

## **Can the IMF save the world from global depression?**

Nozar Hashemzadeh  
Radford University

Charles L. Vehorn  
Radford University

### **ABSTRACT**

The recent global recession has once again highlighted the need for a well coordinated international monetary and fiscal system. Lane and Milest-Ferretti (2010) suggest that international risk sharing (such as intervention by the IMF) has been ineffective in shielding domestic demand from the country-specific components of output declines, primarily because the IMF has neither the financial resources nor the political authority to prescribe policy for sovereign governments which are not currently borrowing from it. Empirical analysis demonstrates that high external debt has the potential to increase the GDP gap (difference between potential and actual GDP) and lower the likelihood for economic growth.

### **KEY WORDS**

Global Economics, IMF, Global Recession, Vector Auto Regressive Model, Financial Crisis

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## INTRODUCTION

Since the creation of the International Monetary Fund (IMF) in 1944, its efficacy in stabilizing the international financial system has been questioned by experts in the field, government officials, and academicians. In 1987 and 1998, the institution apparently helped numerous central banks to overcome major currency crises. It also assisted Argentina to stabilize its currency after it removed its peg to the U. S. Dollar. Most recently, the Fund, acting in concert with the European Commission and the European Central Bank, arranged loans to Greece and Ireland to prevent a sovereign debt default. The IMF is involved in about 70 courtiers worldwide as it attempts to ensure global financial stability. Nevertheless, critics of the IMF have made compelling arguments that the institution has made things worse rather than better. Until the onset of the most recent global recession in late 2007, the IMF was viewed increasingly as an institution with an outdated mission, which included monitoring the global financial system. However, with the deepening of the recent recession, the world has turned to the IMF and the U.S. Federal Reserve System (the Fed) for constructive solutions. To avert a world-wide depression, the U. S. Federal Open Market Committee (FOMC) extended more than \$600 billion dollars credit to 14 countries with the largest recipients being Brazil, Korea, Mexico and Singapore. Comparatively, the amount of credit extended by the IMF was less than half the stimulus provided by the FOMC.

More than 16 years ago, Ferraro and Rosser (1994) predicted a world-wide financial crisis that could plunge “millions of people into conditions of economic despair and depression.” Their analysis and prophecy was based on the worsening conditions of the developing nations whose debt amounted to more than \$1.3 trillion in 1991. They also predicted that as a result of the projected massive default of the debtor nations and the enormous exposure of the banking system of the United States, several major U. S. banks would collapse without government intervention. In 2007, with the onslaught of a deep recession in the United States and elsewhere, the gloomy scenario predicted by Ferraro and Rosser began to take shape.

The stark reality of an imminent global “depression” and financial collapse so alarmed central bankers and the leaders of the G-20 nations that they held an emergency meeting in November 2008 to discuss and adopt activist monetary and fiscal stimulus to restore confidence and minimize the worldwide economic damage from the crisis. Being on the first line of defense, the U. S. Federal Bank Reserve had to undertake massive quantitative easing to save most, if not all, major U. S. commercial banks and other financial institutions. In his remarks to the Tulsa Committee on Foreign Relations, Truman (2009) said the manner in which “the IMF handles the current global financial crisis will affect its future and support for it by the United States and other members” (p. 4). Most economists would agree with this statement.

In an extensive study of the current global financial and macrocosmic crisis, Lane and Milesi-Ferretti (2010), suggest that international risk sharing (such as intervention by the IMF) has been ineffective in shielding domestic demand from output declines, especially country-specific output. These authors discover a strong link between the decline in the growth rate of output (especially domestic demand) and pre-crisis domestic financial factors (such as the rapid growth of the sub-prime market in the United States) along with external imbalances (such as the huge U. S. trade deficit).

