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Provincial Finance Commission: Options for Fiscal Transfers

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The Provincial Finance Commissions were constituted in all four provinces of Pakistan in 2001. The Commissions were asked to formulate a formula for the distribution of resources among the districts in their respective province. The formula includes both transfers- the development transfer and current transfers. The purposes of the current transfers are to ensure the maintainability of existing services at the districts level and of the development grants to minimise the intra-district poverty and inter-districts income differential. In this paper we compute the Rank Correlation between the existing development grants transfer index and the deprivation index. This will help the policy-makers understood whether the transfers are fiscal need based or not? That is to highlight to what extent the existing development transfers are based on the existing level of deprivation in the districts. If not, then what can be done to make the transfers pro-poor. To assist the policy maker in this regards this study carried out a simulation when 50 percent transfers are based on population and 50 percent on deprivation. This simulation will provide sufficient range in which the policy maker can exercise their discretion to minimise poverty and at the same time provide resources to maintain existing infrastructure. The distribution of funds among the districts which is based only on expenditure needs of the districts cannot help address poverty issue. The provinces therefore, have to use different indicators in the formula of PFC Award to achieve both objectives.

The relationship among different indicators used in the formula for inter-governmental fiscal transfers is of crucial importance. Two indicators may or may not have correlation with each other; if the correlation exists it may be positive or negative and may be high or low. In each case inclusion of indicator in the formula will have different implications. If two indicators are negatively related then inclusion of either one or both will change the distribution drastically. If the two indicators are highly positively correlated, it means that they complement each other, and therefore, using both indicators in one formula would not make any difference. In order to simplify the formula

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for distribution of resources, one index from the two can be selected with higher weight. For example, two indicators population share and urbanisation has a very high correlation, say 0.95, if both are included with different weight say 55 percent and 10 percent respectively, will distribute resources almost in same fashion if only one is used with 65 percent. These and other considerations are important to keep in mind while designing formula for PFC Awards.

Each province has its own preferences according to its social, economic and political needs and selects distribution criteria accordingly. In the following section we will first prepare a menu of indicators for each province that can be used in the formula of PFC Awards and also compute correlation and co-variance matrix among the indicators to show their relative strength to change the distribution of resources.

SINDH PROVINCE

Table 1a has indicators indices their mean, median and standard deviation which show their relative strength to change the composition of fiscal transfers. Any of these indices could be included in the formula of PFC Award for the Sindh Province.

Population Index

Population index in Table 1 is constructed by taking the shares of total population (both urban and rural) of each district relative to total population of the province. Population data is based on the census of 1998. The index depicts that Karachi is the most populous district, having 32.4 percent of the population of Sindh, while Shikarpur is the least populous district having only 2.9 percent of Sindh's population.

If the province selects only population as the single criterion of fiscal transfers then Karachi will get 32.4 percent share in resources followed by Hyderabad 9.5 per cent and Larkana will get 6.3 percent. The average of resource transfer would be 6.3 percent, with a median value of 4.2 percent. The value of standard deviation has a value of 7.2 percent which indicates a very high variation in the resource distribution due to high concentration of population in few districts. Almost half of the population of Sindh lives in three districts namely Karachi, Hyderabad and Larkana. Population index has been used in the existing PFC criteria of Sindh with a weight of 60 percent.

Deprivation Index (MDI)

Deprivation index was constructed by SPDC, using Pakistan Standard of Living Measurement survey 2005. This index estimates the percentage of population in each district not having access to basic services such as, education, health, housing (quality), housing services (basic utilities), and employment. According to the index, Karachi is the least deprived, while Thatta is the most deprived of the districts of Sindh. The index ranges from maximum 7.4 percent to minimum 2.4 percent with a low variation of 1.22 percent.

Menu Tables for the Province of Sindh

Table 1a

Districts	Population	MDI-index	Poverty	Economic Base	Urbanisation	HDI-SPDC	Area Share District
Badin	3.7%	6.95%	6.70%	2.85%	3.57%	6.00%	4.77%
Dadu	5.5%	7.11%	7.01%	6.36%	4.64%	5.64%	13.53%
Ghotki	3.2%	6.32%	7.85%	5.10%	3.55%	5.32%	4.32%
Hyderabad	9.5%	5.37%	4.45%	9.73%	11.04%	5.54%	3.92%
Jacobabad	4.7%	6.84%	6.57%	1.53%	5.30%	7.21%	3.75%
Karachi city	32.4%	2.38%	1.76%	47.28%	20.59%	4.78%	2.50%
Khairpur	5.1%	6.53%	5.27%	4.94%	5.13%	5.71%	11.29%
Larkana	6.3%	6.96%	8.33%	2.27%	6.28%	6.88%	5.27%
Mirpurkhas	5.2%	6.40%	5.49%	3.78%	5.70%	5.62%	6.06%
Nausheroferoze	3.6%	6.08%	6.37%	2.69%	3.84%	5.98%	2.09%
Nawabshah	3.5%	6.51%	6.28%	3.23%	5.73%	5.45%	3.19%
Sanghar	4.8%	6.79%	4.74%	3.90%	4.96%	5.91%	7.61%
Shikarpur	2.9%	5.99%	9.81%	1.16%	5.23%	6.13%	1.78%
Sukkur	3.0%	5.06%	4.80%	2.33%	11.06%	5.46%	3.67%
Thar at Mithi	3.0%	7.28%	5.56%	0.06%	0.95%	12.02%	13.94%
Thatta	3.7%	7.43%	9.01%	2.79%	2.44%	6.34%	12.32%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mean	*6.3%*	*6.3%*	*6.3%*	*6.3%*	*6.3%*	*6.3%*	*6.3%*
Median	*4.2%*	*6.5%*	*6.3%*	*3.0%*	*5.8%*	*5.2%*	*4.5%*
Max	*32.4%*	*7.4%*	*9.8%*	*47.3%*	*12.0%*	*20.6%*	*13.9%*
Min	*2.9%*	*2.4%*	*1.8%*	*0.1%*	*4.8%*	*0.9%*	*1.8%*
Std. Dev.	*7.17%*	*1.22%*	*1.96%*	*11.17%*	*1.65%*	*4.64%*	*4.18%*

