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Revisiting 'Demographic Performance': Population Aging and Fiscal Implications

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Abstract

The Fifteenth Finance Commission introduced a significant change by shifting from the outdated 1971 census to the 2011 census. This change was intended to reflect current demographic realities in the methodology for determining states' shares. However, this shift has disproportionately impacted states, particularly those states, that have successfully managed population growth and invested in human development. While the introduction of the "demographic performance" criterion aimed to reward states for controlling their populations, this analysis reveals the limitations of the current formula in effectively incentivizing such states. It highlights the need for a more nuanced evaluation to address demographic challenges, especially those associated with aging populations resulting from increased life expectancy and lower fertility rates, along with further fiscal implications arising from second-generation issues. To incentivize states that have achieved better outcomes in human capital, a revised approach that incorporates total fertility rates and the share of the elderly population is proposed. This approach balances historical and contemporary considerations, fostering a more equitable distribution of resources aligned with the need-based principles of fiscal federalism while simultaneously serving as a performance incentive.

Key Words: Demographic Performance; Population Aging; Elderly Population; Central Transfers; Fiscal Implications

1 Introduction

The Fifteenth Finance Commission (FC) adjusted the methodology for determining states' shares, incorporating considerations of "fiscal needs, equity, efficiency, and performance. Accordingly, the 15th Finance Commission allocated weightage as follows: 45% to income, 15% each to population and area, 10% to forest and ecology, 12.5% to demographic performance, and 2.5% to tax and fiscal efforts. Notably, it shifted focus from the outdated 1971 census to the 2011 census, intending to better capture current demographic realities. However, this change has disproportionately affected states, that have successfully curbed population growth and invested more in human development. To address this, the Commission introduced a new criterion, "demographic performance," indented to reward states for controlling their populations. This analysis explores the limitations of the current formula in incentivizing states that have effectively managed population growth, while highlighting the need for a more nuanced evaluation to address the demographic challenges particularly those related to aging populations driven by increased life expectancy and lower fertility rates that create new fiscal pressures.

Horizontal Devolution and population

Finance Commission's (FC) horizontal devolution formula has been designed to achieve the objectives: bridging the vertical fiscal gap of states, ensuring horizontal equity (favoring low-income states), equalizing fiscal capacities (revenue equalization), and addressing cost differentials in providing public services (expenditure equalization). Based on these principles, the FCs has employed three critical criteria over time: need and cost disability-based, equity-based, and efficiency-based performance indicators (see table 1). The intense distribution of tax shares has evolved through three phases. In the first phase (up to the Seventh FC), population held an overwhelming weightage (80-90%), with the remainder assigned to contributions. The second phase began with the Eighth FC, which introduced a common formula for income tax and excise duties, focusing more on equity by reducing population weightage and increasing the role of income distance. The third phase started with the Eleventh FC, further enhancing equity by reducing population weightage to 10% and increasing income distance, sparking concerns among high income states. Over time, the formula has also incorporated fiscal efficiency and disability factors, though these changes faced criticism from high-income states.

Table.1 Criteria and Weights (%) in Previous Finance Commissions

Classification	**Criteria and Weights (%) in Previous Finance Commissions**					
	Indicators	XIFC	XII FC	XIII FC	X1V FC	XV FC
Need and cost disability	Population (1971)	10	25	25	17.5	15
	Demographic change and population (2011)				10	
	Area Adjusted	7.5	10	10	15	15
	Forest cover				7.5	
	Forest and Ecology					10
Equity Based	Income Distance	62.5	50	47.5	50	45
	Fiscal Capacity Distance					
	Index of Infrasructure	7.5				
Performance Based	Tax effort	5	7.5			2.5
	Fiscal Discipline	7.5	7.5	17.5		
	Demographic Performance (1971) *					12.5
		100	100	100	100	100

Source: Based on reports of Different Finance Commissions.

*15th Fc treated it as under performance criteria.