## DEBT AND ECONOMIC GROWTH

Reinhardt and Rogoff (2009) found that countries with high debt levels (90% of annual GDP), tend to grow slower than countries with lower debt levels. More specifically, they concluded that the average growth rates in advanced countries with a higher than 90% debt-to-GDP ratio was about two percentage points below economies whose debt-to-GDP ratio was less than 30% of GDP. Lane and Milest-Ferretti (2010) provide more credibility regarding the negative impact of high debt levels on GDP growth rates. For some 50 countries, they found that the growth rate during 2008-2009 was at least 4 percentage points lower than during the period 1990-2007. According to their research, countries in the Baltic region, along with Ukraine, Iceland, Ireland, Italy, Hungary and Mexico experienced the most severe economic malaise during the 2008-2009 period. They reasoned that falling growth in these economies was largely due to a significant share of manufacturing in GDP and a high ratio of private debt to GDP.

According to World Bank data, the United States debt-to-GDP ratio in the recent recession has reached a level which is slightly higher than the global average of 90.8 %. The debt-to-GDP ratio for Western Europe countries is much higher reaching 1,267% for Ireland, 422% for Switzerland and 408% for Britain. Small economies of Europe such as Monaco and Luxembourg have debt-to-GDP ratio as high as 1,850% and 4,910% respectively. Considering that debt ratios in advanced economies such as the United States, Japan, and Western Europe have passed the threshold defined by Reinhart and Rogoff, these once prosperous economies are looking at a long and difficult period of low growth and high unemployment. Although Reinhart and Rogoff's conclusions appear to be mostly based on correlation analysis rather than causation, there is little doubt that high sovereign debt stifles the rate of economic growth by crowding out private investment and consumption.

## ERRONEOUS FORECASTS

Like many other macroeconomic forecasting organizations, the IMF forecasts of economic performance are sown with biases and limitations. After examining forecasts for 157 countries over the 1999-2005 period, Dreher et al. (2010) discovered serious biases in the IMF forecasts. For example, they found that countries voting in support of U. S. positions at the UN General Assembly received lower inflation forecasts in the run up to their domestic elections. They also reported that "countries with large loans outstanding from the IMF also receive lower inflation forecasts, suggesting that the IMF engages in "defensive forecasting" (p. 7). Likewise, Beach et al. (1996) from the Heritage Foundation found "evidence of inherent bias in IMF forecasts" (p. 145). They argue that IMF forecasts of output and inflation were overly optimistic for both developing and developed economies. They claim that as the IMF funding increases, so does the error term. This result suggests that the incentive to make an overly optimistic forecast increases as IMF lending to a country increases. While some charge that the IMF projections of global economic activity generally have been too optimistic; others go so far as to suggest that IMF projections are often marred with biases and inaccuracies. As indicated in Table 1 (Appendix), the IMF revised its October 2008 projections drastically downward in the next month (November 2008). For example, in October 2008 the IMF predicted that the global economy would grow by 3.7 percent in 2008 and 2.2 percent in 2009, but revised these projections downward by 0.2 percent and 0.8 percent respectively. For the United States, the

Fund projected a negative output growth of -0.7 percent for the year 2009, but one month later revised that forecast to -1.5 percent for the year 2009.

## **IMF RESOURCES AND CAPABILITIES**

Since its creation in 1944, the IMF has been an equity funded financial institution. The Fund's equity is provided by member nations who are given proportional voting rights based on their quotas. Truman (2005) notes: "The world needs a strong and effective IMF as the principal multilateral institution responsible for international economic and financial stability" (p. 3). Unfortunately, a consensus on its current role and scope does not exist because the Articles of Agreement of the International Monetary Fund do not specifically state that the Fund should ensure "financial stability." Perhaps as economies emerge from the global recession, the Fund's role and scope can be defined more concretely.