Table 1b

Correlation Matrix Sindh

	Population	MDI Index	Poverty	Economic Base	Urbanisation	HDI SPDC	Area Share District
Population	1						
MDI-index	–0.8446	1					
Poverty	–0.6554	0.66469532	1				
Economic base	0.98792	–0.8641881	–0.653	1			
Urbanisation	0.87127	–0.9433805	–0.69	0.86161	1		
HDI-SPDC	–0.2793	0.43027465	0.1211	–0.3395	–0.4652	1	
Area Share	–0.2282	0.53390522	0.0961	–0.227	–0.4557	0.482232	1

Table 1c

Covariance Matrix Sindh

	Population	MDI Index	Poverty	Economic Base	Urbanisation	HDI SPDC	Area Share District
Population	0.00482						
MDI-index	–0.0007	0.00013905					
Poverty	–0.0009	0.00014912	0.0004				
Economic base	0.00742	–0.0011026	–0.001	0.01171			
Urbanisation	0.00272	–0.0004996	–6E-04	0.00419	0.00202		
HDI-SPDC	–0.0003	8.0969E-05	4E-05	–0.0006	–0.0003	0.000255	
Area Share	–0.0006	0.00025484	7E-05	–0.001	–0.0008	0.000311	0.001638

Table 1d

Rank Correlation for Sindh Province with Alternative Simulations

	Fiscal Year 2003		Fiscal Year 2007		
	MDI-RANK	Development Transfers	MDI-RANK	Development Transfers	Proposed Transfers
Badin	3	9	5	12	3
Dadu	9	8	3	7	4
Ghotki	5	13	11	14	5
Hyderabad	15	10	14	4	15
Jacobabad	4	15	6	1	11
Karachi City	16	16	16	16	16
Khairpur	10	4	8	10	13
Larkana	13	12	4	11	14
Mirpurkhas	6	11	10	15	6
Nausheroferoze	12	6	12	3	8
Nawabshah	11	7	9	13	7
Sanghar	7	5	7	9	10
Shikarpur	8	2	13	6	2
Sukkur	14	1	15	2	9
Thar at Mithi	1	14	2	5	12
Thatta	2	3	1	8	1
Rank Correlation		–0.08824		0.038235	0.273529

Index of Poverty

Index of Poverty given in Table 1a was also constructed by SPDC. The original index shows poverty level of the districts, which is estimated by the percentage of district population living below the poverty line. Some adjustments have been made in the original index to make it useful for inclusion in PFC formula. Adjustments were made by dividing each district's poverty ratio with the summation of the poverty ratio of all districts. The adjusted poverty index tells the relative poverty of one district to other and adding all districts' poverty level gives 100. The index shows that poverty is highest in Shikarpur (9.8 percent) and lowest in Karachi (1.8 percent). The standard deviation is 1.96 percent. If all the transfers are made on the basis of this one index then the maximum 9.8 percent funds would go to Shikarpur and Karachi would get only 1.8 percent of the total allocable fund.

Index of Economic Base

The index of Economic Base uses manufacturing and agriculture value added of all the districts. The index shows that Karachi contributes 47.3 percent in the total value added of agriculture and manufacturing, while Thar At Mathi contributes only 0.1 percent. The index virtually shows the level of economic activity in the districts and the output generating capacity of the districts. If the transfers are made on the basis of economic base then the districts having greater capacity of production would get more funds. This can be used to finance further improvement in the industrial base of the districts. Standard deviation i.e. variation of the index numbers from the average is fairly high i.e., 11.2 percent shows very skewed endowment of resources among the provinces.

Inverse of Human Development Index

Human Development Index (HDI) comprises of education, health and income of district population based on PLSM survey. Level of Human development, according to the index, is lowest in Thar At Mathi and highest in Karachi. This index has a variation of 4.64 percent.

Urbanisation Index

Urbanisation Index is based on the percentage of population, estimated on the basis of the 1998 census, living in the urban areas of the districts. Karachi is the most urbanised district with 20.6 percent population living in the urban area. Thar At Mathi is the least urbanised district, since only 1 percent population of the district lives in its urban area. The variation of this index is 1.65.

Index of Area

Index of area shows district area as a percentage of total area of the province. It shows that Thar At Mathi is the largest district of Sindh, and covers 14 percent area of the province. On the other side Shikarpur is the smallest of the districts of Sindh and it occupies only 1.8 percent of the area of the province. The variation of this index is 4.18.

Tables 1b and 1c presents the correlation and covariance matrices of the indices of Sindh. The Tables 1b and 1c shows that population index is highly correlated with urbanisation index and the index of economic base. It also has positive correlation with HDI. On the other side population index has high negative correlation with the indices of deprivation and poverty. The index has very low correlation with the index of area.

Recalling the argument mentioned in the beginning paragraphs, data presented in Table 1b and 1c implies that using population index along with tax collection index, economics base index and/ or urbanisation index in the PFC formula cannot be very useful due to high positive correlation among the indices. However, using population index with the indices of poverty and deprivation might result in more equitable distribution of income.

