Intrinsic Value Currency Evaluation

Values of Yen, Euro and Sterling based upon Gold and Silver

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When evaluated relative to the Bitcoin or the Basecoin, sovereign currencies such as the Japanese Yen, Pound Sterling and the European Union's Euro dollar, show marked instability and multiple equilibria. While multiple equilibria are still present when the above three currencies are measured relative to the United States Dollar, there is much less instability of the prices. What the current analysis seeks to discover is if the above mentioned currencies are measured relative to their prices for the precious metals gold and silver would there be either greater or lesser stability than when measured on either a Bitcoin, Basecoin or US Dollar basis.

To begin the analysis we collect daily data consisting of the price of gold and silver in the three sovereign currencies, the Japanese Yen, the Pound Sterling and the Euro dollar. These six daily data points constitute two ordered triplets of coordinates thereby defining two hyper-surfaces in three dimensional space. We shall follow the time evolution of the intersection of these two hyper-surfaces, which would then be a two dimensional surface. We evaluate the quantity of Japanese Yen that can be purchased with one Pound Sterling and one Euro dollar. These two quantities must be equal regardless of whether we form the ratio from either data points on the gold price surface or the silver price surface. If we designate a Yen price ratio taken from the gold surface with x_i where $i = 0, 1$ and designate a Yen price ratio taken from the silver surface using y_i where i is again either zero or unity, then equating the gold based prices to the silver based prices takes the form of a simple algebraic balance:

$$a_0 x_0 + a_1 x_1 = b_0 y_0 + b_1 y_1 \tag{1}$$

The a_i and b_i where $i = 0, 1$ are undetermined coefficients that are to be evaluated using the time series price data fit to some ordinary least squares error condition. Equation (1) represents our gold-silver intersection surface which we now use as our zero contour level isosurface as we apply the methods of finance rheology. We transform the equation from its most general form into more familiar terms applicable to our current situation. One of the undetermined coefficients can be eliminated by normalizing all others to it. Then we let G_p designate the quantity of Japanese Yen that can be purchased with one Pound Sterling using prices from the gold space; G_e represent the quantity purchased with one Euro dollar; and similarly we let S_p and S_e designate the quantities purchased using prices from the silver space. Our equation (1) can now be written as

$$G_e = aS_e + bS_p + c_0 G_p \tag{2}$$

In equation (2) a, b, c_0 are our new set of undetermined coefficients. Equation (2) is cast in our familiar form for an isosurface. We can now follow the standard procedures described previously, for example in **Basecoin: Exchange Rate Equilibrium**. The isosurface is cast as the zero level isosurface upon which we build our money potential. The evaluation of the optimal form of the money potential is found as the solution to a quadratic equation. Recognizing that it is completely arbitrary which of the undetermined coefficients that we choose to eliminate by normalizing the others with respect to it, we see that (1) can also be transformed into alternative forms such as

$$S_e = \alpha G_e + \beta G_p + \gamma_0 S_p \tag{3}$$

where we have changed the symbols for the undetermined coefficients from Latin letters to Greek letters to indicate different numerical values.

Using both equations (2) and (3) we can obtain two pairs of estimates of the price of the Pound Sterling with respect to the Euro dollar by taking ratios of the roots of the quadratic optimalization equation. One pair of estimates results from ratio of roots produced by the gold space prices and the other pair results from the silver space. Within each of the two pair of roots one accounts for effects from the other metal's space and the other pair does not. To obtain the governing equation for each metal space that does not account explicitly upon the other we recast either (2) or (3) as

$$0 = aX_e + bX_p + c \tag{4}$$

where X indicates either the gold or silver space. The disappearance of the subscript 0 on the third undetermined coefficient occurs because we no longer need to bring any terms on the left side of the equation to the right side when forming the zero contour level isosurface.