During the G-20 Summit in April 2010, leaders of major world economies agreed to boost IMF lending resources from \$380 billion to \$750 billion. While this is a considerable increase in the general allocation of IMF's Special Drawings Rights (SDRs), it is hardly sufficient to preempt a fresh global recession. (The SDR is a basket of four currencies: the dollar, euro, Japanese yen, and British pound. Its current rate in terms of dollars is 1 USD = SDR 0.661143.) When compared to the amount of the global sovereign debt of about \$54 trillion, the IMF's allocations of \$750 billion amounts to only 1.3 percent of that debt.

As indicated in Figure 1 (Appendix), IMF lending (in terms of SDRs) grew considerably during major crises for various large countries. For example, lending grew from around SDR 6 billion to over SDR 20 billion during the Asian crisis 2001-2003. This lending, however, is reactive rather than proactive. The ability of the IMF to anticipate an economic crisis of a country is severely constrained by the unease the institution feels that it could be criticized for precipitating the crisis.

## **REVIEW OF THE EVIDENCE**

The literature on economic crises provides ample theoretical and empirical evidence that recessions (depressions) triggered by financial and banking collapse develop into prolonged and insidious episodes. Ben Bernanke, the current Chairman of the Fed and a well known authority on the Great Depression, has attributed the major cause for the prolonged depression of the 1930's to the collapse of the U. S. financial system. Bernanke et al. (1990) suggested that due to asymmetric information available to borrowers and lenders, financial and monetary shocks have an amplified impact on the economy by reducing production, investment and more importantly employment. During such crises, firms drastically scale back on their investment and may be forced to turn to expensive sources of financing when needed. Likewise, serious financial episodes, such as the one experienced in Japan in the early 1990s, have an enormously negative wealth-effect by reducing the market value of the underlying collaterals used by households and firms to finance consumption and/or investment expenditures. Similarly, beginning in the late 2007, households and businesses in the United States have experienced serious decreases in the market value of their assets and significant deterioration of their credit ratings, which resulted in substantial curtailment in their borrowing abilities and credit lines with the banks. Kiyotaki and Moore (1997) provide persuasive evidence that during a recession, such as the one observed in

Japan in the 1990s, a fall in asset values (which also serve as collateral for loans) undermines the ability of firms to expand or upgrade investment in production, plant, and equipment.

While Reinhart and Rogoff (2009) acknowledge that economic growth is damaged or even paralyzed when the banking system freezes up, they reject the notion that the banks can be blamed for all the economic woes of a recession. They suggest that a number of events can precipitate an economic crisis such as excessive inflation, exchange rate fluctuations, or a sovereign default crisis; but when these events occur in coincidence with a banking crisis the economy is more severely impaired.

## **METHODOLOGY AND DATA ANALYSIS**

Reinhart and Rogoff (2009) report a significant correlation between debt and GDP growth rates. However, their results can be criticized on the basis that correlation does not imply causation, thus this paper attempts to address the puzzle by using more recent data and a different methodology. This current study explores the generalizability of the high debt, low growth hypothesis by applying causality tests and a Vector Auto Regression (VAR) technique on annual output gap (the difference between potential and actual GDP) and debt-to-GDP ratios using data from the IMF and the World Bank. Through VAR modeling, this study attempts to reveal if there exists a consistent causal relationship between these ratios. The results have implications for policy makers and researcher by highlighting the extent to which “theory” agrees with reality during the last two decades.

A compact VAR model is applied to track innovations in debt/GDP ratios to the GDP output gap for selected countries for which we could obtain reliable data over the time period 1990 through 2010. The VAR modeling has proven successful for forecasting systems of interrelated time series variables over short-term horizons (Watson 1994). Succinctly stated, in a VAR model every equation has the same right hand variables, and those variables include lagged values of all the endogenous variables. The inclusion of lagged values of the endogenous variables is intended to eliminate estimation bias associated with simultaneity and serial correlation. In a VAR model, the lag length is chosen using various criteria such as the Akaike Information Criteria (AIC), see Akaike (1987), as well as Sims (1980) and Blanchard and Quah (1993). The raw data seem to suggest a certain degree of causality between output gap and debt-to-GDP ratio for several countries in the sample.

