i.e. participation, the question of whom to include in the decision/policy- making process of the government depends on how impactful such participation can be for better outcomes. Inclusion of marginalized groups including women in policy making can enhance policy outcomes. Women participation (political and economic) is both a source and a signal of social change (Shaul, 1982). Women's role in resource management and strengthened community governance is significant (Flores, Evans, Larson, Pikitle, & Marchena, 2016). In India, inclusion of women at various administrative levels has impacted policy outcomes significantly (Beaman, Duflo, Pande, & Topalova, 2006; Chattopadhyay & Duflo, 2004). With participatory governance, an increase of 1 per cent of gross domestic product in aid leads to an equal fall in poverty and infant mortality (World Bank, 1998). Next, rule of law implies existing laws for all, regardless of their capacities. Defining rule of law can be linked to its outcomes (Denkova, 2015). Incidences of crime and violence surge where rule of law is weak and the same act as important constraints on economic growth and poverty alleviation (Browne, 2019).

It is also important to study if there is any discrimination against women and weaker sections of society with respect to access to law. In this aspect, incidence of crime against women and the weaker sections has been included in the sub-dimension of rule of law. The third sub-dimension, i.e., transparency has been linked in the literature to information

comprising data collection and dissemination by the governments including freedom of media, democracy comprising free and fair elections and existence of legal framework against corruption by government officials or general public. But merely studying the existence of structural framework for the same is insufficient. Instead, the legal proceedings pending and completed provide a better picture on where a nation or state stands as regards its accountability (Islam, 2006; Hollyer, Rosendorff, & Vreeland, 2014).

The next principle regarding responsiveness to citizens implies 'the capacity to satisfy the preferences of citizens' (Ostrom, 1975). Where public participation is infeasible, resort to the same lies in responsive administration so that pendency of court and police cases and unnecessary delays are minimized. Availability of more channels for hearing grievances adds to responsiveness as well. An important link is established between transparency (in terms of access to information) and responsiveness in that with better public access to government information, the expectation for more responsive and trustworthy government increases (Porumbescu, 2015).

The fifth sub-dimension of consensus can be linked to representation, free association and consensual framework in social and political organizations. Consensual systems facilitate meaningful representation (Matolino, 2018). Citizens can be sure that even without their own formal representation, their opinion is given equal attention in the final decisions, irrespective of whether such decisions favour their preference or not (Wiredu, 1997). The role played by citizens indirectly via voting for a representative is enhanced with higher voter turnout and percentage of votes polled. The link between inclusion and consensus is crucial in that ensuring representation of weaker sections of society makes such inclusion consensus oriented. Governance can provide an 'enabling environment for inclusive growth' and ensure that target pro-poor policy benefits are shared equitably (Rahman, 2010). Policies for wider inclusion of weaker sections vary from those ensuring mere existence of institutions that enhance equity to long-term plans that ensure sustainable upliftment of such sections of society. Hence, government target programmes that improve nutrition, health and educational attainment of its public go a long way not only in sustaining retention, but also in human resource development.

The next sub-dimension relates to welfare state, i.e., government as an efficient and effective service provider. Ensuring ease of access to power, urban development, transport and communication and irrigation have been included in this sub-dimension. Other than these, fiscal performance of state governments has also been included as a proxy to efficiency. Efficient fiscal management can help mobilize additional revenue and achieve greater financial self-reliance (Bertucci, 1999). The last sub-dimension of strategic vision relates to the link between governance and long term growth ensuring sustainability. Quality

of health and education, social welfare and environment have been included in this sub-dimension. Economic growth, social development and sustainable environment are not competing goals, but complementary objectives that can be attained with a unified policy (Clark, 2012).

An effective and efficient governance structure can enhance such comprehensive policy-making (Clark, 2012). But performance of such policies and programmes gives a different picture at the state level as compared to the national level (Sahni & Shankar, 2012). Hence, the need for sub-national analysis stems from this difference and the same has been attempted to be studied in the present paper. The paper has several contributions to the relevant literature. First, it adds to the literature of governance indices by constructing a comprehensive governance index comprising 8 sub-dimensions. Second, it theorizes governance and bridges the gap between conceptualization and operationalisation of a measure of governance by constructing the index based on principles of good governance given by UNDP (1997). Third, it sheds light on sub-national governance performance in Indian states categorized to represent high, medium and low income states, to find the link between governance and growth. Fourth, the paper develops hypothesis for differences in inter and intra state temporal governance performance. Finally, the paper gives policy recommendations for state governments in India to enhance governance outcomes.

The paper is structured in four sections. The next section presents the literature review. The third section describes the empirical analysis comprising selection of variables and states, the overview of methodology and estimation results. The last section concludes the study.

2. Literature Review

The literature on governance has mostly come about in the 1990s when the significance of the quality of governance and its impacts on a nation's well-being gained rising dialogue in the international policy arena. Numerous studies have quantified governance using varied approaches and some link the same to the incumbent governments' performance. This section reviews such studies that relate to constructing a governance index, followed by studies that link it to the performance of governments.

Studies that relate to or construct a measure of governance include Kaufmann, Kraay, and Mastruzzi (2011) that summarizes the Worldwide Governance Indicators (WGI) methodology and its analytical issues. Their study reports each nation's margin of error and finds that even after considering margins of error, the WGI provides significant comparisons across countries and over time. Brewer, Choi, and Walker (2007) study WGI's government effectiveness parameter and find that it is most influenced by accountability and voice,

control of corruption, and wealth and income. The Sustainable Governance Indicators (SGI) is another measure that explores how governments target sustainable development. The measure is based on three pillars of policy performance, democracy and governance (SGI, 2021). Transparency International's (2020) Corruption Perception Index (CPI) is a powerful measure of perceived levels of public sector corruption. The CPI ranks 180 countries on a scale of 0 to 100, with 0 indicating the highest perceived corruption and 100 indicating the least corruption.

