

Commentary

A New Measure of Inequality in Asian Economies

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The paper describes a new measure of inequality the Pashum ratio, which was first used in the UNDP Human Development Report for 2020 of Pakistan. The latest estimates of the extent of income inequality are derived from 18 Asian economies using the Gini coefficient and the Pashum ratio respectively. The relative position of nine out of the 18 countries varies in the two measures. Also, the greatest inequality among quintiles is observed in virtually all countries between the top and the second quintile.

A number of inequality measures have been developed in the literature. The first and the simplest measure is the quintile dispersion ratio which is the ratio of the share of the top quintile and the bottom quintile. This measure focuses only on the extreme of a distribution.

The Palma ratio quantifies the ratio of the share of the top decile and the combined share of the bottom two quintiles. It is a useful measure for policy-makers who need to decide on the extent of redistribution via progressive taxation and other measures.

The most widely used measure of inequality is the Gini coefficient. It ranges from zero to one. The value of these coefficient is derived from the Lorentz curve. It satisfies the requirements of mean independence, that if incomes are doubled, the measure remains unchanged. Similarly, it has the property of population size independence and satisfies the Pigou-Dalton axiom that a transfer of income from the rich to the poor should reduce income inequality.

The more complex measure is the Theil index from the viewpoint of measurement. It is not intuitive in nature and does not have a clear interpretation the Gini coefficient. As such, it has seldom been used in empirical research.

The objective of this paper is to present a new measure of inequality, the Pashum ratio. It was first developed and presented in the UNDP country human development report of 2020 for Pakistan (2020).

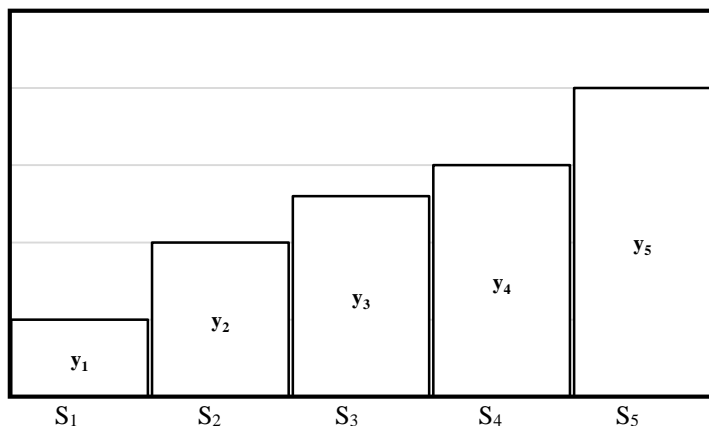
Section 1 describes the methodology for deriving the Pashum ratio. Section 2 demonstrates that the Pashum ratio satisfies the various axioms of inequality. Section 3 then applies the Pashum ratio to construct a ranking of selected Asian countries in terms of the level of inequality.

This ranking is then compared in Section 4 with the ranking obtained by estimation of the Gini coefficient of inequality of the selected countries.

1. THE PASHUM RATIO

The Pashum ratio is derived first in the case where the share of different quintiles are available, as shown in Figure 1. Here, we have that

Fig. 1.



$$S_i = 0.2, i = 1 \sum_{i=1}^n y_i = 1 \quad \text{and} \quad y_{i+1} > y_i \quad \text{for } i = 1, n - 1$$

The Pashum ratio, PR, is derived as

$$PR = \left(\frac{1}{1-S_1} \right) \sum_{i=1}^{n-1} \left(\frac{y_{i+1}}{y_i} \right) S_i - 1 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

In effect, the PR is the weighted average of the ratio of income shares of successive quintiles.

It may be noted that in the case of a uniform distribution

$$S_i = 0.2, y_i = 0.2$$

$$PR = 0$$

Therefore, PR ranges from 0 to α .

Also, where we have the quintile distribution of income, Equation (1) is simplified as follows:

$$PR = \frac{1}{4} \left[\frac{y_2}{y_1} + \frac{y_3}{y_2} + \frac{y_4}{y_3} + \frac{y_5}{y_4} \right] - 1 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

2. SATISFACTION OF AXIOMS OF INEQUALITY

The first axiom is scale invariance. This is the case with the Pashum ratio. The important axiom is the Pigou-Dalton principle of transfers as highlighted above.

The rich are in the top quintile and the poor generally in either the bottom quintile or in the bottom top quintiles.

A transfer of ϵ from the quintile to the bottom quintile changes the Pashum ratio to the following:

$$PR = \frac{1}{4} \left[\frac{y_2}{y_1 + \epsilon} + \frac{y_3}{y_2} + \frac{y_4}{y_3} + \frac{y_5 - \epsilon}{y_4} \right] - 1 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

The new PR in [2] is clearly less than that in [1] because

$$\frac{y_2}{y_1 + \varepsilon} < \frac{y_2}{y_1} \text{ and } \frac{y_5 - \varepsilon}{y_4} < \frac{y_5}{y_4}.$$

The final axiom is that of decomposability. This is very much the case with the Pashum ratio and it is possible to locate in which part of the income distribution inequality is the greatest.