### **Data Sources**

The data were obtained from the World Bank’s World Development Indicators (WDI), the IMF’s International Financial Statistics (IFS), and the IMF’s World Economic Outlook (WEO) data base (see web page – imf.org under Data and Statistics Tab). The countries selected are in the IMF category “advanced economies,” which includes 33 countries. However, several of these countries were dropped due to lack of data over the period 1990 to 2010. We used WEO estimates for the last 1-3 years depending on the country. The variable output gap as a percent of potential GDP was obtained from WDI; the variable external debt as a percent of GDP was obtained from the IFS under the section on the International Investment Position – Total Liabilities (which were divided by GDP). In order to carry the data set into the present, the WEO quarterly data was averaged annually on gross external debt for the last 1-3 years. (The countries included are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece,

Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, United Kingdom, United States; and those excluded are: Cyprus, Czech Republic, Hong Kong SAR, Iceland, Israel, Korea, Luxembourg, Malta, Singapore, Slovak Republic, Slovenia, Switzerland, Taiwan Province of China.)

### Results from the VAR Model

Equation (1) and (2) are estimated using the following VAR model that incorporates two lags for each of the endogenous variable along with a constant term to capture the effects of the exogenous variables including economic openness, exchange rates, and other relevant factors.

$$\text{Var1: } \text{OPG}_t = \alpha_{11}(\text{OPG}_{t-1}) + \alpha_{12}(\text{DGP}_{t-1}) + \beta_{11}(\text{OPG}_{t-2}) + \beta_{12}(\text{DGP}_{t-2}) + c_1 + \varepsilon_{1t} \quad (1)$$

$$\text{Var2: } \text{DGP}_t = \alpha_{21}(\text{OPG}_{t-1}) + \alpha_{22}(\text{DGP}_{t-1}) + \beta_{21}(\text{OPG}_{t-2}) + \beta_{22}(\text{DGP}_{t-2}) + c_2 + \varepsilon_{2t} \quad (2)$$

where OPG is the output gap, DGP is the debt-to GDP ratio,  $c_1$  and  $c_2$  are the constants, and  $\varepsilon_{1t}$  and  $\varepsilon_{2t}$  are innovations for OPG and DGPT respectively. The procedure for determining the lag length was AIC. This statistic is routinely used to select the number of lags in an unrestricted VAR and to purge regressions residuals of any shared component before estimation of the parameters.

The estimates from the VAR model using both the output gap and the debt-to-GDP ratios are presented in Table 2 (Appendix). While measurements of the variables used in the equations may be tainted with statistical, reporting, and recording errors, the results seem to suggest that the impact of innovations in the debt-to-GDP ratios on output gap is significant for most countries in the sample.

### Impulse Response Functions

Following Wickens and Motto (2001), the impulse–response functions (IRFs) were constructed to estimate the effects of shocks to one of the endogenous variable on the remaining variables in the VAR model. The impulse-response functions (Fischer, 1981) are equivalent to dynamic multipliers providing an estimate of the current and future response of a variable in the left-hand-side of the equation to an innovation in one of the variables in the right-hand-side of the system.

The graphs in Figure 2 (Appendix) illustrate for the selected countries, the IRFs of the output gap that arise from innovations in its own lagged values as well as the debt-to-GDP variable. These graphs indicate how the GDP gap reacts to a one standard deviation shock from one of the innovations of the endogenous variable (debt-to-GDP ratio). The IRFs, generally suggest that shocks emanating from the endogenous variable (debt-to-GDP ratio) tend to peak in two periods and decay afterward.

### CONCLUSION

If history is any guide, financial panics cannot be dealt with easily. Loan defaults and bankruptcies are followed by precautionary freezes on lending to households as well as small and medium size businesses. Also, policy makers in the course of seemingly bottomless recessions

commit serious mistakes. Their actions, when erroneous, serve only to make downturns more prolonged with much painful consequences.

