# The equity index and the gross equity product

In a previous correspondence[1] we had proposed a second-order econometric indicator named the gross prosperity product (GPP) as a meaningful measure to compare economies for year-to-year growth and against each other. The primary indicators which are proxies for quality and quantity in econometrics are the per capita income and the size of the population[1]. These led to composite performance indicators of first-order (GDP for gross domestic product) or second-order (GPP for gross prosperity product) depending on the power to which the quality proxy has been raised.

The econometric indicators are generated in a simple fashion. If a district/state/country is taken as a unit and has a population $p$ and a GDP $c$, then the per capita income is given by $i = c/p$. The population $p$ is the zeroth-order measure of size ($p = i^0 p$). Then, the GDP becomes the first-order measure of econometric performance ($c = i^1 p$). We propose an econometric indicator of the second order[2,3]. Thus at the unit level, the second-order econometric indicator is $e = x = i^2 p$. It appears that at the unit level, one cannot make a distinction between $e$ and $x$. However, when districts/states/countries are grouped together into a larger comity, so that $C = \sum c$, $P = \sum p$, $I = C/P$, then $E = \sum e$ is distinct from $X = IC$. At this level, except where there is perfect equality across all units in the comity, $X < E$. Thus $\eta = X/E$ becomes a useful measure of equity (or inequity).

We now use the same econometric data used earlier[1]. These are IMF figures for 184 countries as displayed in Wikipedia (http://en.wikipedia.org/wiki/List_of_countries_by_GDP_nominal), accessed on 17 January 2012). The equity index was found to be 0.308 (where 1 means perfect equity across nations). It becomes possible now to combine the

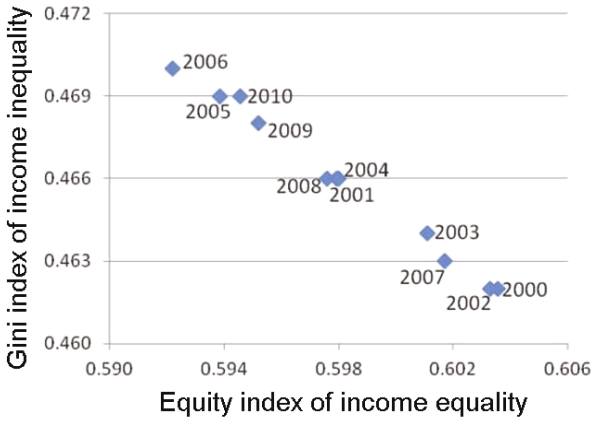


**Figure 1.** Scatter plot of the equity index and the Gini index of income inequality for shares of household incomes by quintiles in the US from 2000 to 2010.

**Table 1.** Computation of the gross equity product (GEP) and equity index from the gross prosperity product (GPP) shown for a selected few of the 184 countries in the IMF list

| Per capita GDP (US$/person) | Zeroth-order indicator – population | First-order indicator – GDP (US$m) | Country | Second-order indicator – GPP (US$/person) |
|---|---|---|---|---|
| 48,147 | 312,892,101 | 15,064,816 | United States | 7.25E+17 |
| 45,774 | 127,919,408 | 5,855,383 | Japan | 2.68E+17 |
| 44,558 | 81,435,949 | 3,628,623 | Germany | 1.62E+17 |
| … | … | … | … | … |
| 5,184 | 1,348,084,491 | 6,988,470 | People's Republic of China | 3.62E+16 |
| … | … | … | … | … |
| 12,917 | 194,931,253 | 2,517,927 | Brazil | 3.25E+16 |
| … | … | … | … | … |
| 8,342 | 50,591,825 | 422,037 | South Africa | 3.52E+15 |
| … | … | … | … | … |
| 3,469 | 240,511,675 | 834,335 | Indonesia | 2.89E+15 |
| 1,527 | 1,207,191,880 | 1,843,382 | India | 2.81E+15 |
| … | … | … | … | … |
| 1,164 | 175,327,320 | 204,081 | Pakistan | 2.38E+14 |
| … | … | … | … | … |
| 690 | 166,627,536 | 114,973 | Bangladesh | 7.93E+13 |
| … | … | … | … | … |
| 1,382 | 168,596 | 233 | Sao Tome and Principe | 3.22E+11 |
| 258 | 4,472,868 | 1,154 | Liberia | 2.98E+11 |
| 2,960 | 12,500 | 37 | Tuvalu | 1.10E+11 |
| 10,197 | 6,886,636,176 | 70,223,389 | $E = \sum$ (Second-order GDP indicators) = $\sum ic$ | 2.33E+18 |
| | | | GPP $X = IC$ | 7.16E+17 |
| | | | Equity index = $X/E$ | 3.08E-01 |
| | | | GEP | 2.20E+17 |

equity index with the GPP to propose a gross equity product as GEP = $\eta X = \eta^2 E$ for the comity of 184 nations. Table 1 shows the protocol for the computation of the GEP and equity index from the GPP for 184 countries in the IMF list. Indeed, this can be done for a country by taking state-wise figures, etc. if fine-grained data are available about the income distribution in the country. The equity index is a second-order indicator that is a promising alternative to the Gini index as a measure of inequality[4].

