

# THE DEBT INDEX AND ITS RELATION TO ECONOMIC ACTIVITY

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## ABSTRACT

*The misery index was created by Arthur Okun to serve as a measure of economic well-being. It combines the inflation rate and the unemployment rate to gauge economic performance. During the 1970s and 1980s the index was useful as a tool to discuss stagflation and the performance of governing authorities in how well the economy was being managed.*

*With expanding national indebtedness and seemingly endless deficit spending, the United States and the world's economies appear to face different issues that move beyond inflation, unemployment, and sluggish growth rates. While there are clearly empirical relationships for these variables to debt and deficit levels, we do not currently have an index that shows explicitly how debt might affect economic activity.*

*This paper combines debt and deficit ratios to develop a "debt index" for several national economies and uses this measure to show how private investment and other economic measures are affected by a nation's debt troubles.*

## THE DEBT INDEX

There are both short run and long run issues involving the debt problem in the United States and elsewhere. In the short run, the deficit represents a problem for policy makers while in the long term, the national debt is an issue that must be addressed.

To construct a "debt index" I combine the absolute value of the annual federal budget deficit divided by federal government spending with the national debt divided by nominal GDP. Put simply:

$$\text{Deficit/Spending} + \text{Debt/GDP} = \text{Debt Index}$$

This combines the temporal aspects of our short and long term debt problems into one measure.

### The Relation of the Debt Index to Macroeconomic Variables

To determine if the debt index had any meaningful statistical relationship with various macroeconomic variables I generated a series of correlation coefficients comparing the debt index with these variables on an annual basis since 1980. A major finding was that the debt

index was highly and negatively correlated with private investment as a percent of GDP. The coefficient was -.831 and it was significant at the 99 percent confidence level.

It might be expected that other measures of debt might be highly and/or more so correlated with investment as a percent of GDP so I ran correlations with these as well. The results are in Table I.

<b>Table I: Debt Measures and Private Investment Correlation Coefficients</b>	
Debt Variable	Correlation Coefficient
Annual Deficit	-.749
Annual Debt	-.640
Annual Deficit/Government Spending	-.576
Annual Debt/GDP	-.766
Debt Index	-.831

Table I demonstrates that the relationship of the debt index to private investment is greater than any individual component of the index.

A simple regression was run to suggest the explanatory power of the relationship between the debt index and investment spending. The results were:

**Regression Analysis: I/GDP versus Debt Index**

The regression equation is

$$I/GDP = 23.8 - 6.28 \text{ Debt Index}$$

Predictor	Coef	SE Coef	T	P
Constant	23.8483	0.5935	40.18	0.000
Debt Index	-6.2818	0.7675	-8.19	0.000

S = 0.979482 R-Sq = 69.1% R-Sq(adj) = 68.0%

While this is a fairly simplistic method of determining explanatory power it does show, according to the adjusted R-Square, that the debt index explains 68 percent of the movement in private investment.

To determine how robust this relationship might be I used IMF data, going back to 1980, when possible, to construct a debt index for 15 major global economies of vary characteristics. The results can be seen in Table II.

USA	-.831
Greece	-.666
Italy	-.729
Japan	-.952
Sweden	-.784
UK	-.740
Germany	-.807
Australia	-.502*
New Zealand	-.311**
Canada	-.460*
France	.057**
Iceland	-.792
Ireland	-.672
Spain	-.402*
Portugal	-.805
*Significant at the .05 percent level.	
**Not significant at the 10 percent level.	

Accept where noted, all coefficients are significant at the 1 percent level in Table II as well as all of the following tables. This would indicate that the debt index is highly and negatively correlated with most western-style economies. This would include Sweden, where a large percentage of GDP flows through the public sector. France and New Zealand are the only economies where the relationship does not hold.

Another variable exhibiting a significant relationship with the debt index is the unemployment rate. For the United States, the correlation coefficient is .479 and it is significant at the 1 percent level. This implies that higher levels of short term and long term debt correspond to higher levels of unemployment. However, in this case the deficit and deficit to government spending ratio are more highly correlated with unemployment than the debt index, with coefficients of .626 and .824, respectively. In contrast the national debt and the debt to GDP ratio are not significantly correlated to the unemployment rate, indicating that unemployment is related much more closely to short run debt difficulties in the United States.

Table III shows the correlation coefficients among the various countries with respect to the debt index and unemployment.

USA	.479
Greece	.686
Italy	.524
Japan	.911
Sweden	.620
UK	.132**
Germany	.216**

Australia	.728
New Zealand	.436
Canada	.881
France	-.061**
Iceland	.885
Ireland	.941
Spain	.692
Portugal	.792
*Significant at the .05 percent level.	
**Not significant at the 10 percent level.	

Unlike in the case of the USA, none of the countries that show a significant correlation coefficient have higher coefficients on the relationship with the short term deficit measures. Some, such as Greece, Canada, and Australia, show a more significant correlation with the debt to GDP ratio. In all other cases the debt index outperforms all other measures in the size of the correlation coefficient.