Based on the data and analysis presented in credible research, it is apparent that higher economic growth by way of sound investment in key industries and infrastructure may be the only positive and practical solution for stimulating economic growth, reducing debt, and lowering unemployment during a serious recession. With their vast resources, North America, China, Western Europe, Japan, Brazil and the resource rich economies of the Middle East have the wherewithal to launch coordinated policies to stimulate growth, reduce debt, and lower nonproductive expenditures. Without drastic reforms and robust international backing, the IMF neither has the financial resources nor the political authority to prescribe policy for the advanced and relatively well-to-do economies, but it may be able to anticipate warning signs originating in smaller developing economies of Asia, Africa, and Southern America to recommend practical and timely actions along with the resources for implementation without imposing too many overwhelming conditions. For example, in the July 2010 WEO update, the IMF noted that emerging successfully from structural adjustment in the fiscal area requires strong aggregate demand. Tax reform measures could be designed to provide incentives for private sector investment, which promote strong demand.

Unfortunately, the IMF's ability to predict recessions in developing economies has been quite dismal. According to the U. S. General Accounting Office (2003), the IMF correctly predicted only 11 percent of the 134 recessions that occurred in 87 emerging market countries during the 1991-2001 period. Furthermore, the Fund seriously erred by projecting strong economic growth for the countries involved in the 14 major economic crises of the decade. Such a low success rate by a premier international institution comes as a disappointment to citizens and politicians. It has been noted that the IMF early Warning System (EWS) models are not suited for predicting financial crises because they have many false positives, i.e., the models forecast numerous crises that never occur (see Berg et al., 2004). The low success rate of the IMF forecasts could suggest that the IMF was unwilling, at that time, to be as transparent as it is today; or it could suggest that the IMF was being careful to avoid creating a self-fulfilling prophecy. But on the other hand, the low success rate could indicate the general state of these models in correctly forecasting downturns. The GAO also found from forecast evaluation studies that these models, whether produced by the private sector, governments, or multinational organizations, routinely fail to forecast crises.

Voicing his concerns about the "legitimacy" and "effectiveness" of the IMF on October 6, 2009, Mervyn King, the Governor of the Bank of England, criticized the Fund "for failing to voice warnings forcefully enough in the run-up to the financial crisis." (The Times).

Last, but not least, the classical work by Reinhardt and Rogoff (2009) is a must reading by politicians and policy makers throughout the world. The insights provided by this seminal work are definitive, informative, and educational to the extent that the historical lessons may help policy makers to recognize sooner the next financial crisis

