



Economic Letter

Rising Public Debt to GDP Can Harm Economic Growth

by Alexander Chudik, Kamiar Mohaddes, M. Hashem Pesaran
and Mehdi Raissi

► **ABSTRACT:** The debt–growth relationship is complex, varying across countries and affected by global factors. While there is no simple universal threshold above which debt to GDP significantly depresses growth, high and rising public debt burdens slow growth in the long term, data from the past four decades indicate.

The relationship between public debt expansion and economic growth has attracted interest in recent years, spurred by a sharp increase in government indebtedness in some advanced economies following the global financial crisis.

Economists tend to agree that in the short run, an increase in public debt arising from fiscal expansion stimulates aggregate demand, which should help the economy grow. The *longer-term* economic impact of public debt accumulation, in contrast, is subject to a more expansive debate.

Some argue there is a negative long-term relationship between debt and economic growth, others doubt there is a long-term association between the two for low or moderate levels of public debt. Still others disregard any long-term association.

A careful empirical examination of this relationship using a panel of 40 advanced and emerging economies and four decades of data indicates that a persistent accumulation of public debt over long periods is associated with a lower level of economic activity. Moreover, the evidence suggests that debt trajectory can have more important consequences for economic growth than the level of debt to gross domestic product (GDP).

Continuous debt accumulation can harm economic growth through several channels, such as “crowding out” private investment, higher long-term interest rates, more aggressive future taxation, and possibly weaker investor sentiment and greater uncertainty.

Global Financial Crisis Responses

The global financial crisis hit many economies, shaving more than 5 percentage points off world growth in 2008–09 (*Chart 1*).

The subsequent economic recovery has been disappointingly slow. With the exception of 2010, global growth has surprised on the downside each year since the crisis. Sovereign debt problems in some advanced countries and a slowdown in key emerging economies accompanied the sluggish pace of recovery.

The large drop in real output growth in 2008–09 and the subsequent disappointing recovery was accompanied by a sizable fiscal response, especially among advanced economies. Postcrisis fiscal expansion resulted in a considerable government debt build-up in advanced economies, from an already elevated level of 71 percent of GDP in 2007 to 107 percent of GDP at year-end 2016 (*Chart 2*).

High levels of public debt and the sovereign-debt problems in the euro area, where policymakers worked to achieve a delicate balance between austerity and pro-growth policies, fueled the discussion about the effects of debt accumulation on economic growth.

Debt–Growth Relationship

The relationship between public debt accumulation and economic growth is

complex, and economic theory alone does not provide clear guidance.

The main argument for a negative relationship between the two is the “crowding out” of private investment by government.

Another explanation relates to confidence: An upward-sloping debt trajectory beyond certain levels could lead investors to worry about the country’s debt sustainability. Reflecting this risk, economic agents would be willing to hold govern-

ment securities only at a higher borrowing cost. The lower demand and investment due to higher interest rates, in turn, can have negative consequences for economic growth in the long run. Because the higher cost of government borrowing poses an additional strain on fiscal balances, an increase in government bond yields could lead to further loss of confidence and become self-fulfilling. In an extreme case, a crisis could occur.

While it is theoretically possible for governments to inflate away local-currency-denominated debt by monetizing (printing money), this is impossible for foreign-currency-denominated debt. In the latter case, a public debt crisis could also trigger currency and/or banking crises with more profound consequences for economic growth. High and increasing public debt might also constrain the ability of fiscal authorities to smooth economic cycles.

All of the arguments so far abstract from the composition of additional government spending—that gives rise to higher public debt. Such additional government spending could be invested in productive public capital (such as infrastructure, education or health) and could be growth enhancing. Consequently, the net effect of debt accumulation on economic growth cannot be established theoretically and requires a careful empirical analysis.

Estimation Challenges

Estimating the debt–growth relationship is no easy task. Many technical complications must be tackled.

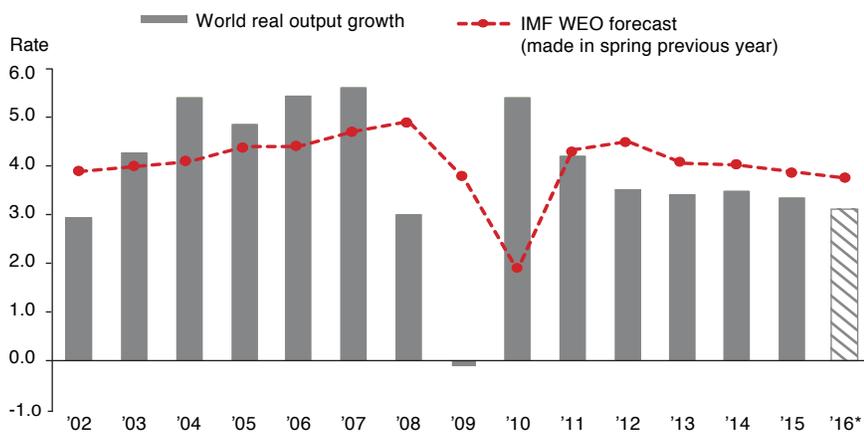
First, the interactions between debt and growth are dynamic. Clearly, the short- and long-run impacts are quite different, and there are feedback effects between the two variables.