Deprivation index is negatively correlated with urbanisation and the index of economic base. The index, however, has high positive correlation with the poverty index therefore it will again not be very useful to have together in the distribution formula.

Similarly economic base, urbanisation and HDI indices have very high positive correlation among themselves and therefore any one index with a greater weight can serve the same purpose as three indices used simultaneously with smaller weights.

Table 1d shows the rank correlation between the index of fiscal transfers and deprivation index is only 0.0382. This shows the current system of fiscal transfer is not pro-poor. It implies if this criterian is continued it will not facilitate reduction in poverty among the districts. Therefore, there is a need for the change in this formula. To assist the policy makers we have conducted two simulations to assist the government of Sindh to make necessary changes in the formula to make it more pro-poor. The first simulation show the rank correlation of the suggested fiscal transfer, which is based 100 percent on population, shows the rank correlation increases to 0.223. This correlation shows even a single criterion of population is more pro-poor than the existing formula. The second

simulation shows the rank correlation between the fiscal transfers, which is based on 50 percent on population and 50 percent on deprivation, and the rank correlation increases to 0.273. This show that these two indicators, population and deprivation, increases the poverty reduction capacity of the formula and therefore, if the poverty reduction is an objective, then both indicators must be use with higher weights.

PUNJAB PROVINCE

Table 2a shows the menu of the indicators for the province of Punjab. This Table shows how and to what extent the distribution of fiscal transfers will be different if we use different indicators in the PFC formula. The complete description of each indicator is given below.

Table 2a

Menu Tables for the Province of Punjab

Districts	Population	MDI-index	Poverty	Economic Base	Urbanisation	HDI-SPDC	Area Share District
Attock	1.73%	2.69%	1.46%	0.92%	2.52%	3.01%	3.34%
Bahawalnagar	2.80%	3.15%	3.36%	2.93%	2.26%	3.04%	4.32%
Bahwalpur	3.30%	3.27%	4.08%	3.12%	3.24%	3.18%	12.09%
Bhakkar	1.43%	3.16%	1.88%	2.50%	1.90%	2.79%	3.97%
Chakwal	1.47%	2.64%	1.87%	0.88%	1.44%	2.83%	3.18%
D.G. Khan	2.23%	3.34%	5.28%	2.09%	1.65%	3.12%	5.81%
Faisalabad	7.37%	2.47%	2.05%	6.22%	5.06%	2.92%	2.85%
Gujranwala	4.62%	2.15%	1.97%	3.25%	5.99%	2.83%	1.76%
Gujrat	2.78%	2.39%	1.32%	1.05%	3.29%	3.09%	1.55%
Hafizabad	1.13%	2.96%	2.49%	1.42%	3.23%	2.89%	1.15%
Jhang	3.85%	3.26%	3.33%	4.75%	2.77%	2.98%	4.29%
Jhelum	1.27%	2.67%	1.27%	1.93%	3.28%	2.55%	1.75%
Kasur	3.23%	2.90%	2.91%	6.19%	2.70%	2.76%	1.95%
Khanewal	2.81%	3.25%	4.02%	3.17%	2.09%	2.95%	2.12%
Khushab	1.23%	3.20%	2.52%	1.50%	2.99%	2.87%	3.17%
Lahore	8.58%	1.64%	1.20%	5.22%	9.76%	2.86%	0.86%
Layyah	1.52%	3.37%	4.23%	1.79%	1.52%	2.88%	3.06%
Lodhran	1.59%	3.63%	5.00%	1.70%	1.72%	3.20%	1.35%
M.B.Din	1.58%	2.85%	1.79%	1.57%	1.80%	2.87%	1.30%
Mianwali	1.44%	3.07%	3.66%	1.59%	2.47%	2.88%	2.84%
Multan	4.23%	2.91%	3.97%	3.82%	5.00%	3.05%	1.81%
Muzaffargarh	3.58%	3.60%	5.82%	3.80%	1.53%	3.17%	4.02%
Narowal	1.72%	2.90%	2.00%	1.03%	1.45%	3.00%	1.14%
Okara	3.03%	3.22%	3.10%	4.52%	2.73%	2.94%	2.13%
Pakpattan	1.75%	3.33%	3.80%	2.59%	1.69%	2.92%	1.33%
R.Y. Khan	4.27%	3.27%	4.74%	5.82%	2.32%	3.01%	5.79%
Rajanpur	1.50%	3.46%	5.60%	1.45%	1.72%	3.10%	6.00%
Rawalpindi	4.57%	2.32%	1.17%	1.25%	6.30%	3.08%	2.57%
Sahiwal	2.50%	3.00%	2.24%	3.37%	1.94%	2.83%	1.56%
Sargodha	3.62%	3.00%	2.65%	3.09%	3.33%	2.97%	2.85%
Sheikhpura	4.51%	2.61%	2.71%	7.90%	3.11%	2.69%	2.90%
Sialkot	3.70%	2.29%	1.44%	2.55%	3.10%	2.86%	1.47%
T.T. Singh	2.20%	2.80%	1.96%	2.15%	2.23%	2.84%	1.58%
Vehari	2.84%	3.26%	3.11%	2.90%	1.90%	3.06%	2.13%
Total	100%	100%	100%	100%	100%	100%	100%
Mean	2.94%	2.94%	2.94%	2.94%	2.94%	2.94%	2.94%
Median	2.79%	3.00%	2.68%	2.57%	2.49%	2.93%	2.35%
Max	8.58%	3.63%	5.82%	7.90%	9.76%	3.20%	12.09%
Min	1.13%	1.64%	1.17%	0.88%	1.44%	2.55%	0.86%
Std. Dev.	1.69%	0.44%	1.34%	1.75%	1.72%	0.14%	2.13%

