Free Trade Deficit Quantitative Tax Losses

9.71 Correlation Analysis – Free Trade Deficit and National Debt

Next we provide a quantitative assessment. Here we use a simple mathematical correlation assessment that should be helpful as part of our initial reliability economic investigation. Correlations are sought all the time in many areas. For example in health, we know that being overweight is correlated to diabetes, smoking has been correlated to lung cancer and emphysema, and so forth.

In a similar manner, according to our FMEA work in Chapter 7 and here, we suspect that the U.S. free trade deficit may be linked to America's national debt due to related TDT losses.

Despite the complex nature in interpreting the data, mathematically we simply will look at the raw data. Results show below that a correlation exists of about 84% in select time periods between 1990 and 2008. First we mention that it is clear the two can be unrelated in certain time periods. For example, we know that the trade deficit in 1990 to about 1995 was minimal compared to the national debt (see Table 9.11 and Figure 9.2). At this point in time where the free trade deficit was just starting to accumulate, tax losses would be minimal. Similarly, one would anticipate a weaker correlation in 2008 and 2009, since the U.S. expenditures have been highly irregular due to the modern recession compared to the free trade deficit which has dropped dramatically due to the recession.

To perform this simple assessment, we provide the trade deficit data (from the U.S. Census.gov website. This is listed in Table 9.11. Column 2 provides the free trade deficit data in trillions of dollars. Columns 3 and 5 reflect the cumulative results and the running totals of each.

First we will look at the raw data in select years that make sense where we expect a correlation to occur. In order to identify the possibility of a mathematical correlation, logically certain years are able to reveal the underlining relation better than other periods in the historical data set. Then the select year assumptions are:

1) Select a reasonable sequential time period within the normal 20 year time frame of interest. We stated earlier that from 1990 to 1995, there was a minor trade deficit and there was little correlation. We also noted that 2008 and 2009 were highly irregular in government spending. These years will be ignored in the correlation analysis.

2) We will use the values M1 in Table 9.11 as a set of 11 logical years from 1996 to 2007 to look for a correlation. We will ignore one irregular data point of the year 2000.

Table 9.11 National Debt and Free Trade Deficit Data (1990-2009)[1]

Year	Annual Trade Deficit in Trillions $	Cumulative Trade Deficit in Trillions $	National Debt in Trillions $	Cumulative National Debt in Trillions $
1990	0.081	1.01[+]	0.33	3.21
1991	0.031	1.04	0.39	3.6
1992	0.039	1.08	0.4	4
1993	0.070	1.15	0.35	4.35
1994	0.098	1.25	0.29	4.64
1995	0.096	1.35	0.28	4.92
1996	0.104 M1	1.45	0.26	5.18
1997	0.108 M1	1.56	0.19	5.37
1998	0.166 M1	1.73	0.11	5.48
1999	0.265 M1	1.99	0.12	5.6
2000	0.380	2.37	0.03**	5.63
2001	0.366 M1	2.74	0.14	5.77
2002	0.422 M1	3.16	0.43	6.2
2003	0.495 M1	3.65	0.56	6.76
2004	0.610 M1	4.26	0.59	7.35
2005	0.715 M1	4.98	0.56	7.91
2006	0.760 M1	5.74	0.54	8.45
2007	0.701 M1	6.44	0.5	8.95
2008	0.696	7.14	1.04	9.99
2009	0.379	7.52	2.3	12.3

Next we look at the raw data by performing a regression analysis of Col. 2 and Col. 4 shown in Figure 9.3. This provides an estimate of how well the national debt and trade deficit correlate. This is obtained from R^2 of 0.711. The square root of this values is the correlation coefficient of 0.84 (R-value), indicating an 84% correlation, in this select periods from 1996 to 2007. Figure 9.3 also shows the 95% confidence bounds about the regression line. The P-value found of 0.001 (Figure 9.3) indicate a probability of 1 in a 1000 that the correlation is by chance. A "Durbin-Watson" statistics for Model 1 was found to be 0.96. This large value (> 0.8) indicates an unlikely autocorrelation.