The generalized expression when the S_i are not the quintiles is as follows:

$$PR = \left(\frac{1}{1 - S_1} \right) \left\{ \sum_{i=1}^{i=n-1} \frac{\left(\frac{y_{i+1}}{S_{i+1}} \right)}{\left(\frac{y_i}{S_i} \right)} \cdot S_{i+1} - 1 \right\} \dots \dots \dots \dots (4)$$

3. RANKING OF COUNTRIES IN INCOME INEQUALITY

A number of countries of Asia have been selected from different regions, namely, South Asia, SouthEast Asia, Northeast Asia and the Pacific. The total number of countries is eighteen. Data on the income distribution by quintile has been obtained from the World Development Indicators data base of the World Bank. The data for the latest year for which the information is available has been selected. For each country selected the magnitudes of the Gini-coefficient and the Pashum ratio have been derived. The estimates are presented in Table 1 in order of the ranking.

Table 1
Rank Ordering of Selected Asian Countries by the Magnitude of the Gini Coefficient and the Pashum Ratio respectively

Ranking	Country	Gini Coefficient	Ranking	Country	Pashum Ratio
1	Papua New Guinea	0.388	1	Papua New Guinea	0.765
2	Philippines	0.387	2	Philippines	0.717
3	Malaysia	0.380	3	Malaysia	0.711
4	Sri Lanka	0.359	4	Samoa	0.650
5	China	0.356	5	Sri Lanka	0.647
5	Samoa	0.356	6	China	0.642
5	Lao PDR	0.356	7	Lao PDR	0.635
8	Indonesia	0.352	8	Indonesia	0.628
9	Vietnam	0.330	9	Vietnam	0.610
10	India	0.328	10	India	0.565
11	Thailand	0.324	11	Thailand	0.550
12	Nepal	0.305	12	Japan	0.540
13	Japan	0.304	13	Korea, Rep of	0.522
13	Mongolia	0.304	14	Mongolia	0.520
15	Bangladesh	0.299	15	Nepal	0.510
16	Korea, Rep of	0.293	16	Bangladesh	0.500
17	Pakistan	0.291	17	Pakistan	0.480
18	Myanmar	0.282	18	Myanmar	0.473

The Gini-coefficient varies by 37.5 percent between the most unequal distribution country and the least unequal country. The variation is larger in the Pashum ratio at 61.7 percent. Also, while all countries have different magnitude in the Pashum ratio, this is not the case with the Gini-coefficient. For example, three countries, namely, China, Samoa and Lao PDR have the same Gini-coefficient at the third place of decimals. Therefore, it appears that the Pashum ratio is a more sensitive inequality measure as it can range from zero to infinity, whereas the Gini-coefficient can vary only from zero to unity.

There are also significant differences in country rankings as revealed by the two measures. For example, out of the 18 countries, the biggest difference in ranking is observed in case of the Republic of Korea. It is ranked 16th according to the Gini-coefficient while the ranking given by the Pashum ratio is 13th. Among the eighteen countries, nine have different rankings in the two measures. However, the rankings are robust at the upper end and lower end of the country distributions. The overall rank correlation coefficient is 0.97.

4. POLICY IMPLICATIONS

The Pashum ratio enables determination of which part of the income distribution, inequality is the highest and the lowest. The findings are reported below in Table 2.

Table 2

<i>Greatest and Least Inequality within Income Distribution</i>		
	Location of Greatest Inequality	Location of Lowest Inequality
4 th vs. Lowest Quintile	Korea, Rep of	
3 rd vs. 4 th Quintile	Korea, Rep of	Indonesia, China, Papua New Guinea
2 nd vs. 3 rd Quintile	Korea, Rep of	All Countries, except Indonesia, China, Papua New Guinea
Top vs. 2 nd Quintile	All countries, except Korea, Rep of	

A clear pattern is visible. The greatest inequality is observed between households in the top quintile versus these in the fourth quintile. This is frequently due to mechanisms of state capture by the elite of a country.

These include tax breaks and concessions, preferential access to ownership of land and access to bank credit, unbridled exercise of monopoly power and so on. The real challenge is for the authorities to reduce inequality, especially when many of them are part of the elite.

In conclusion, an attempt has been made to present an alternative measure of inequality, the Pashum ratio, which is relatively easy to compute, has a clear intuitive interpretation, satisfies the various axioms of inequality and is a more sensitive measure than the Gini-coefficient.

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