Research Report No. 43

COST OF LIVING INDEX BY CITY OF PAKISTAN

SOCIAL POLICY AND DEVELOPMENT CENTRE

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Spatial difference is living costs among different locations of a country have important implications which have generally not been recognised. First, they indicate the extent to which an integrated common market exists within the national boundaries depending upon the level of development of the transport network or presence of restrictions on the inter-regional movement of goods of local monopolies. Second, cities with lower levels of cost of living are more likely, other things being equal especially in terms of employment and income opportunities, to act as the major gravitational points in terms of future migration flows.

Third, lack of recognition of cost of living differentials can lead to significant biases in estimates of the incidence of poverty. It is common to use money income in comparing living standards and a single income threshold in measuring poverty across locations. This procedure gives a misleading picture of the benefits and costs of locating in various parts of the country. For example, if the cost of living is lower in rural areas then a common poverty line for the country as a whole leads to an overstatement of the extent of rural poverty and an understatement for urban areas.

Quantification of the cost of living index by city also enables the development of an appropriate wage remuneration policy which equalises real income across space for a particular category of worker by employers both in the public and private sectors. In Pakistan, for example, a special secretariat allowance is given to government employees located either at the federal or provincial capitals. This presumes that the cost of living is higher at such locations. Unfortunately, no research has been carried out to date in Pakistan on spatial differences in cost of living. This paper represents perhaps the first attempt at measuring the cost of living index by city of Pakistan with respect to the national average.

The paper is organized as follows: Section II presents a review of the international literature on geographic differences in cost of living. Section III presents the methodology used for determining the cost of living by location. Section IV describes the resulting estimates. Section V undertakes econometric analysis to explain the differences observed. Finally, in Section VI are presented the conclusions.

II REVIEW OF LITERATURE

Vinod Thomas [1980] focuses on the difference in the cost of living between rural and urban areas in a developing country, Peru. He finds large differences, with the cost of living being almost twice in the capital city, Lima, as compared to rural Sierra. The difference is substantially more pronounced in the case of non-food items in the consumer basket in relation to food. He estimates that lack of adjustment for the cost of living differential leads to a 16 per cent overstatement of poverty in rural Sierra and an understatement of 50 per cent of poverty in Lima.

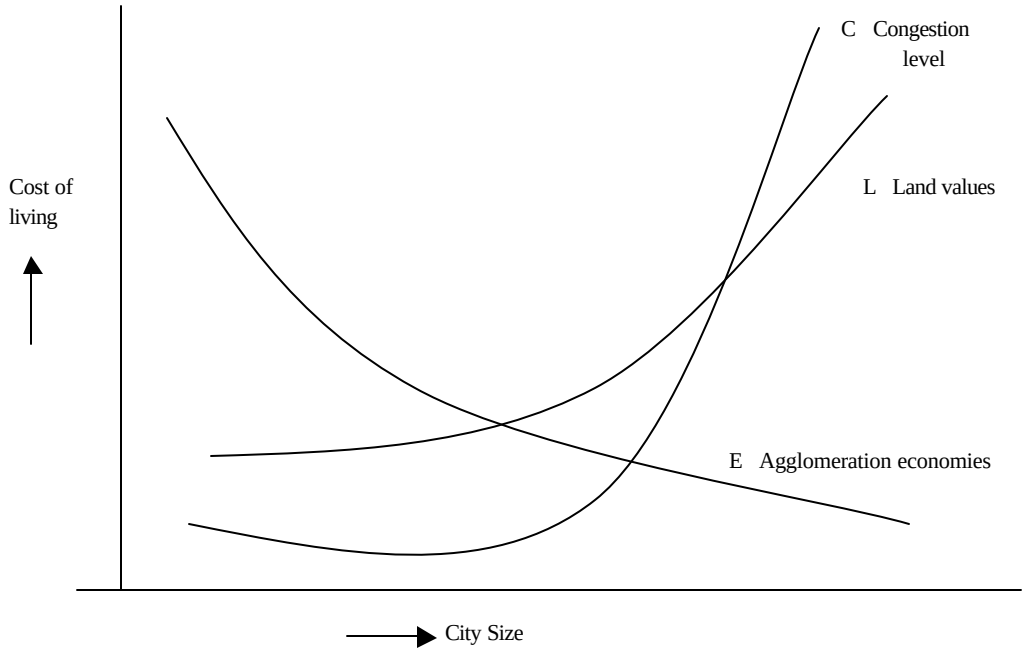
Ravallion and DeWalle [1991] construct a utility-constant cost of living index for households in the state of Java of Indonesia. The make a special effort to adjust housing rents for heterogeniety in quality. The retrieved cost function indicates that the cost-of-utility at the urban price vector exceeds its rural value, although the differential has been substantially overestimated in the past. The relative cost of urban living is found to increase as reference rural income increases.