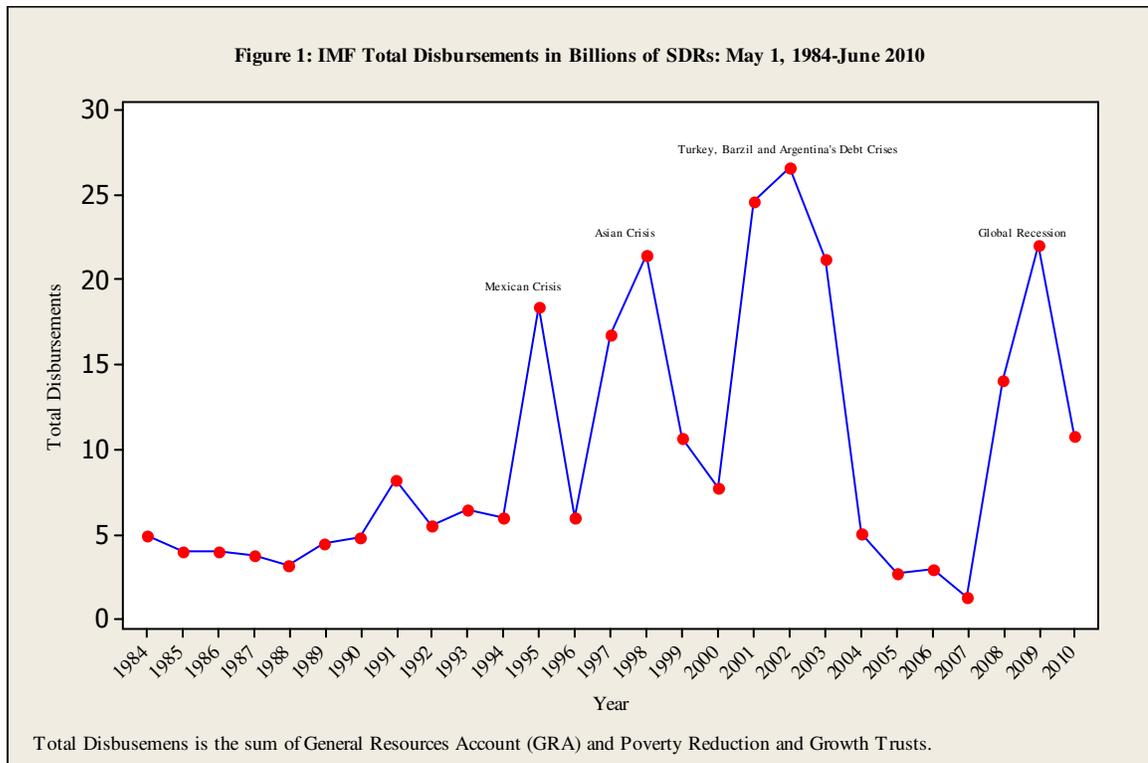
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**Table 1: IMF Projection of the Global Macroeconomic Situation: 2007-2009**

		Latest forecast		Difference from Oct 2008 projections	
		2007	2008	2009	2008
<b>World output</b>	5	3.7	2.2	-0.2	-0.8
<b>Advanced economies</b>	2.6	1.4	-0.3	-0.1	-0.8
United States	2	1.4	-0.7	-0.1	-0.8
Euro area	2.6	1.2	-0.5	-0.1	-0.7
Germany	2.5	1.7	-0.8	-0.2	-0.8
France	2.2	0.8	-0.5	-0.1	-0.6
Japan	2.1	0.5	-0.2	-0.2	-0.7
United Kingdom	3	0.8	-1.3	-0.2	-1.2
Canada	2.7	0.6	0.3	-0.1	-0.9
<b>Developing economies</b>	8	6.6	5.1	-0.3	-1
Africa	6.1	5.2	4.7	-0.7	-1.3
Russia	8.1	6.8	3.5	-0.2	-2
Developing Asia	10	8.3	7.1	-0.1	-0.6
China	11.9	9.7	8.5	-0.1	-0.8
India	9.3	7.8	6.3	-0.1	-0.6
Middle East	6	6.1	5.3	-0.3	-0.6
Brazil	5.4	5.2	3	-	-0.5
Mexico	3.2	1.9	0.9	-0.1	-0.9

Source: International Monetary Fund.