[1] Trade Def. Ref. http://www.census.gov/foreign-trade/statistics/historical/gands.pdf,
National Debt Ref: www.whitehouse.gov/omb/budget/fy2010/assets/hist.pdf
** Outlier point - an irregular data point. [+]Accumulated trade deficit since 1971

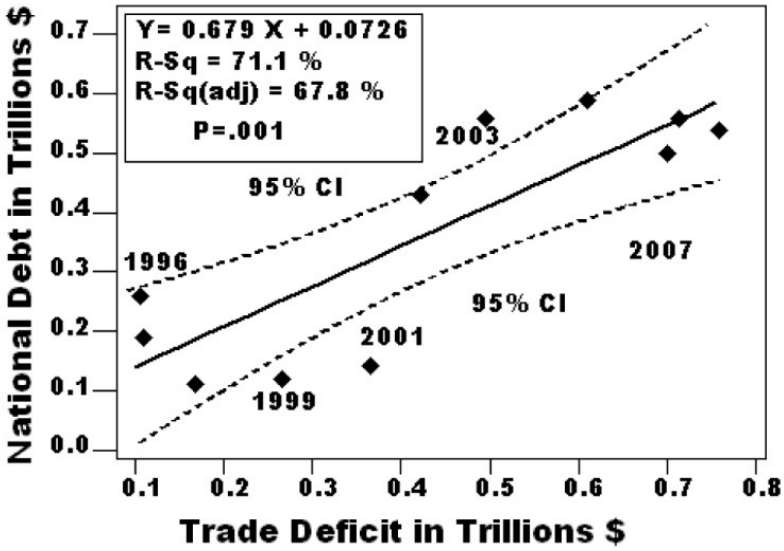

Figure 9.3 Model 1 of the national debt versus the trade deficit, 1996 to 2007

The actual dollar relationship is potentially challenging. To understand this, we note the slope in Figure 9.3 is given by the X-Y relationship on the graph (i.e. Y=0.679X -.0726). First note the Y intercept (.0726) is relatively small compared to values in Column 3 from 1996-2007. This implies there would be little or no tax consequence to the national debt if the trade deficit were zero. It also means we can approximate Y(National Debt) ~ 0.68 X(Trade Def.).

This implies 68% of some trade deficit X-quantity is linked in our model to lost tax revenue and effectively adds to the national debt. We now assert a 3rd model assumption that: this mathematical relationship is valid for any time period. That is, we have been able to identify an underlying relationship using select years; the relationship should still be reasonably valid for other time periods. The question is now, what is the X-quantity? The reason we do not take the entire trade deficit of $7.5 trillion as the X-quantity is that we know excess government spending is complex and also some of the trade deficit reinvestment actually creates tax revenue. Foreigners reinvest trade deficit dollars in businesses and treasuries and both can help GDP growth and tax revenue through businesses and job creation. This indicates the need for a more complex (multiple regression) model. While this is outside our scope we provide an alternate model that will not change the correlation coefficient. The model is Y=(0.679X -.0726)f where f is a fractional estimate or Y ~ 0.679 Xf. This equation will be realized by multiplying Column 4 (national debt) by f then fitting the M1 data in the same way. As an example, we take f=40%. First note that 40% of $7.5 trillion equates to $3 trillion (the X-quantity) that coincides with foreigner investment into U.S. Treasury (see Table 9.3). Note this quantity of foreign reinvestment would not be there if it was not for the trade deficit, providing some f=0.4 justification for our model. We now multiply $3 trillion by 0.68 giving $2 trillion of effective trade deficit that is added to the national debt. The 95% confidence lower bound in Fig. 9.3 was estimated (not shown) to be $0.8 trillion. The $2 trillion seems high in light of Remark 9.9A for example. The $0.8 and $2 trillion values of $12.3 trillion total national debt implies since 1971 roughly 6.5% to 16.3% of the national debt is due to the trade deficit. This is also between 10.7 and 26.7 cents of every trade deficit dollar adds to the national debt. With the U.S. population of about 300

million, this equates to between $2667 to $6667 added to each citizen's national debt credit card! We see that free trade is not really free! This model is a crude 1st approximation. However the range is likely to be reasonable and the model illustrates the correlation. Trade deficit tax loss issues are highly complex, and providing an accurate assessment is most likely a Ph.D. thesis. However, we have now provided reasonable quantitative and qualitative assessment. From our results, we are baffled by a trade policy in which ordinary taxpayers end up subsidizing the deficit through the national debt and now question its legality.