Cebula [1980] examines the cost of living differentials among metropolitan areas (SMSAs) of the USA. He predicts a negative relationship between population size of a metropolis and the cost of living, because of agglomeration economies that are associated with lower costs of production and trading. Population density is assumed to exert upward pressure on the cost of living because congestion leads to greater transportation and marketing costs. Therefore, he essentially postulates the aggolmeration / congestion hypothesis to explain the relationship between city size and cost of living. His empirical analysis confirms the negative relationship with respect to population size and the positive relationship with respect to density. In an extension, Ostrosky [1983] shows that the results improve when fuel-cost (utility-bill) differences are allowed for.

Langsten, Ramussen and Simmons [1987] have argued that an alternative to the agglomeration/ congestion explanation of geographic cost of living cost differentials is rooted in rent theory. Given the positive relationship between urban size and land rents, they see this as a factor contributing to higher cost-of-living in larger cities.

The review of literature leads to the conclusion that there are a number of factors operating on the cost of living at different locations. As shown in Figure 1, agglomeration economies in trading / production tend to keep costs low in larger cities while rising land values and congestion levels contribute to higher costs in such cities. Overall, therefore, there is likely to be an ambiguous relationship between city size and cost of living.

FIGURE 1
FACTORS CONTRIBUTING TO COST OF LIVING



III METHODOLOGY AND DATA

We describe now the methodology used for constructing the cost of living index by location. We designate the following:

P_{ij} = retail price of commodity / service j in location i
q_j = average household consumption nationally of commodity / service j
P_j = average national price of commodity / service j
N_i = number of households in location i

Then we have

$$P_j = \frac{\sum_i N P_{ij}}{\sum_i N_i}$$

(1)

and the cost of living index, I, at the ith location is given by

$$I_j = \frac{\sum_j P_{ij} \bar{q}_j}{\sum_j P_j \bar{q}_j}$$

which transforms to

$$I_i = \sum_j \left(\frac{P_j \bar{q}_j}{\sum_j P_j \bar{q}_j} \right) \bullet \left(\frac{P_{ij}}{P_j} \right)$$

(2)

The first expression on the right hand side of (2) is the share of expenditure on commodity / service j in total expenditure at the national level, while the second expression sit he relative price of item j in the ith location as compared to the national average price.

Monthly data on retail prices of 274 commodities / services have been extracted from the Monthly Bulletin of Statistics of the Federal Bureau of Statistics. Annual average is computed from the monthly prices. Information on prices is available for 25 major urban centres of Pakistan. These centers correspond to the largest cities or towns of the country and account for more than 65 per cent of the total urban population. Included are 14 cities from the Punjab, six from Sindh, four from the NWFP and one from Balochistan. Corresponding price information is not available for rural areas, and, therefore, the analysis has to be restricted to urban areas only.

Information on average monthly household expenditure in urban areas on each commodity / service has bee n obtained from the latest Household Income and Expenditure Survey of 1997-98, carried out by the Federal Bureau of Statistics. Cost of living indices for each city have, therefore, been constructed for 1997-98. Population figures for each city have been taken from the Population Census of 1998.

