

## **Comments: Are All Measures of International Reserves Created Equal?**

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This paper puts together a comprehensive data set for international reserves, covering 174 economies since late 1950s, as well as for several variables that have been used as the comparator in discussing reserve adequacy. It has the following three questions.

1. What structural characteristics of individual economies determine the value of international reserve ratios? The ratios are often calculated relative to population, trade, M2, external debts, and GDP.
2. Do different international reserve ratios produce a similar ranking of economies?
3. What is the persistence (over time) of reserve ratios?

The paper provides a good battery of descriptive statistics, distributed over the text and the appendix. This provision of descriptive statistics would be the main value added of the paper, while its main weakness is that the statistics provide no basis either for the conclusion of the paper, or for answering motivating questions of the paper. The rest of the comments are divided into three parts: the contribution of the paper that is to be further developed, the weakness of the paper that may be dropped or shortened, and a few specific points.

### Contribution of the Paper

Figures 1-5 are very informative in showing the basic patterns of data. It is refreshing to be able to see the broad pattern of reserve holdings over the span of two decades for several groupings of countries. This kind of data description may be strengthened further. In particular, similar summary figures may be presented for the ratios of reserves to different categories of economic variables (population, trade, external debt, and GDP). The current presentation of this information in the appendix runs the risk of overloading the reader, and also lacks the elegant simplicity of Figures 1-5. Such presentation will increase the number of figures greatly, but will be a refreshing and informative presentation, with no priors being imposed on the data.

### Weakness of the Paper

While the data information is refreshing, it is very difficult not to disregard the attempted “interpretation” of data, in all three categories of questions above. Even for the question of the first category, for which I would greatly value a more graphical presentation of information, the economic interpretation lacks a solid footing. In a typical case, the paper explores the correlation between reserve holdings (levels or ratios) with structural characteristics, largely by examining contingency tables. This line of investigation, however,

is predicated on the assumption that some of economic characteristics would be the dominant determinant of reserve holdings, eclipsing all other possible determinants. This would amount to insisting on a single-variable regression while a more accurate description could only be uncovered by a multi-variable regression. Despite this limitation, a compact presentation of the patterns in the data in this part would be a valuable contribution, to reiterate the earlier point.

For the second and third categories of questions, it is doubtful whether the descriptive statistics can add much useful information. To start with the second question, on what premise would one reserve ratio be expected to be closely related to another reserve ratio? For example, assume that countries need reserves for many reasons, and that the “optimal” level of reserves is 100% of the larger of factor A and factor B. And in addition consider two countries, one (country Y) with a large value of factor A and the other (country Z) with a large value of factor B. But then, country Y would have a smaller ratio of reserves to factor A than country Z, while it is country Y for which factor A is the driving factor of reserve holdings. Moreover, the reserve ratios (relative to factors A and B) are oppositely ranked in this example.

	Factor A	Factor B	Reserves	R to A ratio	R to B ratio
Country Y	10	1	10	1	10
Country Z	1	10	10	10	1

This is an extreme example, but the point is the conspicuous absence of conceptual or theoretical basis for expecting cross-country rankings to be similar across different reserve ratios. Hence, this section may be deleted altogether, or at best simplified greatly in presentation. In the latter case, it should be kept as strict presentation of descriptive statistics, with no attempt at unwarranted economic interpretation. The third question on persistence appears to stand on an even less solid basis. What information does persistence of these ratios contain? Combined with the difficulty of distinguishing between a unit root process and a deterministic process with a trend or multiple structural breaks, the persistence investigation appears to add virtually no value, and may best be dropped altogether.

### Specific Points

**The conclusion section does not follow from the body of the paper. It may be best to drop all paragraphs other than the first two which can be re-written as needed.**

International reserves are often measured excluding gold, contrary to this paper.

While difficult to obtain data, much has been made of the foreign currency denominated external debt.