Indeed, population is a fundamental mechanism for resource allocation, ensuring states receive resources proportionate to their population size and needs, it has a significant impact in determining states' shares in the divisible pool. On one hand, it directly reduces the percentage share for states with slower-growing populations. On the other hand, population acts as a scaling factor for assessing all other criteria like per capita income and tax effort, except cost disability parameters. In effect, population influences about 75% of transfers, both explicitly and implicitly, making it the key factor in intergovernmental fiscal transfers. The Fifteenth Finance Commission's distribution reveals significant disparities in the allocation of resources among Indian states, emphasizing for a more equitable framework that adequately addresses the varying needs of all states. Six Hindi-belt states, which account for 42.85% of India's population, are allocated 48.57% of the tax pool for the period 2021-2026. In contrast, the five southern states, representing 21.32% of the population, receive only 15.8%. Meanwhile, the western, eastern, and northern states, comprising 30.61% of the population, are allocated 25.31%. Notably, the northeastern and Himalayan states, which together account for 5.32% of the population, receive a disproportionately higher share of 10.48% (Bhattacharjee, 2021).

'Demographic Performance' and Aging Populations

The introduction of the 2011 census data, replacing the outdated 1971 census data by the Fifteenth Finance Commission (FFC), was intended to better reflect current demographic realities. However, this decision has inadvertently disadvantaged states that have effectively controlled their population growth and prioritized investments in human capital.To address this, the 15th FC introduced a new criterion 'demographic performance 'to incentivize states that have successfully managed population growth. Despite the intention to establish performance-based criteria in the Terms of Reference (TOR) of the 15th Finance Commission, the reliance on demographic data mirrors the approach of the 14th Finance Commission, which scaled its criteria using population data from 2011[1]. This shift aims to reflect the changing demographics and encourage states to focus on population stabilization and family planning efforts, promoting a more equitable distribution of resources based on current demographic realities rather than outdated population figures. This criterion, weighted at 12.5%, evaluates states based on their Total Fertility Rate (TFR), with higher scores awarded to states with lower TFRs. The score is calculated using the reciprocal of TFR, multiplied by the 1971 census data. However, despite its intent to reward demographic performance, the formula paradoxically favors more populous states.

The relevant portion of the ToR of FFC recites here; "Our ToR also makes reference to consider performance incentives to States for the efforts and progress made in moving towards the replacement rate of population growth. Better performance in the reduction of TFR also serves as an indirect indicator for better outcomes in health (especially maternal and child health), nutrition as well as education. Hence, this criterion also rewards States with better outcomes in those important sectors of human capital. Since this is an important performance criterion to reward efforts made by States in controlling their population and achieving better human capital outcomes in education and health, we have decided to assign a total weight of 12.5 per cent" (p.157).

This highlights the intention to reward states that have made significant progress in controlling their population and achieving improvements in human capital, specifically in education and health. By introducing this criterion, the FC incentivizes states to focus on these sectors, reinforcing the role of human capital in

[1] In the 14th Finance Commission (FC), "Demographic Change" was based on 2011 population data. In contrast, the 15th Finance Commission introduced "Demographic Performance" by incorporating the reciprocal of the Total Fertility Rate (TFR) and multiplying it by the 1971 population data, following the performance principle.

long-term development. However, the approach reflects only one side of the demographic dynamics and does not fully capture the realities demographic trends. The impact of prior population control measures and investments in human capital is evident in the higher proportion of elderly people. This demographic shift raises an important question, how do the current allocation criteria account for performance-based measures? States that reduced their Total Fertility Rate (TFR) earlier now have a higher proportion of elderly citizens compared to those where fertility reductions occurred later (Narayana, D. 2024). The growth of the aging population reflects increased life expectancy and lower fertility rates. Therefore, if the aim is to incentivize or reward states that have successfully controlled population growth and achieved better outcomes in human capital development, a more appropriate criterion would include both TFR and the share of the elderly population. This approach would more accurately reflect each state's demographic performance. This demographic shift not only challenges the efficacy of the performance-based approach but also highlights the need for a more nuanced approach to ensure that the criteria address the specific needs arising from demographic changes.