TABLE 1
COST OF LIVING INDEX BY CITY
(National Average = 100)

City*	Prov-ince**	Popula-tion (000)	NATIONAL AVERAGE = 100					
			Food and Beverages	Apparel and Footwear	Fuel and Lighting	Rent	Others	All
Karachi	S		108.23	103.64	99.39	98.00	99.20	104.84
Lahore	P		94.46	89.96	102.61	101.00	101.76	93.36
Faisalabad	P		96.78	103.70	101.69	105.00	103.40	99.31
Rawalpindi	P		100.19	98.54	104.23	99.00	99.39	100.26
Hyderabad	S		100.98	102.03	96.74	99.00	110.55	102.93
Multan	P		96.16	111.86	100.92	106.00	100.41	99.30
Gujranwala	P		90.80	93.65	104.27	98.00	96.73	93.48
Peshawar	N		98.20	105.35	99.93	99.00	97.16	98.76
Sialkot	P		96.49	103.20	102.97	100.00	106.76	100.46
Sargodha	P		91.05	97.54	89.59	105.00	95.59	93.37
Quetta	B		104.15	100.24	97.31	94.00	95.26	100.84
Islamabad	F		102.84	101.35	104.40	98.00	100.37	102.28
Jhang	P		87.86	92.69	92.13	104.00	97.23	91.24
Sukkur	S		95.55	105.20	94.99	99.00	98.33	96.96
Bahawalpur	P		91.21	89.31	95.97	106.00	94.02	92.71
Gujrat	P		97.24	91.02	95.50	98.00	99.65	97.05
Sahiwal	P		87.80	103.43	93.01	105.00	97.30	92.35
Mardan	N		93.19	91.34	99.04	99.00	96.38	94.36
Mirpurkhas	S		92.77	93.61	92.14	99.00	95.32	93.68
Larkana	S		92.37	96.05	93.88	99.00	98.36	94.33
Rahim Yar Khan	P		91.32	105.85	95.21	106.00	96.49	94.58
Nawabshah	S		96.01	92.12	92.40	99.00	103.10	96.66
Abbotabad	N		97.82	109.77	94.50	99.00	96.95	98.60
Muzaffergarh	P		92.14	95.48	94.24	106.00	98.36	94.42
Bannu	N		93.97	85.46	93.24	99.00	91.44	92.56
Standard deviation			4.88	6.77	4.33	3.36		3.66
Range (Max – Min)			20.37	25.21	14.81	12.00		13.60

*presented in descending order of population
** S = Sindh, P = Punjab, N = NWFP, B = Balochistan

IV THE RESULTS

Table 1 gives estimates of the overall costs of living index for each city and for each major consumption category like food and beverages, apparel and footwear, fuel and lighting, rent and others. For all commodities / services combined, the most expensive city of Pakistan is

Karachi, the largest metropolis. The cheapest location is Jhang, a relatively small town located in the South of Punjab. The difference in the cost of living index between these two urban centres is about 15 per cent. Generally, appears to be a positive correlation between there city size and cost of living. There are, however, significant exceptions. Lahore appears to be a relatively cheap city. Despite being the second largest metropolis. It has a cost of living index four per cent below the national average. As opposed to this, Islamabad, a relatively small city serving as the national capital, has a cost of living index two per cent above the national average.

Among consumption categories, the largest spatial variation is observed in the case of apparel and footwear and the least in the case of house rent. The difference between the highest and lowest estimate of the cost of living index is 31 per cent and 13 per cent respectively. Analysis of locational differences in prices of individual commodities / services reveals interesting patterns. The biggest difference is observed in the case of perishables, which cannot be moved over long distances, like milk, fruits and vegetables. In such cases because of the limited scope for trade to equalise prices across space, costs appear to reflect local supply conditions in relation to demand. For example, the price of milk is the highest in Karachi, almost 24 per cent above the national average.

There are, however, a number of reasons why the estimates of spatial differences in cost of living may be biased. Higher costs of living in metropolitan cities may reflect the higher quality of consumption because of larger money incomes. Therefore, if, somehow, an adjustment could be made for quality differences then the spread in cost of living among locations could be smaller. Another factor which tends to artificially reduce the difference among locations is the policy followed by some public or private manufacturers or suppliers to charge the same retail price throughout the country irrespective of location. This practice is observed especially in the case of items like petroleum, oil and lubricants, cigarettes, tea, etc. the data base on prices reveals that this is the case for about 10 per cent of total consumption expenditure. If the cost of living index is derived for the remaining 90 per cent of expenditure then the difference between the highest and lowest cost of living index rises to 17 per cent, as compared to 15 per cent for the overall cost of living index.