Yong and Wenhao (2012) construct a governance index for cities in China using seven dimensions (legitimacy, efficiency, regulation, rule of law, integrity, participation and transparency). It highlights the need for researchers to focus on local governance- 75 percent of China's GDP is contributed by the cities. The results show Beijing is the top performer with respect to equality, efficiency, regulation and rule of law; Shenzhen and Chengdu were notable performers with respect to participation and transparency; and Changsha and Shenzhen with respect to integrity. Mitra (2013) constructs an index of governance using the Alkire-Foster methodology and compares the same to Ibrahim Index of African Governance (IIAG). The proposed measure is superior to the existing measure in terms of methodology for aggregation and dealing with ordinal data as there is no need to scale the data using the proposed method.

Studies on appropriateness of governance indicators include Glass and Newig (2019) that study the impact of different aspects of governance (from SGI) on various sustainable development goals. It finds that democratic institutions, participation as well as economic power, education and geographic location explain SDGs the most. Another study on the selection of governance variables was given by Gisselquist (2013), which throws light on ten questions that must be considered while using or constructing a measure of governance. It suggests keeping focused on fundamentals of social sciences like content validity, reliability, replicability, relevance, etc and paying less attention to common governance measurement issues like descriptive complexities, theoretical fit, estimation precision, correct weighting, etc. It highlights that scholars have not contributed much in governance measures; rather they only used the existing indexes for their analysis. This existing gap in the current literature is the main motivation behind this study- to construct an index of governance performance at the sub-national level.

The interdependence between governance and economic development leading to an upward bias was corrected by Mundle, Chowdhury, and Sikdar (2016) by taking development adjusted governance index. The results show that the top five out of six high performing states in India (Gujarat, Tamil Nadu, Andhra Pradesh, Kerala and Punjab) continued to be the best performers in both the years under study i.e. 2001 and 2011. The four least

performing states (Odisha, Jharkhand, Uttar Pradesh, and Bihar) continued to remain at the bottom during both the years of study. This highlights growing regional disparities among the states over time. Mathew, Dutta, Narayanan, and Jalodia (2016) prepared Public Affairs Index (PAI) for all the Indian states using annual data for 82 indicators covering ten broad themes (essential infrastructure; support to human development; social protection; women and children; crime, law and order; delivery of justice; environment; transparency and accountability; fiscal management; economic freedom). The results show that Kerala and Himachal Pradesh ranked first amongst the large and small states respectively. The worst performing states in the large and small categories were Bihar and Meghalaya respectively. The correlation between PAI and the Human Development Index was moderate positive at 0.492. Ibrahim (2018) presents the 12th Annual Report of the Ibrahim Index of African Governance which takes a total of 102 indicators and shows that governance in the African countries is improving slowly. The IIAG measures governance annually in African countries 'based on four dimensions (a) safety and rule of law (b) participation and human rights (c) sustainable economic opportunity (d) human development'. A total of 34 African nations witnessed an improvement in their overall governance score in the last ten years, out of which 15 nations paced up their governance scores in the last five years during the study period.

Studies that link governance to government's performance include that of Trivedi (1994) which examines reasons for failure in increasing the accountability of government officials/ departments in India by critically examining the Action Plan of 1994. The analysis shows that Action Plans are useless instruments of measuring performance of governments. Instead, Performance Contracts must be adopted as they evaluate on the basis of composite scores and assign weights that help prioritize for channelling resources. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) examine the indicators of the quality of governments across 152 countries. They assess 'government performance post 1990 using measures of government intervention, size of government, public good provision, public sector efficiency, and political freedom'. Their results show that countries with poor governance were either 'poor, close to the equator, ethno-linguistically heterogeneous, used French or socialist laws, or had high proportions of Catholics or Muslims' and that the larger governments were better performers. DAKSH, a civil society organization in Karnataka, India conducted a survey in 2009 for 218 legislative assembly constituencies to assess functioning of their state government using Perceptions Survey; attendance and other performance records of Members of Legislative Assembly (MLAs). The results show that Karnataka is faring poorly in the implementation of the Right to Information Act, in internal accountability and there is a huge gap between people's expectations and perceptions of representatives' performances (Narasappa & Vasavi, 2010).

Reviewing the literature on governance indexes and performance highlights the need to contribute to a comprehensive governance measure with sound theoretical backing. The theoretical concept/ definition of good governance that has evolved over time in the literature has not been incorporated in the construction of such governance indexes. Studies on sub-national analysis on governance performance in the Indian context are scarce. Based on these, the present study attempts to bridge these gaps in the literature and analyses variations in state wise governance performance in India over time.

3. Empirical Analysis

3.1 Data and Variables

To construct the overall governance index, a total of 75 variables have been selected in this study, which have been categorized under the 8 principles of good governance (UNDP, 1997). A detailed list of these variables and their data source are given in Appendix1.

Table 1: Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
State	45	3.3333	2.0780	1	3
Year	45	2009	4.3693	2002	2016
gi	45	.4418	.1289	.2135	.6752
Sdi1	45	.6703	.1280	.4372	.8531
Sdi2	45	.4950	.1425	.2105	.8069
Sdi3	45	.4685	.1772	.0866	.7288
Sdi4	45	.3964	.0545	.2718	.4937
Sdi5	45	.3027	.1518	.0786	.6036
Sdi6	45	.4287	.1040	.2209	.5746
Sdi7	45	.3995	.0736	.2441	.5295
Sdi8	45	.4526	.0633	.3319	.5522

3.2 Selection of States

Out of 19 major Indian states, 3 states have been selected on the basis of their per capita GSDP values during the year 2016-17 (at constant prices- 2011-12) to represent highest, middle and lowest per capita GSDP (see Appendix-2). The state with highest per capita GSDP is Haryana, the state with middle GSDP is Andhra Pradesh and the state with the lowest GSDP is Bihar. The study analyzes governance performance of these states over the time period 2002-2016 (due to data availability).