Fiscal Implications of Population Aging

The demographic shift toward aging populations will significantly impact labor markets, economic growth, social systems, and government budgets. With shrinking labor forces and a rising old-age dependency ratio, state will face mounting challenges. Declining fertility rates and stabilizing or shrinking populations could slow potential economic growth, even when factoring in extended working lives and advances in technology. Furthermore, the increasing demand for public spending on pensions, healthcare, and long-term care will likely put additional strain on government budgets. This fiscal pressure may limit other critical areas of public investment, such as education and infrastructure, which have historically fueled economic growth and enhanced social well-being. It is also postulated connected to ‘Cost Diseases’ that certain public services such as education and health are labor-intensive and do not experience the same productivity gains as the private sector, causing their costs to rise faster than in other sectors (Nos M, 2015; Hartwig, J., & Krämer, H;2023)

As the formal labor market shrinks, governments face the dual challenge of increased public spending on pensions and healthcare while experiencing a decline in tax revenues. The fiscal burden is exacerbated as technological innovation, such as automation, changes the economy's tax structure by shifting the tax base from labor to capital. Since capital is often taxed at lower rates, this transition could further strain public finances (Guillemette & Turner, 2018).Moreover, employment rates directly impact government finances. Lower employment results in decreased tax revenues and higher unemployment benefits. While reduced fertility rates might decrease young-age public expenditures like education, this decline is expected to be minor compared to the rise in old-age expenditures, such as healthcare and pensions. (European Commission, 2018). This imbalance highlights the need for structural reforms to address labor market participation and healthcare cost inflation, both of which could mitigate some fiscal pressures associated with aging populations (OECD, 2018). This emphasize that the fiscal pressures that arise as the dependency ratio increases, particularly focusing on the sustainability of social security systems (Heer et al. 2020). Using an overlapping generations (OLG) model, the study explicates a "threshold dependency ratio" beyond which tax revenues fail to meet social security obligations, suggesting the necessity of proactive measures to prevent fiscal imbalance that aging populations will significantly increase fiscal requirements over the long term, necessitating structural reforms to manage public debt and maintain growth prospects (Heer, Polito, & Wickens, 2020; Guillemette & Turner 2014).).

Developing economies face significant fiscal challenges from aging populations, as limited fiscal capacity intensifies the burden of rising old-age expenditures. The World Bank discussion paper highlights the need for fiscal reforms to address the growing demands on social welfare as populations age. These challenges extend beyond the sustainability of social security systems, they also raise concerns about inclusive growth (Bogetic et al. 2015; Rouzet et al. 2019). These analyses emphasize the importance of implementing inclusive policies that cater to the needs of an aging demographic while ensuring long-term fiscal stability. Their work underscores the need for a balanced approach that integrates social welfare reforms with fiscal sustainability measures to meet the demands of aging societies.

Aging Population and Need-Based Criteria for Fiscal Transfers

Given the federal structure of India, the aging population presents a significant fiscal challenge for states that have experienced faster demographic transitions. These states face a dual challenge of rising expenditure responsibilities for healthcare, pensions, and social services, alongside a shrinking potential for revenue generation. The decline in working-age populations, compounded by migration and second-generation issues, exacerbates the strain on these states' tax bases. As the demand for elderly-specific services increases, the fiscal pressure on such states intensifies, making it imperative to revisit the inter-state tax share transfer formula. This would ensure an equitable distribution of resources, maintain fiscal sustainability, and address the growing disparities between states in their capacity to manage the financial demands of an aging population through a need-based approach.