Second, the long-run relationship between debt and growth could depend on the level of debt itself (threshold effects) as highlighted by the confidence factors.

Third, the absence of a sufficient number of historical observations makes it difficult to obtain a reliable individual-country statistical inference on the debt–growth relationship.

Instead, a panel of countries forms the basis here for such an analysis.

CHART 1 Global Economy Hard Hit After Global Financial Crisis

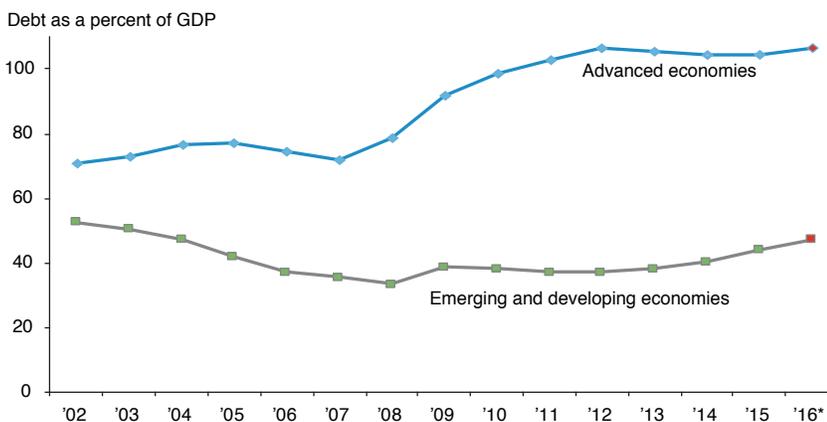


*Estimated.

NOTES: The chart shows the annual growth rate of the world’s real output (gray bars). The definition of the world aggregate is taken from the International Monetary Fund (IMF) World Economic Outlook (WEO) report. The last data point (striped bar) is the estimate reported in the April 2017 update of the WEO report. The dashed line shows IMF WEO projections made in the spring of the previous year.

SOURCES: International Monetary Fund, WEO report; Haver Analytics.

CHART 2 Fiscal Stimulus in Advanced Economies Leads to Record Levels of Public Debt



*Estimated.

NOTES: The chart shows gross public debt as a percent of gross domestic product (GDP). Gross debt comprises the stock (at year-end) of all government gross liabilities (both to residents and nonresidents). The country classification and country aggregation are based on the World Economic Outlook (WEO) report.

SOURCE: International Monetary Fund, WEO report, April 2017; Haver Analytics.

Use of Panel Data

The panel data bring two additional technical challenges. First, individual countries are subject to country-specific factors and institutions. Clearly, there are significant differences between countries with regard to the degree of financial deepening (typically, the availability of financial services), track record in meeting past debt obligations, composition and maturity profile of public debt, and nature of political systems.

Second, individual economies are globally interdependent. Such interdependencies arise from global factors, including world commodity prices and the stance of the global financial cycle, and/or spillover effects from one country to the next that tend to be magnified at times of financial crises.

The limited availability and quality of data pose another challenge. A large sample of countries spanning a long time period would be ideal. In an effort to obtain comprehensive country coverage, “gross government debt” is used. It includes intragovernmental holdings, as opposed to the net debt held by the public, which would be more appropriate. Taking these into consideration, 40 economies were reviewed, with annual observations covering 1966 to 2010.

Table 1 summarizes the results. Individual columns report findings for two estimation methods, CS-ARDL and CS-DL, each capable of dealing with the noted technical challenges.¹ For each method, we consider different specifications and compute two different statistics for testing the significance of the debt-threshold effect (labeled as SupT and AveT).²

While no evidence is found for a universally applicable threshold effect in the relationship between public debt and economic growth (top panel of Table 1), the findings show that countries with rising debt-to-GDP ratios exceeding 60 percent tend to have lower real output growth rates (bottom panel of Table 1). These results suggest that debt trajectory is probably more important for growth than the level of debt itself.

Advanced, Emerging Economies

Similar evidence of no simple debt threshold is found after splitting the panel into advanced and emerging economies subgroups. Evidence of the debt-trajectory effects weakens once the two groups of countries are considered separately. Regardless of threshold effects, the relationship with output growth can be strongly negative when there is a persistent increase in debt to GDP.

Importantly, long-run relationships do not provide any indication about the direction of causality but merely provide a statistical association between the variables in the long run. In fact, the causality can run both ways.