Table 2b

Correlation Matrix Punjab

	Population	MDI Index	Poverty	Economic Base	Urbanisation	HDI SPDC	Area Share District
Population	1						
MDI-index	–0.570459	1					
Poverty	–0.170226	0.80201	1				
Economic Base	0.6887311	–0.11978	0.121953	1			
Urbanisation	0.790739	–0.7669	–0.43333	0.3049474	1		
HDI-SPDC	0.0336585	0.416994	0.555388	–0.21696	–0.11915	1	
Area Share	–0.020383	0.390375	0.471593	0.0755536	–0.17516	0.423333	1

Table 2c

Covariance Matrix Punjab

	Population	MDI Index	Poverty	Economic Base	Urbanisation	HDI SPDC	Area Share District
Population	0.000278						
MDI-index	–4.15E-05	1.9E-05					
Poverty	–3.75E-05	4.62E-05	0.000174				
Economic Base	0.0001984	–9E-06	2.78E-05	0.0002985			
Urbanisation	0.000224	–5.7E-05	–9.7E-05	8.953E-05	0.000289		
HDI-SPDC	7.93E-07	2.57E-06	1.04E-05	–5.3E-06	–2.9E-06	2E-06	
Area Share	–7.12E-06	3.57E-05	0.000131	2.735E-05	–6.2E-05	1.25E-05	0.000439

Population Index

Table 2a which shows the relative population of each district in Punjab depicts that Lahore is the most populous district, having 8.58 percent of the population of Punjab, while Hafizabad is the least populous district having only 1.13 percent of Punjab's population. If the province selects only population as the single criterion of fiscal transfers then Lahore will get most (8.58 percent) and Hafizabad gets lowest (1.13 percent) share in total resources. This Table 2a also shows the average of transfer is 2.94 percent, the median is 2.79 percent and standard deviation of transfer distribution would be 1.69 percent.

Deprivation Index (MDI)

The SPDC Multiple Deprivation Index (MDI) shows the Lodhran district is the most deprived district and has index value of 3.63 percent. Lahore is the least backward and least deprived district and has a value 1.64 percent. The mean and median value of distribution is 2.94 and 3.0 respectively and the standard deviation of transfer is .44. If only this index is used then Lodhran will get maximum share in transfer.

Poverty Index

The SPDC Poverty index gives different picture. The highest poverty registered in Muzaffargarh with an index value 3.6 percent while it is lowest in Rawalpindi has an index value 1.17 percent. The median of this distribution is 2.68 percent and standard deviation is 1.34 percent. This index if used exclusively for distribution purposes, will benefit Muzaffargarh most and Rawalpindi least.

Economic Base Index

The index of Economic Base shows the index is highest for Sheikhupura district 7.90 percent while the Chakwal district has lowest value of .88 percent.

Urbanisation Index

Urbanisation Index shows highest 9.67 percent of urban population lives in Lahore and only 1.44 percent lives in Chakwal.

Human Development Index

The Human Development Index shows the index is 2.55 lowest in Jhelum and highest 3.20 in Lodhran. This index has a low variation of 1.65 percent.

Area Index

The Bahawalpur district is the largest area-wise district of Punjab and cover almost 12.09 per cent area where as Lahore is the smallest district in Punjab in terms of area covers only 0.86. The standard deviation is 2.13.

Correlation matrix of the above indices, presented in Table 2b and c show that there is a relatively high positive correlation between population, economic base and urbanisation. On the other side there is relatively high negative correlation between population and backwardness and deprivation index.

Table 2d shows the distribution of resources based on existing formula and simulations based on alternative formulas. The existing PFC formula of Punjab distributes the resources among the districts on the basis of population 50 percent and backwardness 50 percent. It is interesting to note the rank correlation between the index of transfer based on existing formula and the backward index is 0.41 which is relatively high. This show the variation in the transfer is minimised in the existing formula and therefore it is more pro-poor.

We ran two alternative simulations. First simulation assumes distribution of transfers is solely on the basis of population. Second simulation assumes the distribution of transfers is 50 percent on population base and 50 percent on multiple development index.

Results of the first simulation given are given in Table 2d. By assigning 100 percent weights to population share index, the standard deviation of the distribution increased to 1.69 percent. Lahore gets the highest share 8.58 per cent on account of highest population. Minimum share goes to Jehlum only 1.27 percent, which has small population. The median of this distribution is 2.79 percent. This simulation shows if only population is used in the distribution criteria it will increase income inequality because no consideration is given to poverty and deprivation indices. The rank correlation between the index of transfer from this simulation and MDI is (–.297) which clearly indicate if in Punjab only population is used for distribution, it will be more dis-equiliser in character.