3.3 Index construction

The governance performance of the selected states has been computed by constructing an index of overall governance using 8 principles of good governance (UNDP, 1997) as sub-

dimensions of governance. These principles comprise (a) participation, (b) rule of law, (c) transparency, (d) responsiveness, (e) equity and inclusiveness, (f) accountability, (g) effectiveness and efficiency and (h) consensus. The overall governance index and sub-dimensional indexes have been computed using the average of averages of normalized values of all 75 variables. The average of averages is chosen based on the study by Daoud (2015) which shows that the method helps to explain 44.1% state-level variance by governance and corruption measures, and that the measure has consistently yielded statistically significant results (Daoud, 2015). They have been normalized using the following min-max formula as was used to construct the Human Development Index (Roser, 2014):

a) For positive variables (higher the better):

[(Actual Value – Minimum Value)/ (Maximum Value – Minimum Value)]

b) For negative variables (lower the better):

[(Maximum Value – Actual Value)/ (Maximum Value – Minimum Value)]

The index of overall governance has been computed using the following average of averages formula:

$$G.I.=\frac{\sum_{j=1}^{N} S.D.I_{itj}}{N}$$

Where,

G.I. = Overall Governance Index

S.D.I= Sub Dimensional Index of governance for i-th state at t-th time period.

N = number of sub-dimensions

j = 1…..N

The sub-dimensional indexes have been computed using the following formula:

$$S.D.I = \frac{\sum_{j=1}^{n} DV_{itj}}{n}$$

S.D.I = Sub Dimensional Index of governance for i-th state at t-th time period, the value of which ranges between zero and one

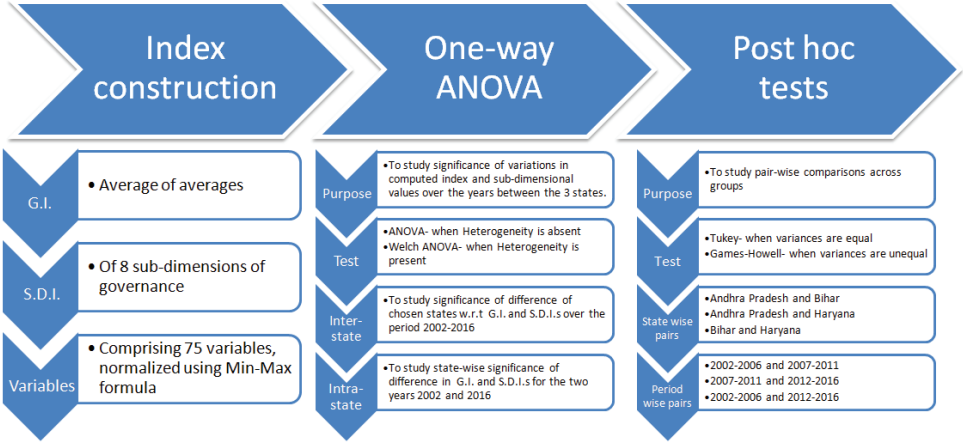
DV_{itj} = value of the normalized variables which are a constituent part of the Sub Dimensional Index of governance (SDI)

n = number of normalized variables for each dimension

j = 1……n

See Appendix 2 for a list of variables for overall governance index.

Figure 1. Flow chart of methodology



As seen from Figure 1, the empirical analysis of this paper includes constructing the index and applying the results of the index to one-way ANOVA to study the significance of differences in governance performance of the selected states over the study period. Sections 3.4 and 3.5 of the study explain the inter and intra state analysis' methodology in detail.

Overall governance index and sub-dimensional index scores

Table 2 and Figure 2 show the overall governance index values of the three selected states for the time period 2002-16.

From Table 2, Andhra Pradesh has the highest overall governance scores throughout the period of the study, followed by Haryana and lastly, Bihar. This shows that a low growth state also had poor governance, but the opposite does not hold for high growth states. The governance performance of all three states remained stable over the period of the study, with Haryana's highest score of 0.4962 in 2012 and lowest score of 0.4296 in 2006, Andhra Pradesh's highest score of 0.5503 in 2006 and lowest score of 0.4868 in 2016 and Bihar's highest score of 0.4489 in 2012 and lowest score of 0.3319 in 2004.

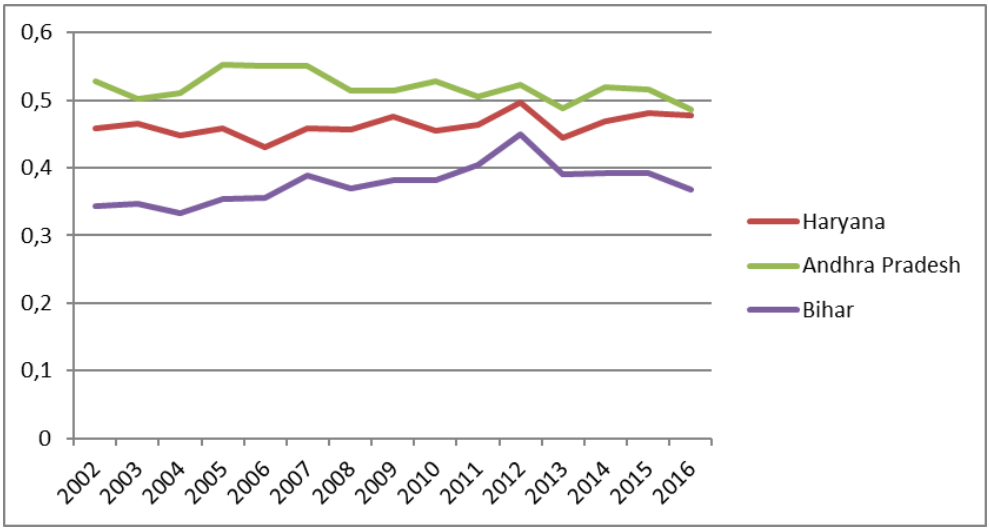
The SDI scores of the three states have been given in Appendix-3.