One might make the argument that higher rates of unemployment might be better explained by declining private sector investment or falling GDP. Table IV shows these correlations.

Country	Private Investment	GDP
USA	-.435	-1.71**
Greece	-.549	.655
Italy	-.466*	-.602
Japan	-.929	.613
Sweden	-.508	-.391*
UK	.018**	-.511
Germany	-.414*	.148**
Australia	-.828	-.787
New Zealand	-.672	-.621
Canada	-.672	-.621
France	-.721	.073**
Iceland	-.678	.595
Ireland	-.714	-.658
Spain	-.855	-.404*
Portugal	-.926	.759
*Significant at the .05 percent level.		
**Not significant at the 10 percent level		

Table IV shows that private investment is more highly correlated with unemployment than the debt index in the following countries: Japan, Germany, Australia, New Zealand, France, Spain, and Portugal. These countries have a GDP more highly correlated with unemployment

than the debt index: Italy, Australia, and New Zealand. Otherwise, the debt index is better correlated with unemployment than these better known variables.

### The Debt Index through Time

Table V shows the value of the debt index in the selected countries since 2000.

Date	USA	Greece	Italy	Japan	Sweden	UK	Germany	Australia	New Zealand
2000	0.441	0.853	1.110	1.626	0.471	0.372	0.573	0.146	0.281
2001	0.495	0.907	1.152	1.687	0.517	0.361	0.651	0.148	0.241
2003	0.666	0.961	1.120	1.826	0.553	0.424	0.684	0.123	0.196
2003	0.791	1.099	1.117	1.889	0.541	0.469	0.727	0.086	0.138
2005	0.809	1.151	1.114	1.961	0.495	0.487	0.742	0.059	0.088
2005	0.764	1.123	1.150	2.058	0.466	0.503	0.757	0.037	0.057
2006	0.733	1.197	1.135	2.029	0.401	0.496	0.714	0.046	0.067
2007	0.703	1.197	1.067	1.948	0.333	0.505	0.644	0.058	0.081
2008	0.848	1.305	1.118	2.067	0.343	0.635	0.661	0.140	0.184
2009	1.244	1.565	1.263	2.420	0.445	0.902	0.805	0.279	0.347
2010	1.307	1.638	1.279	2.431	0.403	0.973	0.909	0.338	0.485
2011	1.457	1.697	1.292	2.578	0.343	0.993	0.863	0.333	0.522

Date	Canada	France	Iceland	Ireland	Spain	Portugal
2000	0.749	0.602	0.372	0.209	0.618	0.513
2001	0.811	0.601	0.474	0.245	0.572	0.570
2003	0.808	0.652	0.476	0.266	0.538	0.562
2003	0.768	0.708	0.467	0.215	0.493	0.558
2005	0.704	0.719	0.344	0.157	0.471	0.5807
2005	0.677	0.723	0.138	0.107	0.405	0.687
2006	0.663	0.684	0.149	0.034	0.343	0.648
2007	0.625	0.694	0.163	0.109	0.313	0.754
2008	0.708	0.745	0.715	0.422	0.499	0.795
2009	0.944	0.923	1.055	0.720	0.776	1.033
2010	0.966	0.949	1.037	1.265	0.807	1.110
2011	0.942	0.973	1.102	1.217	0.817	1.182

For most countries the debt index increased significantly after the global financial crisis of 2008. Only Sweden has returned to pre-2008 levels.

If the debt index is in and of itself a harbinger of major problems in the future it would be clear that Japan is the most likely country to face the prospects of severe economic consequences. Investment as a percent of GDP has fallen from 32.3 to 21.4 percent since 1980

and the unemployment rate has risen from 2.0 to 4.9 percent. The debt index would predict that these trends will hold in the future.

After Japan, Greece carries the highest debt index and its economic problems have been well covered by the world media. Unfortunately, the United States has the next highest debt index and our private investment has fallen from 21 to 16 percent of GDP since 1980 and the unemployment rate remains high by historic standards.

Other countries that have been noted as facing fiscal problems, such as Spain, Italy, Portugal, and Ireland, have debt indexes below that of the U. S. which should give policy makers cause for concern.

### **SUMMARY**

At present, policy makers do not have a useful index to show the problem of public sector debt and how it might relate to current and future economic activity. Given the concerns over deficit and debt problems both in the U. S. and abroad, a tool to measure this might be useful. This paper combines short term and a long term measures to develop the debt index. This index is then used to show how it relates to certain measures of economic activity.

Debt problems are shown to be related to lower private investment levels and higher unemployment rates. For the latter, the debt index is more strongly correlated with the unemployment rate than is the traditional correlation of unemployment and GDP.

Finally, the debt index predicts severe fiscal problems, in order, for Japan, Greece, and the United States. The problems for the U. S. may be more severe than those of Italy, Spain or Portugal.

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