The Rank Correlation of second simulation is o.482. This shows if the distribution of transfer is based on 50 percent on population and 50 percent on SPDC MDI index then such transfer will be more pro-poor. It is important to note that in Punjab the existing formula is 50 percent population and 50 percent backwardness. Whereas this proposed

Table 2d

Rank Correlation for Punjab Province with Alternative Simulations

	Fiscal Year 2003		Fiscal Year 2007		
	MDI-RANK	Development Transfers	MDI-RANK	Development Transfers	Proposed Transfers
Attock	26	12	25	7	13
Bahawalnagar	11	5	15	10	19
Bahwalpur	9	25	8	23	22
Bhakkar	6	3	14	2	5
Chakwal	21	1	27	3	11
D.G. Khan	3	14	5	9	14
Faisalabad	30	33	29	29	33
Gujranwala	31	26	33	30	32
Gujrat	29	20	30	28	24
Hafizabad	20	2	19	16	1
Jhang	10	18	10	20	25
Jhelum	28	6	26	11	8
Kasur	19	28	21	25	23
Khanewal	12	22	11	19	17
Khushab	16	4	13	4	2
Lahore	34	34	34	32	34
Layyah	4	9	4	6	6
Lodhran	5	32	1	14	4
M.B.Din	23	21	23	22	10
Mianwali	13	11	16	5	7
Multan	22	31	20	27	28
Muzaffargarh	2	30	2	24	21
Narowal	24	8	22	8	12
Okara	15	24	12	1	20
Pakpattan	7	29	6	17	9
R.Y. Khan	8	10	7	26	27
Rajanpur	1	13	3	13	3
Rawalpindi	32	23	31	33	31
Sahiwal	17	15	18	18	16
Sargodha	18	16	17	12	26
Sheikhpura	25	27	28	34	30
Sialkot	33	19	32	31	29
T.T. Singh	27	17	24	15	15
Vehari	14	7	9	21	18
Rank-Correlation		0.180443		0.413293	0.48326967

formula is 50 percent population and 50 percent on SPDC MDI index. The results show the Rank correlation of the existing formula simulation and the proposed simulation which uses deprivation and backwardness are more pro-poor than the simulation which consider only the population for the distribution of resources.

NWFP PROVINCE

Table 3a shows indices of different indicators that could be included in the formula of PFC Award of NWFP.

Area Index

Area index in Table 3a depicts that Chitral is the largest district of NWFP in terms of area and if NWFP government distributes all resources on the basis of area, maximum share of 19.93 percent would go to Chitral. Malakand is the smallest district and on the basis of area it would get only 1.3 percent of the total allocable resources.

Index of Population

Index of population shares shows that Peshawar, which is again one of the smallest districts in terms of area, is the largest district in terms of population and 11.4 percent of the population of NWFP lives in Peshawar. Tank is the smallest district in terms of population. It has 1.3 percent of NWFP's population.

Index of Poverty

Index of Poverty show that poverty is highest in Upper Dir (6.3 percent) and lowest in Mansehra (2.4 percent). The standard deviation is 0.99 percent. If all the transfers are made on the basis of this one index then the maximum funds would go to Upper Dir and only 2.4 percent of the fiscal transfers would go to Mansehra.

Index of Economic Base

The index of Economic Base shows that Mardan and Peshawar are the biggest contributors, 11.97 and 11.83 percent, respectively, in the total value added of agriculture and manufacturing in NWFP, while Battagram contributes only 0.4 percent in the province's value added of agriculture and manufacturing. Variation of the index numbers from the average is 3.83 percent.

Relative Inverse of Human Development Index

Relative Inverse of Human Development Index (HDI) shows that human development conditions are best in Haripur, while it is worst in Kohistan.

Urbanisation Index

The Urbanisation Index, which is based on the percentage of population living in the urban areas of the district, shows that Peshawar is the most urbanised district with 15.7 percent population living in the urban area. Kohistan is the least urbanised district, since its urbanisation rate is zero percent.

Data presented in Table 28 shows that population share is highly correlated with urbanisation index and the index of economic base. Human Development Index and deprivation both have maximum positive correlation of 0.74 and index of HDI with poverty is 0.34. Area has high correlation with deprivation index 0.38.

Table 3b and c shows that existing PFC formula distributes the resources among the districts, 50 percent on the basis of population, 25 percent on the basis of backwardness, and 25 percent on the basis of infrastructure. Table 3d shows that based on the existing formula the Rank Correlation between the index of transfer and index of deprivation is 0.428, which show relative high correlation and indicate the transfers are pro-poor and helpful in poverty and deprivation reduction.

In search of better alternative formulae for the fiscal transfers two simulations were made. In the first simulation we tried to find how funds would be distributed among different districts if the single criterion of population is used and consequently what will be Rank Correlation between the transfer index and deprivation index.