Table 2: Overall Governance Index scores of the selected states for 2002-2016

Years	Haryana	Andhra Pradesh	Bihar
2002	0.457683207	0.528579922	0.342710377
2003	0.4659204	0.502077708	0.346321088
2004	0.447427745	0.509870889	0.331977576
2005	0.458967731	0.552262237	0.352904877
2006	0.429604313	0.550341284	0.355617152
2007	0.458970985	0.550177097	0.388021293
2008	0.456936417	0.514701495	0.368886671
2009	0.475747985	0.514129126	0.381196878
2010	0.455036569	0.527427449	0.382063602
2011	0.463736858	0.505690541	0.404090299
2012	0.496209093	0.522339513	0.4489295
2013	0.444773082	0.487336982	0.389632716
2014	0.469283025	0.51842101	0.392492761
2015	0.480824607	0.515401334	0.391900467
2016	0.47758323	0.486842043	0.368269878

Source: Author's own calculation

Figure 2. Overall Governance Index scores for the years 2002-2016



3.4 Inter-state analysis

To check whether the differences in the governance performance of various states are significant or not, the statistical tool of one-way analysis of variance (ANOVA) is applied, which is similar to the independent samples t-test. One-way ANOVA includes data assumptions of normality, sample independence, equality of variance of population and a continuous dependent variable. ANOVA can control the overall Type-I error rate (i.e. avoiding false positive statements) and is a more powerful parametric test, provided data satisfies normality assumption. But the assumptions of normality, equal variance, etc. render the test inapplicable when they are not met. Equal variance across samples is called homogeneity of variance and Levene's statistic can be used to test the same. Unequal variances (Heteroskedasticity) can affect Type-I error, thereby giving false positives. In case the results of Levene's test are significant, ANOVA cannot be applied without adjusting for heterogeneity, as 'heterogeneity has a greater effect on the robustness of ANOVA' (Blanca, Alarcón, Arnau, Bono, & Bendayan, 2017). In that case, the robust test of equality of means i.e. Welch ANOVA is applied. In case the assumption of normality is violated, the non-parametric substitute of ANOVA i.e. Kruskal-Wallis test has been applied in the literature, but since ANOVA results are robust even in case of non-normal data (Blanca et al., 2017; Pearson, 1931; Black, Ard, Smith, & Schibik, 2010; Clinch & Keselman, 1982), the non-parametric ANOVA has not been applied in this study.

To test for significance of difference between the performances of the three states, post-hoc tests have been applied for pair-wise comparisons between them. When there is equality of variances among groups, Tukey's post-hoc test is applied. When there is inequality in variance across groups, then Games-Howell post-hoc test is preferred as it yields efficient results even with unequal variances across groups (Ruxton & Beauchamp, 2008).

In its simplest form, ANOVA is conducted by computing the F-ratio, which is calculated as below:

$F = MSB / MSW$

Where,

MSB= Variance between samples = SSB / (k – 1)

[SSB= Sum of squares of deviation between samples;

And SSB = $n_1(\bar{x}_1 - \bar{\bar{x}}_2)^2 + n_2(\bar{x}_1 - \bar{\bar{x}}_2)^2 \ldots + n_k(\bar{x}_k - \bar{\bar{x}}_2)^2$ (with k-1 = v_1 degrees of freedom)]

And,

MSW = Variance within the samples = SSW / (N – k)

[SSW = Sum of squares of deviation within samples;

And SSW = $(\bar{x}_1 - \bar{x}_1)^2 + (\bar{x}_2 - \bar{x}_2)^2 \ldots + (\bar{x}_k - \bar{x}_k)^2$ (with N-k = v_2 degrees of freedom)]

The methodology tests if there is a significant difference between the performance of varyana, Andhra Pradesh and Bihar with respect to each sub-dimension and overall governance over the period of the study. The study by Mathew et. al. (2017) shows that majority of states in India retained their governance rankings over the period of time. Hence, the null hypothesis is as follows:

H0: There is no significant difference between the chosen states with respect to the sub-dimensional index and overall governance index over the period of study.

Table 3 gives classification of data to carry out one-way ANOVA. It shows that the analysis of variance is carried out for each sub-dimension separately, along with the overall governance index scores, with each analysis being carried out for the time period 2002-2016.

Each row represents the respective sub-dimensional or governance index separately for 15 years (2002-2016) for the selected three Indian states. The ANOVA results would show how significant the overall differences between the three states are over the stated time period for the respective dimension. Post-hoc tests i.e. Tukey's test and Games-Howell's test results show multiple comparisons across the states. These highlight which states' differences are most significant to cause an overall significance of difference. The results of inter-state analysis are given in Table 4.

Table 3: Inter-state variations in governance performance for SDIs and G.I. over the years

Year	Dependent Variable	States (Groups for comparison)
2002 to 2016	SDI-1	Haryana, Andhra Pradesh and Bihar
2002 to 2016	SDI-2	Haryana, Andhra Pradesh and Bihar
2002 to 2016	SDI-3	Haryana, Andhra Pradesh and Bihar
2002 to 2016	SDI-4	Haryana, Andhra Pradesh and Bihar
2002 to 2016	SDI-5	Haryana, Andhra Pradesh and Bihar
2002 to 2016	SDI-6	Haryana, Andhra Pradesh and Bihar
2002 to 2016	SDI-7	Haryana, Andhra Pradesh and Bihar
2002 to 2016	SDI-8	Haryana, Andhra Pradesh and Bihar
2002 to 2016	G.I.	Haryana, Andhra Pradesh and Bihar

3.4.1 Sub-dimensional Indexes (SDI)

From Table 4, the second column showing Levene's statistic highlights the equality of variance across states for all sub-dimensions, except SDI-2 and SDI-7 i.e. rule of law and effectiveness and efficiency respectively. Data for all three states for these respective SDIs are homogeneous and have a significant p-value in ANOVA computations, which show that there is a significant difference between Haryana, Andhra Pradesh and Bihar. The fifth column in Table 4 for Tukey's test results shows a significant difference between all three states (pair-wise) for SDI-1, SDI-4, SDI-5, SDI-6 and SDI-8. With respect to SDI-3 i.e. transparency and accountability, there was no significant difference between Haryana and Andhra Pradesh.