**Table 2: VAR Estimates with Output Gap and External Debt as Dependent Variables by Country, 1990-2010**

Country	Dependent Variable	Stats	Outgap (-1)	Outgap (-2)	Debtgdp (-1)	Debtgdp (-2)	Constant	R-squared	Adj. R-squared
Australia	Outgap	Estimates	0.50	-0.19	2.62	-2.34	-0.38	0.63	0.519
		T-Values	3.02	-1.40	3.12	-2.67	-0.62		
	Debtgdp	Estimates	-0.04	0.01	0.55	0.32	0.17	0.71	0.63
		T-Values	-0.86	0.18	2.16	1.20	0.95		
Austria	Outgap	Estimates	0.65	-0.23	4.91	-4.78	-0.73	0.66	0.56
		T-Values	3.66	-1.09	2.94	-2.67	-1.41		
	Debtgdp	Estimates	-0.02	-0.05	0.97	0.05	0.10	0.97	0.96
		T-Values	-0.60	-1.49	3.38	0.16	1.14		
Belgium	Outgap	Estimates	0.30	-0.13	2.62	-2.42	-1.00	0.53	0.39
		T-Values	1.38	-0.57	2.76	-2.52	-1.26		
	Debtgdp	Estimates	-0.06	0.00	1.34	-0.37	0.17	0.94	0.92
		T-Values	-0.93	-0.06	4.96	-1.36	0.73		
Canada	Outgap	Estimates	0.91	-0.58	9.54	-4.18	-5.13	0.65	0.55
		T-Values	3.92	-2.19	1.80	-0.75	-1.25		
	Debtgdp	Estimates	-0.01	0.00	0.28	0.37	0.34	0.41	0.24
		T-Values	-0.55	-0.22	1.08	1.35	1.70		
Denmark	Outgap	Estimates	0.94	-0.80	4.88	-3.97	-1.33	0.62	0.50
		T-Values	4.30	-2.47	1.74	-1.49	-0.70		
	Debtgdp	Estimates	0.01	0.05	0.48	0.34	0.34	0.94	0.92
		T-Values	0.71	1.67	2.05	1.52	2.14		
Finland	Outgap	Estimates	0.92	-0.57	3.23	-2.05	-2.41	0.72	0.64
		T-Values	4.54	-2.92	2.15	-1.38	-1.37		
	Debtgdp	Estimates	0.04	0.03	0.97	-0.36	0.75	0.85	0.80
		T-Values	1.36	1.03	4.18	-1.55	2.74		
France	Outgap	Estimates	0.81	-0.23	4.46	-4.75	-0.23	0.75	0.68
		T-Values	4.18	-1.01	2.97	-3.06	-0.44		
	Debtgdp	Estimates	0.00	-0.02	0.92	0.07	0.14	0.96	0.94
		T-Values	-0.09	-0.52	3.20	0.25	1.36		

Note: Output gap is the difference between Actual GDP and Potential GDP as a percent of GDP.  
External Debt is measured as a percent of GDP.

**Table 2: VAR Estimates with Output Gap and External Debt as Dependent Variables by Country, 1990-2010**

Country	Dependent Variable	Stats	Outgap (-1)	Outgap (-2)	Debtgdp (-1)	Debtgdp (-2)	Constant	R-squared	Adj. R-squared
Germany	Outgap	Estimates	0.49	-0.52	5.23	-6.12	0.19	0.65	0.55
		T-Values	2.75	-2.27	2.51	-2.99	0.28		
	Debtgdp	Estimates	-0.01	-0.01	0.78	0.15	0.16	0.94	0.92
		T-Values	-0.25	-0.47	2.96	0.57	1.87		
Greece	Outgap	Estimates	0.46	-0.93	4.02	2.12	-6.87	0.81	0.69
		T-Values	0.90	-2.68	1.76	0.50	-1.70		
	Debtgdp	Estimates	-0.11	-0.02	0.47	1.07	-0.41	0.89	0.82
		T-Values	-1.55	-0.39	1.54	1.89	-0.76		
Ireland	Outgap	Estimates	0.84	-1.14	0.42	-0.60	4.59	0.86	0.67
		T-Values	3.04	-2.16	0.31	-0.41	1.21		
	Debtgdp	Estimates	-0.04	-0.13	0.25	0.70	2.41	0.93	0.83
		T-Values	-0.29	-0.56	0.42	1.09	1.44		
Italy	Outgap	Estimates	0.83	-0.54	4.87	-5.17	-0.19	0.61	0.49
		T-Values	4.04	-2.16	1.40	-1.48	-0.26		
	Debtgdp	Estimates	0.00	0.00	0.66	0.30	0.10	0.95	0.93
		T-Values	-0.17	-0.25	2.37	1.08	1.71		
Japan	Outgap	Estimates	0.73	-0.40	6.31	-13.09	2.34	0.67	0.57
		T-Values	3.58	-1.52	1.01	-1.95	1.64		
	Debtgdp	Estimates	0.00	-0.01	1.34	-0.48	0.07	0.87	0.83
		T-Values	0.61	-0.95	5.75	-1.93	1.39		
Netherlands	Outgap	Estimates	0.79	-0.44	3.09	-2.47	-2.49	0.87	0.83
		T-Values	5.55	-3.09	5.08	-4.02	-3.65		
	Debtgdp	Estimates	0.01	-0.03	0.90	0.05	0.26	0.92	0.90
		T-Values	0.10	-0.50	3.35	0.19	0.87		
New Zealand	Outgap	Estimates	0.94	-0.52	-1.56	1.36	0.49	0.63	0.52
		T-Values	4.33	-1.92	-0.61	0.51	0.28		
	Debtgdp	Estimates	0.03	0.00	0.57	0.42	0.04	0.83	0.78
		T-Values	1.37	0.10	2.21	1.54	0.25		