The differential rates of demographic transition significantly affect state finances, States with aging populations bear higher expenditure burdens, particularly in sectors such as health, pensions, and social security, while their revenue-generating potential may decline. India has observed a high level of financial dependency among the elderly population, along with pronounced gender and state-wise disparities (Devi, 2023). State governments bear substantial responsibilities for health and social services, and population aging is likely to increase demands for state-specific fiscal transfers. States with older populations may require more resources for infrastructure tailored to the elderly, such as public transportation and community housing. Yet, the current criteria for intergovernmental transfers do not adequately account for these needs. The Finance Commission's fund transfer mechanism has not fully addressed these demographic pressures, disproportionately affecting states with a larger elderly population, thereby creating horizontal imbalances across states.

To a comprehensive criterion

As highlighted throughout the paper we propose a revised existing criterion, introducing an adjustment linked to demographic performance as a reflection of demographic shifts to extract the overall effect the 15th Fc formula is taken as reference.[2] The revised criteria, which incorporate both fertility rate and the proportion of the elderly population, align with the Finance Commission's objective of rewarding performed states while ensuring proportional scaling based on population reinforces the need-based principle. And, also analysed the total tax share to states after incorporating this revised criterion into the devolution formula to assess the overall impact. To construct the variable, here multiplied the reciprocal of the Total Fertility Rate (TFR) by the old-age dependency ratio (ODR) for each state and scaled it using the 1971 census data in line with the methodology adopted

[2] Here used the 15th Finance Commission's formula as a reference point to assess the changes. These outcomes may change based on the criteria adopted by the upcoming 16th Finance Commission.

by the 15th Finance Commissions. The proposed formula is given here;

15th Fc's Formula is given as, $\frac{1}{TFR} * pop\ 1971$

$$Here\ TFRi = 5 \times \sum_{k=15-19}^{45-49} ASFRik$$

Considering both sides, the performance index is; $Pi = \frac{1}{TFR} * ODR$

$$Dpi = Pi * Pop(1971) \ldots\ldots\ldots\ldots\ldots. (\text{case F}) *$$

Interstate share of i^{th} state is $Dpi/\sum_{i=j}^{28} Dpj$

The proposed formula, offers a more nuanced approach compared to the previous method used by the 15th Finance Commission.[3] This factor aligns with the need-based principle, which should consider the demographic structure and the specific needs arising from an aging population, TFR alone was inadequate in capturing the full spectrum of demographic challenges. By including the old age population, the new formula addresses the needs of fertility rates and the share of transfers. States with lower TFR (indicating lower fertility and potentially higher share of old age population) would have a higher reciprocal value, aligning with the principle that states with more challenging demographic profiles should receive more resources. Further the scaling by the 1971 population maintains continuity with historical data while integrating contemporary demographic realities. This approach balances past and present considerations,

[3] Yadawendra and Lekha Chakraborty (2024), in their study, proposed introducing an additional criterion for the elderly population with a 5% weightage, while reducing the weight assigned to the population from 15% to 10%. They also suggested an alternative scenario eliminating the tax effort criterion. Rather than creating an additional criterion solely for the elderly population this study put forward a revised formula

promoting a more equitable distribution of resources that aligns with the need-based principle of fiscal federalism at the same time as a performance incentive. By addressing both fertility trends and the increasing elderly population, the new formula aims to provide a more comprehensive and fair allocation, ensuring that resource distribution better reflects the varied needs of different states.

To explicate the difference here we elucidating five different scenarios. The table.2 outlines the changes in the share allocations for each state under five different scenarios (A, B, C, D, E, F). Each case represents a different formula or adjustment in the distribution criteria, leading to varying outcomes in terms of how much each state gains or losses in its share of allocation. The table presents five scenarios for calculating the Finance Commission (FC) share, focusing on different demographic criteria. Case A reflects the allocation based on the Fifteenth Finance Commission's (FC-15) share, using the reciprocal of the Total Fertility Rate (1/TFR) multiplied by the 1971 population. Case B adjusts this by incorporating both the reciprocal TFR and the Old Age Population (OAP).Case C considers the Old Age Dependency Ratio (ODR) * 1971 census data, highlighting historical demographic trends. Case D combines the Rec TFR with the ODR addressing aging population dependency challenges. Case E takes this approach a step further by incorporating Human Development Index (HDI) performance into the formula. Case F provides a comprehensive perspective by multiplying the Rec TFR, the ODR, and the 1971 census data, illustrating the fiscal implications of an aging population on state shares.