For SDI-2 and SDI-7, Welch ANOVA is applied to test for overall significance of difference across states, and the Games-Howell post-hoc test is applied to test for multiple group comparisons. The results of Welch ANOVA show that there was a significant difference between all three states for these SDIs. The results of Games-Howell's test show that there was a significant difference across all three states (pair-wise).

Table 4: Inter-state variations in governance performance for G.I. and SDIs over the years

SUB- DIMENSION	Levene's statistic	ANOVA p-value	Welch ANOVA p-value	Post-Hoc tests for multiple comparisons across groups	
				Tukey's test	Games-Howell's test
SDI-1	0.278	.000	-	All sig	-
SDI-2	0.007	-	.000	-	All sig
SDI-3	0.635	.000	-	HR-Bih, AP-Bih sig	-
SDI-4	0.107	.000	-	All sig	-
SDI-5	0.352	.000	-	All sig	-
SDI-6	0.64	.000	-	All sig	
SDI-7	0.045	-	.000	-	All sig
SDI-8	0.264	.000	-	All sig	-
G.I.	0.14	.000		All sig	

Source: Author's own calculation

3.4.2 Overall Governance Index (G.I.)

From Table 4, the value of Levene's statistic for overall G.I. highlights the equality of variance across states with a significant p-value in ANOVA computation, which shows a significant difference between Haryana, Andhra Pradesh and Bihar with respect to overall governance performance. For multiple pair-wise comparisons across the states, Tukey's test results confirm that there is a significant difference across all three states.

3.5 Intra-state analysis

Each of the three states has been studied over the time period 2002-2016 to analyze their governance performance over time. The time period of study has further been divided into three sub-periods viz. 2002-2006, 2007-2011 and 2012-2016 for quinquennial analysis. The performance of each state overtime w.r.t. overall governance and all the sub-dimensions has been analyzed to find the significance in their improvement or deterioration in performance over these years by using one-way ANOVA. To test the significance of difference between the performances of each state for the three sub-periods, post-hoc tests have been applied. Rank values are based on comparative performance of the selected states out of 19 major Indian states. A detailed analysis for each of the three Indian states has been given in the subsequent sub-sections. The columns in tables 5, 6 and 7 represent the results of these tests, the minimum and maximum state ranking during the period of study (2002-2016) and their difference, and lastly, the ranking of the states in the years 2002 and 2016 and their difference.

3.5.1 Haryana

Haryana's governance performance w.r.t values of SDI-2, SDI-3, SDI-4, SDI-5 and SDI-7 has varied significantly over the period of study, as given in Table 5. The state remained a middle performer throughout the period of study, but it performed poorly w.r.t SDI-6. It was the best performing state w.r.t SDI-3 in 2009, 2012, 2015 and 2016, but was the worst performing state w.r.t SDI-1 in 2013 and SDI-6 in 2002, 2003, 2010, 2012, 2014 and 2016. On comparing the ranks of the state in 2002 and 2016, there was a maximum decline in the state's ranking for SDI-1 (a fall by 10 ranks), and a maximum improvement in the state's ranking for SDI-3 (an increase of 11 ranks) which is significant according to the post-hoc results for periods 1 and 3. For SDI-6, the performance of Haryana remained constant with a rank of 19 in the respective years. Upon comparing the highest and lowest ranks for each sub-dimension over the period of study (i.e. 2002-2016), it is found that Haryana's performance fluctuated the most w.r.t SDI-1 with a difference of 12 ranks, and the least w.r.t SDI-7 with a difference of 2 ranks. Upon comparing with other states, the state witnessed the most improvement in ranking between the years 2002 and 2016 w.r.t overall governance and SDI-4, whereas for SDI-1, Haryana witnessed the least fluctuation in ranking for these years. It was also the state with the least change in ranking over the period of study w.r.t SDI-6.

Table 5: Analysis of variance of overall governance and sub-dimensional performance of Haryana over the period of study

HR	ANOVA/ WELCH p-value	Post-Hoc tests- Tukey/ Games Howell's test	Min rank 02-16	Max rank 02-16	Difference	Rank 2002	Rank 2016	Difference
GI	0.097	None sig.	6	14	8	13	6	7
SDI-1	0.479	None sig.	7	19	12	7	17	-10
SDI-2	0.002	1-3, 2-3 sig.	5	8	3	5	7	-2
SDI-3	0.018	1-3 sig.	1	12	11	12	1	11
SDI-4	0.012	1-3 sig.	4	14	10	14	4	10
SDI-5	0.001	1-3, 2-3 sig.	7	14	7	7	9	-2
SDI-6	0.267	None sig.	16	19	3	19	19	0
SDI-7	0.026	1-3 sig.	6	8	2	7	8	-1
SDI-8	0.379	None sig.	9	17	8	9	14	-5

Source: Author's own calculation

The time period of the study i.e. 2002-2016 has been divided into 3 sub-periods viz.