Note: Output gap is the difference between Actual GDP and Potential GDP as a percent of GDP. External Debt is measured as a percent of GDP.

**Table 2: VAR Estimates with Output Gap and External Debt as Dependent Variables by Country, 1990-2010**

Country	Dependent Variable	Stats	Outgap (-1)	Outgap (-2)	Debtgdp (-1)	Debtgdp (-2)	Constant	R-squared	Adj. R-squared
Norway	Outgap	Estimates	1.00	-0.53	4.18	-3.28	-1.61	0.83	0.74
		T-Values	4.26	-2.53	2.34	-1.60	-1.37		
	Debtgdp	Estimates	0.00	-0.01	0.49	0.55	0.06	0.88	0.81
		T-Values	0.04	-0.33	1.45	1.42	0.28		
Portugal	Outgap	Estimates	1.15	-0.56	2.94	-2.98	-0.36	0.77	0.71
		T-Values	6.27	-3.14	1.90	-1.91	-0.65		
	Debtgdp	Estimates	-0.01	0.00	0.75	0.24	0.20	0.97	0.96
		T-Values	-0.22	-0.09	2.90	0.94	2.11		
Spain	Outgap	Estimates	0.95	-0.59	5.61	-5.37	-0.39	0.76	0.69
		T-Values	5.57	-3.38	2.84	-2.64	-0.64		
	Debtgdp	Estimates	0.01	-0.01	0.71	0.29	0.12	0.95	0.94
		T-Values	0.32	-0.52	2.75	1.09	1.53		
Sweden	Outgap	Estimates	0.96	-0.30	2.46	-2.58	-0.67	0.48	0.34
		T-Values	3.33	-0.93	0.97	-0.82	-0.33		
	Debtgdp	Estimates	-0.05	0.01	0.19	0.99	-0.09	0.93	0.91
		T-Values	-1.54	0.19	0.72	3.09	-0.45		
United Kingdom	Outgap	Estimates	0.90	-0.23	3.00	-3.48	0.66	0.92	0.90
		T-Values	9.69	-1.40	7.46	-8.28	1.25		
	Debtgdp	Estimates	0.02	-0.01	0.70	0.23	0.39	0.89	0.85
		T-Values	0.27	-0.05	2.72	0.84	1.16		
United States	Outgap	Estimates	0.72	-0.45	0.00	0.18	-0.52	0.44	0.28
		T-Values	2.57	-1.32	0.00	0.02	-0.49		
	Debtgdp	Estimates	0.03	-0.02	1.33	-0.30	0.03	0.99	0.98
		T-Values	2.24	-1.40	4.33	-0.92	0.57		

Note: Output gap is the difference between Actual GDP and Potential GDP as a percent of GDP. External Debt is measured as a percent of GDP.

**Figure 2: Dynamics of Changes in GDP gap from Innovations in Debt-to-GDP Ratio**

