

Notes on the Trilemma Measures

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The trilemma indexes quantify the degree of achievement along the three dimensions of the “trilemma” hypothesis: monetary independence, exchange rate stability, and financial openness, and available for more than 170 countries. These indexes are first introduced in [Aizenman, Chinn, and Ito \(NBER Working Paper # 14533\)](#), and have been updated.

The dataset is available in both Excel and STATA format at http://web.pdx.edu/~ito/trilemma_indexes.htm.

Monetary Independence (MI)

The extent of monetary independence is measured as the reciprocal of the annual correlation between the monthly interest rates of the home country and the base country.

The index for the extent of monetary independence is defined as:

$$MI = 1 - \frac{corr(i_i, i_j) - (-1)}{1 - (-1)}$$

where i refers to home countries and j to the base country. By construction, the maximum value is 1, and the minimum value is 0. Higher values of the index mean more monetary policy independence.^{1,2}

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¹ The index is smoothed out by applying the 3-year moving averages encompassing the preceding, concurrent, and following years ($t-1, t, t+1$) of observations.

² We note one important caveat about this index. Among some countries and in some years, especially early ones, the interest rate used for the calculation of the MI index is often constant throughout a year, making the annual correlation of the interest rates between the home and base countries ($corr(i_i, i_j)$ in the formula) undefined. Since we treat the undefined $corr$ the same as zero, it makes the MI index value 0.5. One may think that the policy interest rate being constant (regardless of the base country’s interest rate) is a sign of monetary independence. However, it can reflect the possibilities not only that (i) the home country’s monetary policy is independent from the base country’s; but also (ii) the home country uses other tools to implement monetary policy than manipulating the

We use money market rates to represent policy short-term interest rate. The data are extracted from the IMF's *International Financial Statistics* (60B..ZF...). For the countries whose money market rates are unavailable or extremely limited, the money market data are supplemented by those from the Bloomberg terminal and also by the discount rates (60...ZF...) and the deposit rates (60L..ZF...) series from *IFS*.

The base country is defined as the country that a home country's monetary policy is most closely linked with as in Shambaugh (2004). The base countries are Australia, Belgium, France, Germany, India, Malaysia, South Africa, the United Kingdom, and the United States. For the countries and years for which Shambaugh's data are available, the base countries from his work are used, and for the others, the base countries are assigned based on the International Monetary Fund's *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)* and *Central Intelligence Agency Factbook*.

Exchange Rate Stability (ERS)

To measure exchange rate stability, annual standard deviations of the monthly exchange rate between the home country and the base country are calculated and included in the following formula to normalize the index between 0 and 1:

$$ERS = \frac{0.01}{0.01 + stdev(\Delta(\log(exch_rate)))}$$

Merely applying this formula can easily create a downward bias in the index, that is, it would exaggerate the "flexibility" of the exchange rate especially when the rate usually follows a narrow band, but is de- or revalued infrequently.³ To avoid such downward bias, we also apply a threshold to the exchange rate movement as has been done in the literature. That is, if the rate of monthly change in the exchange rate stayed within +/-0.33 percent bands, we consider the exchange rate is "fixed" and assign the value of one for the ERS index. Furthermore, single year pegs are dropped because they are quite possibly not intentional ones.⁴ Higher values of this

interest rates, such as changing the required reserve ratios and providing some window guidance (while leaving the policy interest rate unchanged); and/or that (iii) the home country implements a strong control on financial intermediary, including credit rationing, that makes the policy interest rate appear constant. To make the matter more complicated, some countries have used (ii) and (iii) to exercise monetary independence while others have used them while strictly following the base country's monetary policy. The bottom line is that it is impossible to incorporate these issues in the calculation of MI without over- or under-estimating the degree of monetary independence. Therefore, assigning an MI value of 0.5 for such a case should be a reasonable compromise. However, it does not preclude the necessity of robustness checks on the index, which we plan to undertake.

³ In such a case, the average of the monthly change in the exchange rate would be so small that even small changes could make the standard deviation big and thereby the ERS value small.

⁴ The choice of the +/-0.33 percent bands is based on the +/-2% band based on the annual rate, that is often used in the literature. Also, to prevent breaks in the peg status due to one-time realignments, any exchange rate that had a percentage change of 0 in 11 out of 12 months is considered fixed. When there are two re/devaluations in 3 months, then they are considered to be one re/devaluation event, and if the remaining 10 months experience no exchange rate movement, then that year is considered to be the year of fixed exchange rate. This way of defining the threshold for the exchange rate is in line with the one adopted by Shambaugh (2004).

index indicate more stable movement of the exchange rate against the currency of the base country.

Financial Openness/Integration (KAOPEN)

For the measure of financial openness, we use the index of capital account openness, or *KAOPEN*, by Chinn and Ito (2006, 2008). *KAOPEN* is based on information regarding restrictions in the International Monetary Fund's *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)*. Specifically, *KAOPEN* is the first standardized principal component of the variables that indicate the presence of multiple exchange rates, restrictions on current account transactions, on capital account transactions, and the requirement of the surrender of export proceeds.⁵

Since *KAOPEN* is based on reported restrictions, it is necessarily a *de jure* index of capital account openness (in contrast to *de facto* measures such as those in Lane and Milesi-Ferretti [2006]). The choice of a *de jure* measure of capital account openness is driven by the motivation to look into policy intentions of the countries; *de facto* measures are more susceptible to other macroeconomic effects than solely policy decisions with respect to capital controls.⁶

The Chinn-Ito index is normalized between zero and one. Higher values of this index indicate that a country is more open to cross-border capital transactions.

The dataset of the trilemma indexes does not include the United States. The summary statistics of these indexes can be found in our papers that are available at http://web.pdx.edu/~ito/trilemma_indexes.htm.

If you still have questions, please contact Hiro Ito (ito@pdx.edu). All rights pertaining to these indexes reserved. Please reference our paper when you use the indexes.

⁵ This index is described in greater detail in Chinn and Ito (2008).

⁶ *De jure* measures of financial openness also face their own limitations. As Edwards (1999) discusses, it is often the case that the private sector circumvents capital account restrictions, nullifying the expected effect of regulatory capital controls. Also, IMF-based variables are too aggregated to capture the subtleties of actual capital controls, that is, the direction of capital flows (i.e., inflows or outflows) as well as the type of financial transactions targeted.

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