Period 1: 2002-2006 Period 2: 2007-2011 Period 3: 2012-2016

The post hoc results for Haryana show a varied performance during the three sub-periods for SDI-2, SDI-3, SDI-4, SDI-5 and SDI-7. There was no significant difference between time periods 1 and 2 for any of the dimensions. But between time periods 2 and 3, there was a significant difference for SDI-2 and SDI-5; and between time periods 1 and 3 for SDI-2, SDI-3, SDI-4, SDI-5 and SDI-7. This significance of difference corresponds to the maximum improvement in Haryana's performance of SDI-3 witnessed between 2002 and 2016 i.e. a gain of 11 ranks (from rank 12 to rank 1 during the period 2002-06)

3.5.2 Andhra Pradesh

Table 6: Analysis of variance of overall governance and sub-dimensional performance of Andhra Pradesh over the period of study

AP	ANOVA/ WELCH p-value	Post-Hoc tests- Tukey/ Games Howell's test	Min rank 02-16	Max rank 02-16	Difference	Rank 2002	Rank 2016	Difference
GI	0.206	None sig.	2	5	3	2	4	-2
SDI-1	0.001	1-2, 1-3 sig.	3	7	4	3	7	-4
SDI-2	0.006	1-3, 2-3 sig.	12	18	6	15	12	3
SDI-3	0.934	None sig.	1	16	15	7	4	3
SDI-4	0.003	1-3 sig.	1	9	8	1	9	-8
SDI-5	0.125	None sig.	10	17	7	15	15	0
SDI-6	0.002	1-3, 2-3 sig.	1	7	6	4	3	1
SDI-7	0.002	1-3, 2-3 sig.	4	9	5	6	9	-3
SDI-8	0.013	1-2, 1-3 sig.	5	11	6	11	10	-1

Source: Author's own calculation

From Table 6, except overall governance score, SDI-3 and SDI-5, there was a significant difference over the period of study in the values of all other sub-dimensions of Andhra Pradesh. It was the top performing state w.r.t SDI-3 in 2006 and 2007, SDI-4 in 2002 and 2003 and SDI-6 in 2003. On comparing the ranks of the state in 2002 and 2016, there was no change in its ranks w.r.t SDI-5. There was a maximum decline in the state's ranking for SDI-4 (a dip by 8 ranks) which is significant in the post-hoc test results as well, while there was slight improvement in the state's ranking for SDI-2 and SDI-3 (an increase of 3 ranks each). Upon comparing the highest and lowest ranks for each sub-dimension over the period of study (i.e. 2002-2016), it is found that Andhra Pradesh's performance fluctuated the most w.r.t SDI-3 with a difference of 15 ranks, and the least w.r.t overall governance ranking with a difference of 3 ranks.

As seen from Table 6, the post-hoc tests of Andhra Pradesh show that the state had no significant difference over these time periods for overall governance, SDI-3 and SDI-5. There was a significant difference between periods 1 and 2 for SDI-1 and SDI-8; between periods 2 and 3 for SDI-2, SDI-6, and SDI-7; and between periods 1 and 3 for SDI-1, SDI-2, SDI- 4, SDI-6, SDI-7 and SDI-8.

3.5.3 Bihar

Table 7 shows a significant difference over the period of study in the values of overall governance scores, SDI-4 and SDI-8 of Bihar. The state remained the least performing states throughout the period of study w.r.t. overall governance score and all sub-dimensions. It was the least performing state w.r.t overall governance in all years of study except 2012, 2014 and 2015. It was also the least performing state w.r.t SDI-3 in 2002 and 2003, SDI-4 in the years 2002-2006 and 2008-2010, SDI-5 in 2005 and SDI-7 in 2002 and 2005. On comparing the ranks of the state in 2002 and 2016, there was no change in its ranks w.r.t overall governance. There was a maximum decline in the state's ranking for SDI-8 (a dip by 10 ranks) which is significant as per post-hoc test results, and a maximum improvement in the state's ranking for SDI-1 (an increase of 9 ranks). Compared to other states, Bihar witnessed the most decline in ranking between 2002 and 2016 w.r.t SDI-5 and SDI-8 and the most improvement in ranking between 2002 and 2016 w.r.t SDI-7. Upon comparing the highest and lowest ranks for each sub-dimension over the period of study (i.e. 2002-2016), it is found that Bihar's performance fluctuated the most w.r.t SDI-6 with a difference of 14 ranks, and the least w.r.t overall governance and SDI-4 with a difference of 3 ranks. Upon comparing with other states, Bihar witnessed the most fluctuation in ranking over the period of study w.r.t SDI-1 and the least fluctuation in ranking over the period of study w.r.t SDI-4.

Table 7: Analysis of variance of overall governance and sub-dimensional performance of Bihar over the period of study

BIH	ANOVA/ WELCH p-value	Post-Hoc tests- Tukey/ Games Howell's test	Min rank 02-16	Max rank 02-16	Difference	Rank 2002	Rank 2016	Difference
GI	0.003	1-2, 1-3 sig	16	19	3	19	19	0
SDI-1	0.196	None sig.	4	17	13	17	8	9
SDI-2	0.07	None sig.	9	15	6	11	9	2
SDI-3	0.097	None sig.	6	19	13	19	18	1
SDI-4	0.004	1-3 sig.	16	19	3	19	18	1
SDI-5	0.698	None sig.	11	19	8	11	16	-5
SDI-6	0.046	None sig.	4	18	14	16	12	4
SDI-7	0.045	1-3 sig.	11	19	8	19	11	8
SDI-8	0.002	1-3, 2-3 sig.	8	18	10	8	18	-10

Source: Author's own calculation

The post-hoc test results show that values of overall governance scores, SDI-4, SDI-7 and SDI-8 had a significant difference over the sub-periods of the study. There was a significant difference between time periods 1 and 2 for overall governance; between time periods 2 and 3 for SDI-8; and between time periods 1 and 3 for overall governance, SDI-4, SDI-7 and SDI-8. This significance of difference corresponds to the maximum decline witnessed by the state w.r.t SDI-8 between 2002 and 2016 (a dip by 10 ranks); and an improvement in SDI-7 by 8 ranks over these years.