In All cases, the case reflects comparatively better based on the criterion compared to the 15th FC recommendations. That brings a slight shift in shares for many states, with Andhra Pradesh, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Tamil Nadu, Telangana, and Uttarakhand seeing positive gains. Overall, this formula shows benefit to all states with greater demographic or fiscal needs, based on their performance considering their population size. though some large-population states affect a mere lose compare to previous formula, at the same time due to multiplication of 1971 population it also considers the population size. But in case C, where that is ODR* 1971 population avoiding the TFR impact brings loses to performed states like Tamil Nadu and Andhra Predesh, Panjab, Karnataka in comparing to case 1 and FFC formula, but further increase share to larger states Uttar Predesh, Madhya Pradesh and Bihar than FFC formula. That means it reflect the size than performance and need. The states such as Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, Uttar Pradesh, and West Bengal experience mere losses but due to scaling with 1971 population data that does not much affect. While Case B introduces relatively minor shifts compared to Case A, Kerala, Himachal Pradesh, Punjab, and Uttarakhand experience slight positive gains. While Andra Predesh, Tamil Nadu and Larger states like Bihar and Uttar Pradesh show marginal declines. Smaller states like Arunachal Pradesh and Goa see little to no change. But we couldn't see such a benefit to performing states like Andra Predesh and Tamil Nadu.

In Case B, multiplying with share of old age population instead of 1971 data larger states like Uttar Pradesh, Bihar, and Madhya Pradesh experience more noticeable losses. While in case C multiplying ODR with 1971 population, the impact on states like Tamil Nadu and Andhra Pradesh is disagreeable compared to Case A and the 15th FC formula. This case leans more towards states with larger populations indicating that it prioritizes population size over performance or demographic control. This highlights the paradox where states that have invested in population control, like Tamil Nadu and Andhra Pradesh, Karnataka, Goa, Himachal Pradesh, Panjab are somewhat affected under Case D, while larger states gain.

The last column introducing both TFR and old age dependency ratio the case F indicating a recalibration towards population-based needs and performance based introduces a slight shift in shares for many states, with Andhra Pradesh, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Tamil Nadu, Telangana, and Uttarakhand seeing slight increase compared to Case D, but overall, they maintain higher shares than in Case A as performance at the same time satisfying fiscal need arising out of demographic change. States continue to show gains under this case, benefiting from the formula's focus on performance, especially due to the adoption of the 2011 Census, without significantly affecting larger states that have been considered based on prior population sizes as in case E. States such as Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, Uttar Pradesh, and West Bengal may see minor losses, but the criteria prioritize performance as the central focus of the formula.

Variability

To assess progressivity, here analyzed a comparison between the 15th Finance Commission (FC) formula and incorporating the revised formula, evaluating the relationship between tax share and per capita income for the states. Both coefficients show (See, Appendix Table1 negative sign reflecting progressivity, that as per capita income increases, the tax share declines, aligning with the goal of redistributing funds equitably. Among variability measures, the standard deviation (3.78 vs. 3.808) and coefficient of variation (1.061 vs. 1.066) are marginally lower in the revised formula, suggesting reduced variability. Skewness also shows a slight decrease (2.14 vs. 2.15), indicating a minor reduction in the asymmetry of the data distribution. Overall, the revised formula slightly improves consistency and balance.

Conclusion

The analysis reveals that while the adoption of the 2011 Census (recent) data by the Finance Commission marks a legitimate methodological shift, it has significantly impacted states with slower population growth that now face second-generation challenges. This underscores the need to incorporate compensatory performance-based criteria to ensure that states which have effectively controlled their population are not adversely affected. While this provides a more accurate reflection of demographic realities and is justifiable, it also introduces specific challenges that must be addressed. If this approach is to be pursued, it calls for the introduction of compensatory criteria in the form of performance-based incentives. Otherwise, it may place states that have effectively controlled their population growth and invested in human capital at a disadvantage, resulting in a disproportionate reduction in their share of transfers.