On one hand, an unexpected increase in output following a positive technology shock will result in larger fiscal revenue and an improved debt-to-GDP ratio. On the other hand, an increase in the level of

TABLE 1 Statistical Evidence of Threshold Effects Appears Weak

	Threshold definition: Debt to GDP exceeds the threshold level		Estimation method: CS-DL		
	Estimation method: CS-ARDL		0	1	2
	Maximum lag order:		1	2	
Estimated threshold level	40%	30%	40%	40%	40%
Statistical significance of the threshold effect (at 5% or 1% level):					
Based on SupT test statistics	no	no	no	no	no
Based on AveT test statistics	no	no	no	no	no
Threshold definition: Debt to GDP exceeds the threshold level and is rising					
Estimated threshold level	60%	60%	60%	60%	60%
Statistical significance of the threshold effect (at 5% or 1% level):					
Based on SupT test statistics	no	no	no	yes: 5%	yes: 5%
Based on AveT test statistics	yes: 1%	yes: 1%	yes: 1%	yes: 1%	yes: 1%

NOTES: Lag order refers to the number of lags of the dependent and explanatory variables. These lagged terms are used to capture dynamics. Higher lag orders allow for more complex dynamics but are more difficult to estimate. SupT and AveT are tests for the presence of threshold effects. No rejection means no evidence of threshold effects. Statistical significance of 5 percent or 1 percent refers to the nominal size of the tests (that is, the probability of falsely rejecting the null hypothesis).

SOURCE: “Is There a Debt-Threshold Effect on Output Growth?” by Alexander Chudik, Kamiar Mohaddes, M. Hashem Pesaran and Mehdi Raissi, *Review of Economics and Statistics*, vol. 99, no. 1, 2017, pp. 135–50.

TABLE 2 Estimates of (Mean) Long-Run Effects of Public Debt on Output Growth Are Statistically Significant

	Estimation method: CS-ARDL		Estimation method: CS-DL		
	Maximum lag order:		0	1	2
	1	2			
All countries	-0.082 (0.012)	-0.086 (0.014)	-0.085 (0.012)	-0.080 (0.013)	-0.068 (0.014)
Advanced economies	-0.081 (0.021)	-0.093 (0.024)	-0.094 (0.019)	-0.093 (0.023)	-0.081 (0.020)
Emerging economies	-0.082 (0.013)	-0.080 (0.014)	-0.077 (0.014)	-0.069 (0.015)	-0.057 (0.021)

NOTES: Standard errors are provided in parentheses. All estimates are statistically significant at the 1 percent level.

SOURCE: “Is There a Debt-Threshold Effect on Output Growth?” by Alexander Chudik, Kamiar Mohaddes, M. Hashem Pesaran and Mehdi Raissi, *Review of Economics and Statistics*, vol. 99, no. 1, 2017, pp. 135–50.

debt following an expansionary fiscal policy shock (such as a lowering of the income tax rate) will improve domestic demand and, thus, raise output.

Table 2 shows the corresponding estimates of the (average) long-run impact of public debt accumulation on output growth. All estimates are statistically significant at the 1 percent level and robust across different specifications, estimation methods and country groupings. These estimates are all negative and in the range of -5.7 to -9.4 percent, suggesting that a persistent accumulation in the debt-to-GDP ratio at an annual pace of 3 percent is eventually associated with annual GDP growth outcomes that are 0.2 to 0.3 percentage points lower on average.

Understanding Fiscal Policies

The post-1965 experience of 40 advanced and developing economies reveals a statistically robust long-term relationship between a persistent accumulation of public debt and economic growth.

Moreover, estimates of the corresponding long-run coefficients are all negative, implying that countries that incurred persistent increases in the debt-to-GDP ratio over long periods also experienced lower output growth. However, a temporary increase in the ratio (for instance, to help smooth out business-cycle fluctuations) does not play a role in the long-term relationship between public debt and economic growth.

The analysis does not provide any indication about the direction of causality between public debt and growth, and in fact it allows for causality to run both ways. Consequently, it is often difficult to provide generic policy advice based on estimated relationships using a large set of diverse economies.

The mere fact that there is a negative long-term relationship between a persistent accumulation of debt and economic growth in the last four decades of available data calls for a better understanding of the economic implications of fiscal policies leading to persistent accumulation of public debt.

The key to prudent debt financing is the reassurance, backed by commitment and action, that the increase in government debt is temporary and will not be a permanent departure from the prevailing norm.

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The views expressed here are those of the authors and do not necessarily represent those of the Federal Reserve Bank of Dallas, the International Monetary Fund (IMF) or IMF policy.

Notes

For full details of the empirical analysis and related literature, see "Is There a Debt-Threshold Effect on Output Growth?" by Alexander Chudik, Kamiar Mohaddes, M. Hashem Pesaran and Mehdi Raissi, *Review of Economics and Statistics*, vol. 99, no. 1, 2017, pp. 135–50, and "Long-Run Effects in Large Heterogeneous Panel Data Models with Cross-Sectionally Correlated Errors," by Chudik, Mohaddes, Pesaran and Raissi, *Advances in Econometrics*, vol. 36, 2016, pp. 85–135.

¹ CS-ARDL stands for cross-sectionally augmented autoregressive distributed lag approach, and CS-DL stands for cross-sectionally augmented distributed lag approach. The approaches are explained in Chudik et al. (2016).

² SupT and AveT are tests for threshold effects. These test statistics are developed in Chudik et al. (2017).

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