4. Conclusion

The quality of governance impacts the outcomes of policies, and constructing an index of governance allows measuring the governance performance. The present paper constructed an index of governance for three Indian states selected to represent high, middle and low per capita GSDP states (as per 2016-17 data) out of 19 major states and studied inter and intra state variations in their governance performance over the years 2002 to 2016. The results show that governance performance of the lowest GSDP state Bihar was the poorest, but that of the middle GSDP state Andhra Pradesh was better than the highest GSDP state Haryana. This highlights a strong relation between poor governance and low growth, but a relatively weaker relation between good governance and higher growth. An important social implication of this could be higher focus on pro-poor policies. The inter-state analysis shows that the difference in overall governance performance and sub-dimensional performance of the three states is significant, but with respect to transparency and accountability, performance of Haryana and Andhra Pradesh was not significantly different. (Mathew et al., 2016, Mundle et al., 2016). This shows a weaker link between higher growth and corruption/ crime by police.

The intra state analysis for Haryana shows that despite being the state with highest growth, it performed poorly with respect to equity and inclusiveness comprising upliftment of the socially and economically weaker sections of society, public distribution system and backward regional development. (Mathew et al., 2016). During the period of study, the state witnessed the maximum deterioration with respect to women participation. In the first two phases of the study, Haryana's performance did not vary much with respect to all sub-dimensions, except participation, equity/inclusiveness and strategic vision. But it improved in its ranking of corruption and crime by police.

The governance performance of Andhra Pradesh remained stable, with no change in its consensus ranking during the period of study. However, it witnessed a dip in ranking with respect to responsiveness of courts and police. The performance of the state fluctuated most with respect to transparency and accountability (Mathew et al., 2016, Mundle et al., 2016). Over the three time phases of study, the state performance of overall governance did not vary significantly.

Bihar was the worst performer with respect to overall governance and all sub-dimensions throughout the period of study (Mathew et al., 2016, Mundle et al., 2016). Its performance on strategic vision front deteriorated the most over the years, while it improved with respect to women participation. In comparison with Haryana and Andhra Pradesh, the effectiveness and efficiency of Bihar state government improved the most during the period of study.

Broad policy suggestions based on the above discussion include following a unified and comprehensive approach while framing policies to improve economic outcomes of governance for states with low GSDP. For states with high GSDP, policies for better governance need to have a targeted approach towards separate governance parameters. For instance, in Haryana, there is a need to increase government expenditure on participation and inclusion of socially and economically weaker sections of society, public distribution system and backward regional development. While in Andhra Pradesh, the governance performance of which has been the highest, there still needs to be policy action taken with respect to legislative and policing reforms to enhance their responsiveness. But for Bihar, other than the policies for economic growth, there is a need to prioritise policies for improving health and educational quality for human resource development, increasing expenditures on social welfare programmes, and environment for sustainability.

The main limitation of this study relates to recent years' data unavailability for most of the 75 variables selected to construct the governance index. Next, sub-dimensions of the index have been chosen theoretically based on UNDP's principles of good governance. Significance of including each of these sub-dimensions can be empirically verified in future

studies (at the national and sub-national level) by using the index values computed in this study. Dimension-wise sub-national analysis for any particular state can also be done using the index from this study.

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Appendix 1 Principles of good governance and variables identified

Sub-Dimensions	Variables	Source
SDI-1 Participation	Women Participation (in state assemblies, judiciary, police forces and elections)	Indiastat, Election Commission of India (EC) Reports
SDI-2 Rule Of Law	Incidence of crime against SC, ST women and children	National Crime Records Bureau (NCRB)
	Rate of crime against SC, ST, women and children	
	Rape and Murder victims	
SDI-3 Transparency & Accountability	Corruption (% cases charge sheeted, trials completed and pending with Anti Corruption Board)	NCRB
	Crime by police (human rights violation by police, complaints against police)	
SDI-4 Responsiveness	Pendency of IPC and SLL cases by Courts and Police	NCRB
	Vacancy of police (above ASI)	
	Police availability per 100,000 population	
SDI-5 Consensus	Inclusion in state assembly elections (voter turnout, state parties, independent candidates)	EC Reports, Indiastat
	SC/ ST representation in state assembly elections and police forces	
SDI-6 Equity & Inclusiveness	Enrolment of SC/ ST in higher education, Welfare expenditure on SC/ST	Indiastat, Economic & Political Weekly Research Foundation (EPWRF)
	Public Distribution System (% off-take)	
	Backward region development expenditure	
SDI-7 Effectiveness & Efficiency	Power (rural electrification, T&D lines and losses, availability of power, energy expenditure)	Indiastat, Reserve Bank of India (RBI) reports, EPWRF
	Urban & Housing Development Expenditure	
	Transport/ Communication (state highways' length, % expenditure on roads/bridges, teledensity)	
	Fiscal Performance (Revenue deficit, expenses on tax collection, interest payments, state's own tax and non-tax revenue	
	% Irrigation expenditure, % Irrigated to net sown area	
SDI-8 Strategic Vision	Human Resource Development (Health and education)	EPWRF
	% Social and Family Welfare expenditure	
	Environment and sustainability (forest cover, air pollution levels, % expenditure on science, technology and environment)	

Appendix 2 Per Capita Gross State Domestic Product of 19 major Indian States in 2016-17 (in Rupees)

State	Per Capita GSDP (Constant Prices- 2011-12)
Haryana	**158483**
Maharashtra	152122
Gujarat	151340
Uttarakhand	148924
Himachal Pradesh	142730
Kerala	140387
Karnataka	137858
Tamil Nadu	132838
Punjab	118557
Andhra Pradesh	**108482**
Rajasthan	80055
Chhattisgarh	74223
Odisha	72780
West Bengal	68181
Assam	59885
Madhya Pradesh	59789
Jharkhand	53840
Uttar Pradesh	44784
Bihar	**28580**

Source: EPWRF India Time Series.