The demographic transition, particularly the aging population, also demands higher public spending on elderly care, contributing to fiscal stress in states with older populations. As such, states with a higher percentage of elderly populations are disproportionately burdened, reinforcing the need for a revised devolution formula that includes both needs based and performance-based criteria. By integrating both demographic shifts and performance-based criteria, as adopted by the 15th Finance Commission, the devolution formula can ensure equitable treatment for performing states while also addressing the fiscal challenges posed by changing demographic trends. Aligning fiscal policies with these realities will ultimately foster a more balanced and sustainable model of fiscal federalism, which is likely to be a key consideration for the upcoming Finance Commission.

Table .2. Demographic performance criterion and total tax share- A comparison

States	Case A	Case B	Case C	Case D	Case E	Case F
Andhra Pradesh	4.046	4.021	3.899	3.905	4.041	4.103
Arunachal Pradesh	1.757	1.754	1.969	1.753	1.758	1.752
Assam	3.128	3.047	3.134	3.064	3.108	3.048
Bihar	10.058	10.034	9.638	10.334	9.977	10.04
Chhattisgarh	3.407	3.386	3.52	3.423	3.397	3.383
Goa	0.387	0.389	1.131	0.384	0.391	0.391
Gujarat	3.478	3.444	3.263	3.391	3.470	3.392
Haryana	1.093	1.126	1.287	1.114	1.107	1.086
Himachal Pradesh	0.83	0.837	1.358	0.825	0.839	0.839
Jharkhand	3.307	3.273	3.335	3.336	3.285	3.272
Karnataka	3.647	3.681	3.326	3.57	3.670	3.657
Kerala	1.925	1.95	2.11	2.03	2.021	2.129
Madhya Pradesh	7.85	7.854	7.624	7.953	7.816	7.808
Maharashtra	6.317	6.52	5.604	6.326	6.394	6.407
Manipur	0.716	0.716	1.093	0.708	0.717	0.71
Meghalaya	0.767	0.763	0.895	0.767	0.767	0.761
Mizoram	0.5	0.501	0.757	0.499	0.500	0.498
Nagaland	0.569	0.57	0.825	0.564	0.570	0.563
Odisha	4.528	4.513	4.516	4.544	4.499	4.567
Punjab	1.807	1.851	2.054	1.809	1.834	1.846
Rajasthan	6.025	6.052	5.874	6.123	6.030	5.981
Sikkim	0.389	0.389	0.877	0.385	0.389	0.386
Tamil Nadu	4.079	4.031	3.532	3.879	4.152	4.182
Telangana1	2.102	2.14	2.24	2.019	2.110	2.103
Tripura	0.708	0.708	1.156	0.696	0.706	0.701
Uttar Pradesh	17.938	17.889	16.712	18.273	17.827	17.855
Uttarakhand	1.118	1.124	1.465	1.125	1.123	1.121
West Bengal	7.523	7.44	6.806	7.202	7.502	7.436

*Case A = 15th FC formula (1 / TFR * 1971), Case B reflects 1 / TFR * OAP (Old Age Population), Case C reflects the reciprocal of TFR multiplied by the Share of Old Age Population, Case D reflects ODR (Old Age Dependency Ratio) * 1971, Case E reflects the reciprocal of TFR * HDI, then scaled by 1971, and Case F repeats the reciprocal of TFR* ODR, then scaled by 1971.*

Source: Author's computation based 2011 census data.

APPENDIX-1 Results of progressivity and variability analysis

Formula	correlation	P-value	regression-P-value		Std.Dev	C.V	Skewness
15th	-0.43	0.02	-1.034	0.003	3.80	1.066	2.15
Revised	-0.43	0.02	-1.025	0.002	3.78	1.061	2.14

Source: *Author's computation based on the 15th FC report and revised formula.*

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