Menu Tables for the Province of N.W.F.P

Table 3a

Districts	Population	MDI-index	Poverty	Economic Base	Urbanisation	HDI-SPDC	Area Share District
Abbottabad	4.96%	3.69%	2.43%	6.58%	5.79%	3.41%	2.64%
Bannu	3.82%	3.77%	3.81%	2.42%	2.27%	4.27%	1.65%
Battagram	1.73%	4.84%	3.35%	0.40%	0.00%	5.08%	1.75%
Buner	2.85%	4.53%	5.20%	2.45%	0.00%	4.31%	2.50%
Charsadda	5.76%	4.19%	4.68%	7.32%	6.09%	3.96%	1.34%
Chitral	1.80%	4.62%	4.70%	0.86%	3.10%	4.11%	19.93%
D.I. Khan	4.81%	4.05%	3.97%	4.02%	4.76%	4.19%	9.83%
Hangu	1.77%	4.35%	4.95%	0.33%	6.59%	5.04%	1.47%
Haripur	3.90%	3.68%	3.13%	7.73%	3.86%	3.39%	2.31%
Karak	2.43%	4.50%	4.24%	1.42%	2.09%	4.03%	4.52%
Kohat	3.17%	3.91%	3.27%	4.44%	8.72%	3.70%	3.42%
Kohistan	2.66%	5.11%	4.08%	0.81%	0.00%	5.29%	10.05%
Lakki Marwat	2.76%	4.07%	5.33%	1.66%	3.09%	4.24%	4.25%
Lower Dir	4.05%	3.88%	3.97%	1.72%	1.99%	4.27%	2.12%
Malakand	2.55%	4.15%	4.49%	2.39%	3.08%	3.78%	1.28%
Mansehra	6.50%	4.29%	2.38%	4.22%	1.72%	4.05%	6.14%
Mardan	8.23%	3.84%	4.87%	11.18%	6.53%	3.68%	2.19%
Nowshera	4.93%	3.77%	3.21%	6.04%	8.38%	3.80%	2.35%
Peshawar	11.38%	3.15%	4.19%	11.05%	15.71%	3.90%	1.69%
Shangla	2.45%	4.60%	5.82%	1.21%	0.00%	4.66%	2.13%
Swabi	5.79%	3.77%	3.13%	7.86%	5.63%	3.69%	2.07%
Swat	7.09%	4.11%	4.55%	11.09%	4.46%	3.74%	7.16%
Tank	1.34%	4.51%	4.00%	0.46%	4.84%	4.92%	2.25%
Upper Dir	3.25%	4.61%	6.25%	2.34%	1.28%	4.46%	4.96%
Total	100%	100%	100%	100%	100%	100%	100%
Mean	*4.2%*	*4.2%*	*4.2%*	*4.2%*	*4.2%*	*4.2%*	*4.2%*
Median	*3.5%*	*4.1%*	*4.1%*	*2.4%*	*3.5%*	*4.1%*	*2.3%*
Max	*11.4%*	*5.1%*	*6.3%*	*11.2%*	*15.7%*	*5.3%*	*19.9%*
Min	*1.3%*	*3.2%*	*2.4%*	*0.3%*	*0.0%*	*3.4%*	*1.3%*
Std. Dev.	*2.39%*	*0.45%*	*0.99%*	*3.59%*	*3.57%*	*0.52%*	*4.19%*

Table 3b

Correlation Matrix N.W.F.P.

	Population	MDI Index	Poverty	Economic Base	Urbanisation	HDI SPDC	Area Share District
Population	1						
MDI-index	–0.689706	1					
Poverty	–0.199112	0.364438543	1				
Economic Base	0.884616	–0.70295206	–0.22524	1			
Urbanisation	0.654618	–0.74127769	–0.21913	0.633212	1		
HDI-SPDC	–0.534189	0.742597973	0.348056	–0.71885	–0.44235	1	
Area Share	–0.159296	0.381276273	0.082009	–0.19116	–-0.20318	0.094711	1

Table 3c

Covariance Matrix N.W.F.P.

	Population	MDI Index	Poverty	Economic Base	Urbanisation	HDI SPDC	Area Share District
Population	0.000547						
MDI-index	–7.06E-05	1.91655E-05					
Poverty	–4.5E-05	1.54337E-05	9.36E-05				
Economic Base	0.000727	–0.00010811	–7.7E-05	0.001234			
Urbanisation	0.000534	–0.0001133	–7.4E-05	0.000777	0.001219		
HDI-SPDC	–6.39E-05	1.66264E-05	1.72E-05	–0.00013	–7.9E-05	2.62E-05	
Area Share	–0.000153	6.84385E-05	3.25E-05	–0.00028	–0.00029	1.99E-05	0.001681

Table 3d

Rank Correlation for N.W.F.P Province with alternative simulations

	Fiscal Year 2003		Fiscal Year 2007		
	MDI-RANK	Development Transfers	MDI-RANK	Development Transfers	Proposed transfers
Abbottabad	22	6	22	10	18
Bannu	18	12	20	12	13
Battagram	3	10	2	13	2
Buner	5	19	6	15	9
Charsadda	14	23	11	14	19
Chitral	7	1	3	5	3
D.I. Khan	9	4	15	11	16
Hangu	6	15	9	3	4
Haripur	23	3	23	18	15
Karak	13	2	8	4	7
Kohat	19	5	16	21	12
Kohistan	1	16	1	8	5
Lakki Marwat	17	9	14	7	10
Lower Dir	10	11	17	22	14
Malakand	15	8	12	9	8
Mansehra	12	13	10	20	20
Mardan	20	22	18	16	23
Nowshera	21	14	21	6	17
Peshawar	24	24	24	23	24
Shangla	2	17	5	2	6
Swabi	16	20	19	24	21
Swat	11	18	13	17	22
Tank	8	7	7	1	1
Upper Dir	4	21	4	19	11
Rank-Correlation		–0.06522		0.428696	0.733043

Results of the first simulation given in Table 3d shows the Rank Correlation between the transfer based on population only and deprivation index became (–.675) which indicate in N.W.F.P. such arrangement would be very anti pro-poor. The second simulation assumes the transfers are 50 percent based on population and 50 percent on SPDC MDI index. The resulting Rank Correlation between the proposed transfer and SPDC MDI become 0.733 which show proposed transfers are very fiscal equaliser. This proposed transfer system if implemented would reduce inter district variation in the deprivation in N.W.F.P.

BALOCHISTAN PROVINCE

Table 4a shows indices of different indicators that could be included in the formula of PFC Award of Balochistan.

Area Index

This depicts that Chaghi is the largest district of Balochistan and if Balochistan government distributes all resources on the basis of area, maximum share of 14.6 percent would go to Chaghi. Ziarat is the smallest district and on the basis of area it would get only 0.4 percent of the total allocable resources. Quetta the most developed district of Balochistan cover only 0.76 area and therefore will get less than one per cent of resources if distributed on the basis of area only. There is big variation in the size of districts of Balochistan reflected by the high standard deviation 3.97 percent. This implies that if in Balochistan resources are distributed only on the basis of area index it will lead to regional inequality in the province.