We can easily establish the connection between the Gini index of inequality and the equity index using data from the US Census[5] for 2000–2010. The equity index and the Gini index are almost perfectly negatively correlated (Pearson's correlation coefficient = –0.9967). Figure 1 shows the scatter plot of the equity index and the Gini index of income inequality for shares of household incomes by quintiles in the US from 2000 to 2010.

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2. Prathap, G., *Scientometrics*, 2011, **87**, 515–524.
3. Prathap, G., *Scientometrics*, 2011, **88**, 555–562.
4. Gini, C., *Econ. J.*, 1921, **31**, 124–126.
5. http://www.census.gov/hhes/www/income/data/historical/inequality/IE-1.pdf (accessed on 30 January 2013).

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# Geoffroy's Trident Leaf-nosed bat, *Asellia tridens* (Geoffroy, E., 1813) from India

Bats, being pollinators, seed dispersers and insect eaters, play an imperative role in the betterment of ecosystems and the environment we live in. India harbours 118 bat species out of the 1117 reported worldwide in rather two unequal sub-orders – Yinpterochiroptera and Yangochiroptera[1].

Rajasthan part of the Thar Desert in India has not only seen remarkable depletion in species diversity of bats, but many of their roosts reported earlier have either been destroyed in the pretext of prevailing misconceptions or evicted casually over a period of the last two decades due to lack of adequate awareness among locals regarding ecological and economical significance of bats. Six Yinpterochiroptera (Indian Flying Fox, *Pteropus giganteus*; Short-nosed fruit bat, *Cynopterus sphinx*; Fulvous Fruit bat, *Rousettus leschenaulti*; Greater Mouse-tailed bat, *Rhinopoma microphyllum*; Lesser Mouse-tailed bat, *Rhinopoma hardwickii* and Blyth's Horseshoe bat, *Rhinolophus lepidus*) and four Yangochiroptera (Egyptian Tomb bat, *Taphozous perforatus*; Naked-rumped Tomb bat, *Taphozous nudiventris*; Asiatic Greater Yellow House bat, *Scotophilus heathii* and Indian Pigmy bat, *Pipistrellus tenuis*) species have been reported in the recent past collectively from Jodhpur, Jaisalmer and Bikaner districts in the Rajasthan part of the Thar Desert. Whereas two species each of sub-orders Yinpterochiroptera (Greater False Vampire, *Megaderma lyra* and Fulvous Leaf-nosed bat, *Hipposideros fulvus*) and Yangochiroptera (Dormer's bat, *Pipistrellus dormeri* and Egyptian Free-tailed bat, *Tadarida aegyptiaca*) reported here earlier through early 1960s to 1980s have been found missing[2–6].

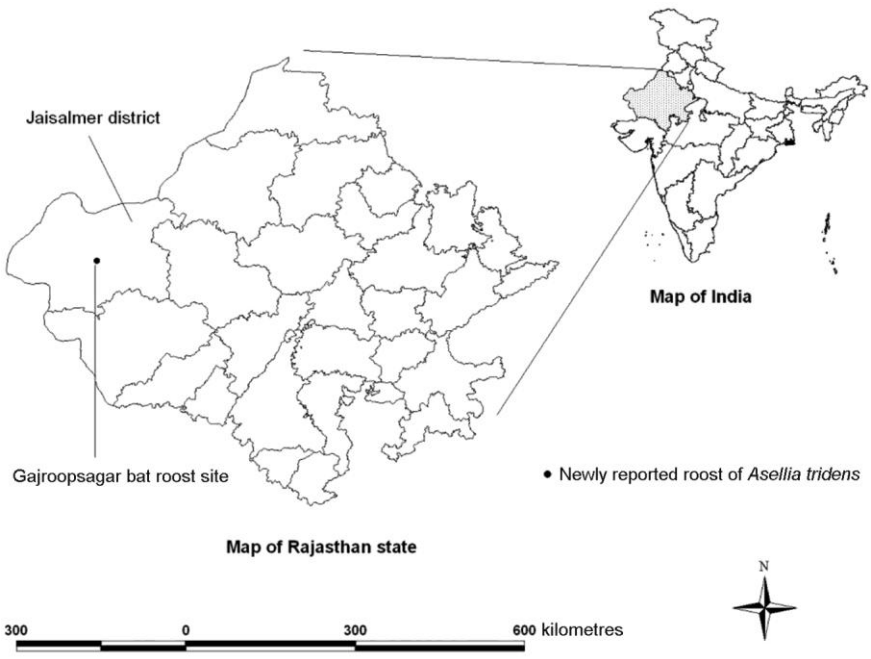


**Figure 1.** Geographical representation of roost of *Asellia tridens*.

During our bat survey in January 2011 at Gajroopsagar tunnel (26.94722°N and 70.92888°E) bat roost in Jaisalmer district (Figure 1), we observed two individuals of bat, *R. leschenaulti* and a single individual of Trident Leaf-nosed bat, *Asellia tridens*. They were found roosting in association with *R. microphyllum*, *R. hardwickii* and *R. lepidus*[7].

The Gajroopsagar tunnel roost is geographically located approximately 386 km northeast (aerial distance) to its earlier reported nearest roost in Karachi, Pakistan. We undertook a repeat survey of this bat roost on 12 January 2013 and found six individuals of *A. tridens* roosting in association with the other above-mentioned bat species. We caught one of these six individuals to examine morphological characteristics and measurements