V ANALYSIS

We now set up a model to explain the variation in cost of living among locations.

The following explanatory variables are used.

Population: It has been argued earlier that the relationship between city size and cost of living is ambiguous. This is tested for by taking a cubic polynomial of population.

Distance from National Highway: The main road artery of Pakistan is the National Highway, which runs from Karachi to Peshawar. The main railway line also lies in close proximity to the highway, for most of the distance. We expect that, other things being equal, cities on the highway are likely to have lower transport costs and, therefore, a lower cost of living.

Per Capita Income: there is likely to be a positive relationship between average per capita income of households at a location and the cost of living, due in particular to a stronger preference for better quality. Data on per capita income at the city level is not available in Pakistan. Therefore, industrial value added per capita is used as a proxy. Data on industrial value added by location has been extracted from the Census of Large-Scale Manufacturing Industries, carried out periodically by the Federal Bureau of Statistics.

Provincial Dummy Variables: provincial dummy variables have been created. .... ND, for example, has a value of 1 in the case of cities of the NWFP and zero otherwise. Similarly, the dummy variables – BD, SD, ID – have been specified for Balochistan, Sindh and Islamabad, the capital city. In the case of cities of Punjab, all four dummy variables have the value of zero.

These dummy variables have been included to capture, albeit in a somewhat crude way, differences in local conditions with respect to demand and supply. For example, the province of Balochistan is generally in food deficit and, therefore, other things being equal, food prices are likely to be higher.

Results of OLS regressions of cost of living with respect to the above explanatory variables are presented in Table 2. The model is able to explain over 77 per cent of the spatial variation

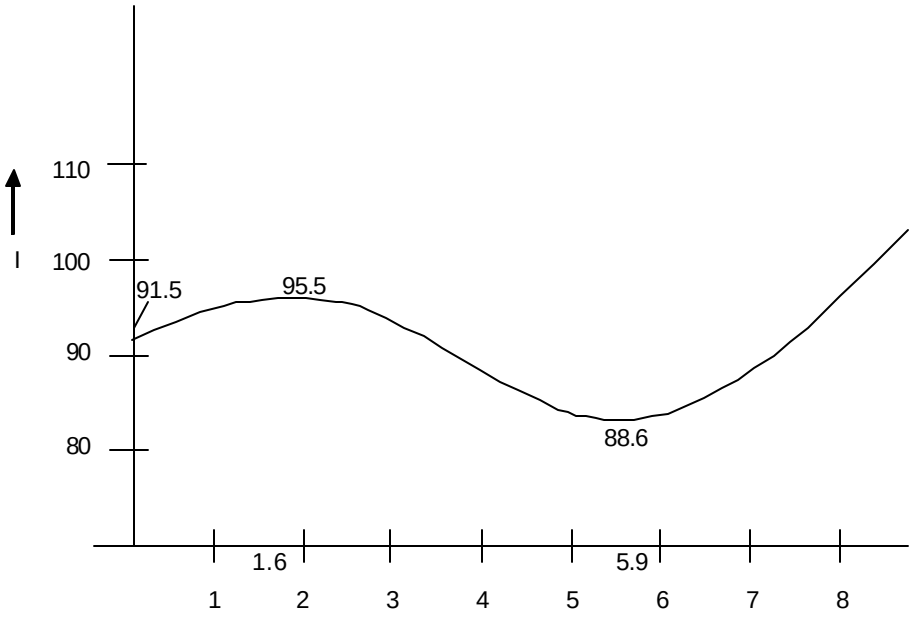
in the overall cost of living. The cubic expression with respect to population works well and all three powers emerge as significant. The funtional relationship is presented in Figure 2. other things being equal, the cost of living tends to rise upto a population of about 1.6 million and then starts falling upto a population of about 6 million, with the minimum index value of below 89. It rises rapidly thereafter. Therefore, it appears that cities with relatively low cost of living are likely to be medium sized with populations between 2 to 6 million. These are cities where probably the gains from agglomeration economies exceed the costs of higher congestion and land values. It might even be argued that from the viewpoint of efficiency these are cities which should be targeted for future growth in spatial planning.