Index of Population

Index of population shows that Quetta, which is one of the smallest districts in terms of area, is the largest district in terms of population and 11.6 percent of the population of Balochistan lives in Quetta. Ziarat the smallest district in terms of area is also smallest in terms of population. The standard deviation is 2.27 percent which is high and therefore any distribution only on this criteria will not be fiscal equaliser.

Menu Tables for the Province of Balochistan.

Table 4a

Districts	Population	MDI-index	Poverty	Economic Base	Urbanisation	HDI-SPDC	Area Share District
Awaran	1.80%	4.45%	4.42%	2.07%	0.00%	3.97%	6.23%
Barkhan	1.58%	3.87%	3.79%	5.20%	1.59%	3.42%	1.01%
Bolan	4.39%	3.81%	3.27%	1.07%	2.94%	4.34%	2.31%
Chagai	3.09%	3.91%	5.52%	8.40%	3.80%	3.14%	14.56%
Dera Bugti	2.76%	3.58%	3.87%	0.03%	1.83%	6.96%	2.93%
Gwadar	2.83%	3.65%	3.41%	0.66%	11.58%	4.42%	4.87%
Jafarabad	6.59%	3.46%	3.17%	5.75%	4.24%	3.28%	0.70%
Jhal Magsi	1.67%	4.17%	3.83%	1.38%	1.58%	4.56%	0.89%
Kalat	3.62%	3.53%	3.01%	4.38%	3.05%	3.38%	1.91%
Kech(Turbat)	6.29%	3.83%	3.90%	4.72%	3.56%	3.05%	6.49%
Kharan	3.15%	4.33%	3.98%	4.26%	2.88%	3.54%	13.84%
Khuzdar	6.36%	4.06%	3.66%	2.57%	6.07%	3.78%	12.46%
Killa Abdullah	5.64%	4.13%	4.22%	1.31%	3.29%	4.24%	1.52%
Killa Saifullah	2.95%	4.29%	4.35%	3.53%	2.80%	3.83%	3.06%
Kohlu	1.52%	3.76%	3.87%	1.21%	2.08%	5.73%	2.19%
Lasbela	4.76%	3.78%	4.76%	5.59%	7.91%	3.33%	3.62%
Loralai	4.53%	3.69%	3.74%	5.13%	2.52%	3.37%	2.83%
Mastung	2.51%	3.80%	3.04%	5.78%	3.14%	3.10%	1.70%
Musa Khail	2.04%	4.62%	3.89%	0.74%	1.85%	4.70%	1.65%
Nasirabad	3.75%	3.78%	4.11%	9.50%	3.35%	3.32%	0.98%
Panjgur	3.56%	4.22%	3.57%	5.64%	1.95%	3.45%	4.38%
Pishin	5.59%	3.38%	4.47%	3.89%	1.34%	3.02%	1.68%
Quetta	11.57%	2.57%	2.45%	0.67%	15.95%	3.68%	0.76%
Sibi	2.75%	3.55%	4.01%	1.51%	6.87%	3.99%	2.25%
Zhob	4.19%	4.30%	4.74%	4.29%	3.42%	3.55%	4.76%
Ziarat	0.51%	3.49%	2.96%	10.69%	0.41%	2.84%	0.43%
Total	100%	100%	100%	100%	100%	100%	100%
Mean	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*
Median	*3.4%*	*3.8%*	*3.9%*	*4.1%*	*3.0%*	*3.5%*	*2.3%*
Max	*11.6%*	*4.6%*	*5.5%*	*10.7%*	*15.9%*	*7.0%*	*14.6%*
Min	*0.5%*	*2.6%*	*2.5%*	*0.0%*	*0.0%*	*2.8%*	*0.4%*
Std. Dev.	*2.27%*	*0.42%*	*0.66%*	*2.83%*	*3.47%*	*0.91%*	*3.97%*

Table 4b

Correlation Matrix Balochistan

	Population	MDI Index	Poverty	Economic Base	Urbanisation	HDI SPDC	Area Share District
Population	1						
MDI-index	–0.53093	1					
Poverty	–0.2382	0.505131	1				
Economic Base	–0.16324	–0.04732	0.130695	1			
Urbanisation	0.64851	–0.56867	–0.2882	–0.27428	1		
HDI-SPDC	–0.2304	0.097396	–0.00819	–0.70353	–0.05153	1	
Area Share	0.01901	0.357507	0.449549	0.098636	0.029281	–0.12716	1

Table 4c

Covariance Matrix Balochistan

	Population	MDI Index	Poverty	Economic Base	Urbanisation	HDI SPDC	Area Share District
Population	0.00049						
MDI-index	–4.9E-05	1.71E-05					
Poverty	–3.4E-05	1.35E-05	4.18E-05				
Economic Base	–0.0001	–5.4E-06	2.34E-05	0.000769			
Urbanisation	0.00049	–8E-05	–6.3E-05	–0.00026	0.001159		
HDI-SPDC	–4.6E-05	3.58E-06	–4.7E-07	–0.00017	–1.6E-05	7.89E-05	
Area Share	1.6E-05	5.75E-05	0.000113	0.000106	3.88E-05	–4.39E-05	0.0015124