Appendix 3 Sub-Dimensional Scores of the selected states for the years 2002 to 2016

a) Haryana

YEARS	GI	SDI1	SDI2	SDI3	SDI4	SDI5	SDI6	SDI7	SDI8
2002	0.457683	0.420969	0.853087	0.446596	0.499632	0.442771	0.078632	0.513792	0.405987
2003	0.46592	0.423822	0.829773	0.470242	0.456158	0.444014	0.163025	0.5013	0.43903
2004	0.447428	0.213525	0.849017	0.460431	0.542693	0.439487	0.17771	0.503434	0.393126
2005	0.458968	0.314733	0.821351	0.527248	0.520354	0.409136	0.247885	0.487812	0.343222
2006	0.429604	0.303674	0.783792	0.480298	0.423644	0.422005	0.241894	0.484094	0.297434
2007	0.458971	0.293934	0.822685	0.484591	0.553553	0.422219	0.231415	0.47489	0.388482
2008	0.456936	0.282096	0.80265	0.550663	0.544189	0.426332	0.213112	0.482254	0.354195
2009	0.475748	0.298276	0.802878	0.603307	0.540884	0.440146	0.212099	0.469094	0.439299
2010	0.455037	0.283743	0.796936	0.554448	0.467349	0.450704	0.150549	0.475778	0.460785
2011	0.463737	0.260012	0.832625	0.463434	0.605595	0.476265	0.140881	0.491795	0.439288
2012	0.496209	0.277543	0.80873	0.718725	0.718957	0.469275	0.104176	0.466857	0.405411
2013	0.444773	0.233694	0.755443	0.528815	0.587644	0.493766	0.126759	0.479401	0.352663
2014	0.469283	0.336884	0.741862	0.569257	0.581649	0.486393	0.120149	0.48329	0.43478
2015	0.480825	0.328481	0.712672	0.718477	0.565497	0.493009	0.191807	0.445077	0.391577
2016	0.477583	0.291862	0.727316	0.740095	0.599016	0.482632	0.151247	0.43158	0.396919

Source: Author's own calculations.

b) Andhra Pradesh

YEARS	GI	SDI1	SDI2	SDI3	SDI4	SDI5	SDI6	SDI7	SDI8
2002	0.52858	0.61125	0.653467	0.495143	0.728828	0.325684	0.469647	0.542043	0.402577
2003	0.502078	0.615343	0.481068	0.299429	0.676742	0.358834	0.603671	0.509121	0.472412
2004	0.509871	0.675176	0.450754	0.384755	0.694408	0.380702	0.495859	0.5439	0.453413
2005	0.552262	0.636526	0.52574	0.72071	0.710068	0.399072	0.512239	0.5355	0.378243
2006	0.550341	0.584824	0.437176	0.806991	0.699416	0.40455	0.529979	0.561512	0.378282
2007	0.550177	0.56785	0.485136	0.724627	0.673748	0.443066	0.534952	0.504695	0.467343
2008	0.514701	0.554644	0.454513	0.498584	0.620107	0.4515	0.494539	0.57458	0.469145
2009	0.514129	0.601307	0.467035	0.534898	0.600247	0.411299	0.491325	0.550584	0.456338
2010	0.527427	0.577119	0.443673	0.542227	0.656508	0.366162	0.574795	0.543074	0.515862
2011	0.505691	0.533563	0.456242	0.465125	0.612105	0.386249	0.532105	0.530631	0.529504
2012	0.52234	0.546787	0.530447	0.637906	0.686438	0.37119	0.383692	0.510175	0.512081
2013	0.487337	0.548992	0.580418	0.4678	0.5814	0.360609	0.395429	0.49999	0.464058
2014	0.518421	0.532965	0.682729	0.565593	0.579936	0.392704	0.419907	0.449277	0.524257
2015	0.515401	0.526213	0.639826	0.637579	0.553689	0.383477	0.457928	0.427788	0.496712
2016	0.486842	0.489139	0.648741	0.542618	0.504008	0.387709	0.456172	0.419446	0.446904

Source: Author's own calculation*s.*

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YEARS	GI	SDI1	SDI2	SDI3	SDI4	SDI5	SDI6	SDI7	SDI8
2002	0.34271	0.249647	0.792368	0.238879	0.214629	0.367834	0.20466	0.265471	0.408195
2003	0.346321	0.251588	0.75563	0.21049	0.211685	0.352987	0.228907	0.293446	0.465835
2004	0.331978	0.392246	0.599773	0.286144	0.086631	0.384413	0.205412	0.276474	0.424729
2005	0.352905	0.4949	0.748279	0.360467	0.217047	0.271808	0.155069	0.220975	0.354694
2006	0.355617	0.479752	0.737756	0.365117	0.156968	0.301759	0.203118	0.270232	0.330235
2007	0.388021	0.464485	0.7051	0.493139	0.263709	0.333623	0.242325	0.244912	0.356877
2008	0.368887	0.445011	0.686962	0.443255	0.197999	0.332163	0.213491	0.29355	0.338662
2009	0.381197	0.433836	0.693639	0.51653	0.189111	0.322781	0.227276	0.297586	0.368815
2010	0.382064	0.539252	0.643253	0.349759	0.276582	0.364283	0.172321	0.338274	0.372785
2011	0.40409	0.516479	0.695345	0.414598	0.393976	0.400057	0.218583	0.311401	0.282283
2012	0.448929	0.521449	0.602186	0.634945	0.49172	0.379692	0.414951	0.302344	0.244149
2013	0.389633	0.494233	0.625673	0.41117	0.42665	0.368255	0.230882	0.309205	0.250994
2014	0.392493	0.466882	0.637599	0.318489	0.385424	0.405119	0.309953	0.328928	0.287548
2015	0.3919	0.481285	0.677563	0.341573	0.307237	0.323512	0.423946	0.290643	0.289444
2016	0.36827	0.485023	0.687258	0.250053	0.29007	0.308979	0.270688	0.357218	0.296871

Source: Author's own calculations.