TABLE 2
RESULTS OF REGRESSIONS COST OF LIVING INDEX

Variable	Food and Beverages	Apparel and Footwear	Fuel and Lighting	Rent	Overall
Constant	88.981 (69.194)*	93.161 (26.551)*	92.190 (62.794)*	104.764 (85.202)*	91.545 (82.877)*
N	$4.557X10^{-6}$ (1.796)**	$1.169X10^{-5}$ (1.688)	$8.490X10^{-6}$ (2.930)*	$2.386X10^{-7}$ (0.098)	$5.240X10^{-6}$ (2.404)*
N^2	$-1.863X10^{-12}$ (-2.002)**	$-5.170X10^{-12}$ (-2.037)**	$-2.300X10^{-12}$ (-2.166)*	$-8.326X10^{-14}$ (-0.094)	$-2.028X10^{-12}$ (-2.538)*
N^3	$1.767X10^{-19}$ (2.122)**	$4.687X10^{-19}$ (2.063)**	$1.652X10^{-19}$ (1.738)	$1.116X10^{-20}$ (0.140)	$1.792X10^{-19}$ (2.506)*
PCA	0.091 (2.794)*	0.098 (1.176)	0.029 (0.843)	-0.048 (-1.632)	0.083 (3.167)*
DHW	0.101 (0.081)	-2.569 (-0.757)	1.511 (0.811)	-0.869 (-0.731)	-0.316 (-0.297)
ID	2.984 (0.866)	-3.874 (-0.412)	3.915 (0.996)	-1.472 (-0.447)	0.664 (0.224)
ND	1.092 (0.617)	-1.561 (-0.323)	-0.091 (-0.045)	-3.023 (-1.786)**	-0.807 (-0.531)
BD	8.345 (2.815)*	-3.105 (-0.384)	-0.459 (-0.136)	-8.328 (-2.938)*	2.560 (1.005)
SD	2.227 (1.417)	-0.144 (-0.035)	-2.300 (-1.336)	-3.703 (-2.569)*	1.351 (1.043)
R2	0.824	0.322	0.710	0.661	0.770
Degrees of Freedom	15	15	15	15	15
F	7.819*	0.793	4.081*	3.255*	5.570*

*
**

FIGURE 2
RELATIONSHIP BETWEEN CITY SIZE AND COST OF LIVING



The only other variable which emerges as significant in the overall regression is per capita income, with the expected positive sign. Other variables have the right sign, but are not statistically significant. It may be noticed that in the regression for cost of food and beverages, the coefficient for the Balochistan dummy variable has a large positive magnitude and is statistically significant. This highlights the impact on food production of limited local production, especially of wheat.

Overall, the results tend to demonstrate that the overall cost of living is influenced less by inter-urban factors like the differences in the local demand-supply conditions, distance from major transport networks, etc, and impacted more by intra-urban determinants related more to the presence of aggolmeration economies / congestion and the level of land values. This highlights the fact that, by and large, an integrated national market has emerged in Pakistan for most commodities and tradeable services, except for food items like wheat, where inter-provincial restrictions on movement continue to exist.

VI CONCLUSIONS

The paper has constructed a cost of living index for the major 25 cities and towns of Pakistan, perhaps for the first time. Significant spatial variation is observed in the level of cost of living with the difference between the maximum (in Karachi) and the minimum (in Jhang) exceeding 15 per cent. At least three of the federal / provincial capitals, viz., Karachi, Islamabad and Quetta, have cost of living indices above the national average, justifying special allowances to workers in their remuneration packages at these locations.

Most of the explanation for the geographic differences in cost of living appear to relate to intra-urban factors like the presence of agglomeration economies / congestion and the level of land values. Medium sized cities tend to have relatively low costs of living, implying that such cities may be more efficient in production and marketing and as such be perhaps targeted more for future urban growth.

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