Table 4d

Rank Correlation for Balochistan Province with Alternative Simulations

	Fiscal Year 2003		Fiscal Year 2007		
	MDI-RANK	Development Transfers	MDI-RANK	Development Transfers	Proposed transfers
Awaran	4	11	2	11	4
Barkhan	10	6	11	6	5
Bolan	14	19	13	20	18
Chagai	16	26	10	26	13
Dera Bugti	9	9	20	7	10
Gwadar	22	18	19	18	11
Jafarabad	18	21	24	22	25
Jhal Magsi	6	7	7	8	2
Kalat	20	15	22	13	16
Kech(Turbat)	21	14	12	14	24
Kharan	2	8	3	24	9
Khuzdar	8	17	9	16	23
Killa Abdullah	13	25	8	25	22
Killa Saifullah	12	12	5	12	8
Kohlu	3	3	17	3	3
Lasbela	17	20	16	17	20
Loralai	19	10	18	10	19
Mastung	15	5	14	5	7
Musa Khail	1	22	1	19	6
Nasirabad	11	24	15	23	15
Panjgur	7	23	6	21	21
Pishin	24	4	25	4	17
Quetta	26	13	26	9	26
Sibi	23	2	21	2	12
Zhob	5	16	4	15	14
Ziarat	25	1	23	1	1
Rank-Correlation		–0.13299		–0.4188	0.27453

Deprivation Index

Deprivation index shows that Musa Khail is the most deprived, while Quetta is the least deprived of the districts of Balochistan. The index ranges from maximum 4.6 percent to minimum 2.6 percent with a low standard deviation 0.42 percent. This low standard deviation value shows less variation among the districts in terms of deprivation index and therefore, any distribution on this basis would be more equitable.

Index of Poverty

This index shows that poverty is highest in Chaghi (5.5 percent) and lowest in Quetta (2.5 percent). The standard deviation is 0.66 percent. This implies if all the transfers are made on the basis of this index then the maximum funds would go to Chaghi and Quetta would get only 2.5 percent of the total allocable fund. The low standard deviation also indicate more equitable distribution of income if this index is used for distribution.

Index of Economic Base

The index of Economic Base shows that Ziarat contributes 10.7 percent in the total value added of agriculture and manufacturing in Balochistan, while Dera Bugti contribute only 0.03 percent in the province's value added of agriculture and manufacturing. Variation of the index is 2.83 percent.

Urbanisation Index

Urbanisation Index shows that Quetta is the most urbanised district with 15.9 percent population living in the urban area. Awaran is the least urbanised district, since its urbanisation rate is zero percent.

Human Development Index (HDI)

Human Development Index (HDI) (in Table 4a the inverse of HDI is given) shows that human development conditions are best in Ziarat, while it is worst in Dera Bugti. So if the inverse of this index is used for distribution the Dera Bugti district will get maximum share.

Table 4b and 4c presents the correlation and covariance matrices of the indices of Balochistan. The Table 4 b and c shows area, deprivation and poverty has positive correlation mean poverty and deprivation exist in those districts where area is large. Population and urbanisation has high positive correlation but has negative correlation with poverty and deprivation. However, due to high standard deviation if only area, population, urbanisation and economic base are used it will lead to more un-equitable distribution of income in the province. Therefore, for more equitable distribution of income deprivation and poverty indicies must be used with high weightage.

Table 4d shows three Rank Correlations- one is based on the index of transfers based on existing formula and deprivation index and two based on alternative transfers arrangements. The existing PFC formula of Balochistan distributes the resources among the districts on the basis of population 50 percent and area 50 percent. Table 4d shows the Rank correlation between the fiscal transfers on the basis of existing formula and the

deprivation index is –0.41. This value clearly shows the existing fiscal transfer are not fiscal equaliser, in fact, the negative value indicate this arrangement will further increase the deprivation disparity among the districts of Balochistan. There is a need to change this formula in order to reduce disparity among the provinces. To assist the government of Balochistan we have conducted two simulations.

In the first simulation we tried to find how funds would be distributed among different districts if the single criterion of population is used. The Rank correlation of this proposed transfers and deprivation index is –0.13. The distribution of resources based on only population index is still negative but has lower value than the existing formula. This implies if only population is used for distribution the inequality will increase but at a slower rate as compared to the existing fiscal arrangements.

The other simulation shows the rank correlation between the fiscal transfers and the deprivation index is 0.274. In this simulation the fiscal transfers to the districts are based on 50 percent on population and 50 percent on deprivation. This simulation shows this arrangement will make fiscal transfer fiscal equaliser and will reduce deprivation and disparity among the districts.

CONCLUSIONS

This paper computes Rank Correlation between the index of fiscal transfer and the existing deprivation index. This rank correlation indicates to what extent the existing transfer system is depended upon the existing deprivation level of each district. This paper shows in two out of four provinces, Punjab and N.W.F.P., the computed rank correlation are 0.413 and 0.428 respectively, in one province, Sindh, it is 0.038 and in one province, Balochistan, it is –0.41. The wide range of rank correlation among the provinces shows varying degree of reliance of existing development transfers system on the existing deprivation level. Two provinces, Punjab and N.W.F.P. allocate reasonably their resources based on the prevailing deprivation index, however, other two provinces, Sindh and Balochistan, do not consider much the existing deprivation indices for the allocation of resources among the district. The inter-temporal rank correlations shows except in Balochistan other three provinces had improved distributional formula.

The paper carried out a simulation for each province to assist the policy makers to make the fiscal transfer more pro-poor. The simulation is assumed 50 percent transfers are on population and 50 percent on poverty bases and therefore considers both expenditure need and the poverty level of the district. The study shows in each province especially in the two provinces Sindh and Balochistan the transfers may also be pro-poor if it is according to the suggested simulation and are much improved over the existing system of transfer. Opting this suggested system district governments would be able to expand resources on poverty alleviation programs and enhance access to provision of public services to inhabitant of the district. Therefore, district governments may also contribute along with provincial and federal governments to achieve Millennium Development Goals.