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Public debt "causing" inflation? Very unlikely

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Abstract
Granger non-causality tests applied to data for a large set of countries indicate that public debt/GDP ratio is, generally, a poor "leading indicator" for the price level and the growth rate of the public debt/GDP ratio is, generally, a poor "leading indicator" for the inflation rate. Moreover, in a few cases the rising debt/GDP ratio appears to have depressed inflation. The widespread conviction that expanding public debt must sooner or later lead to higher inflation is empirically unfounded.

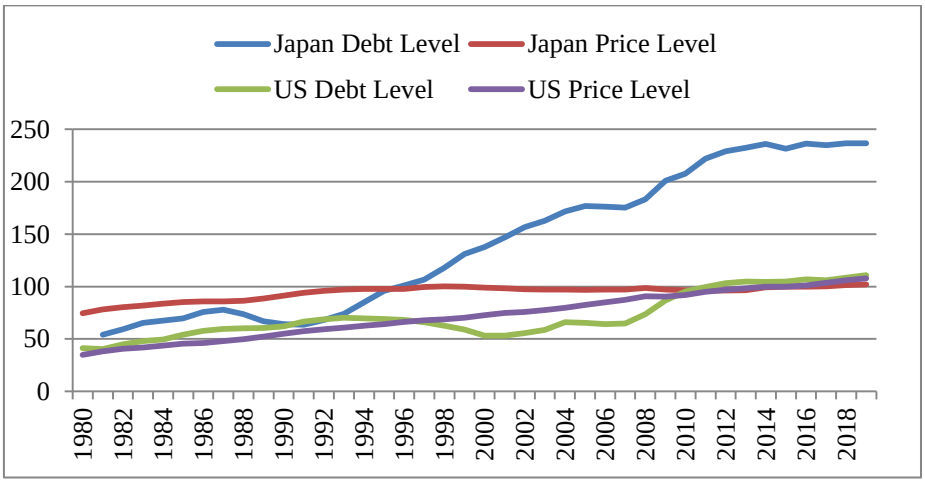
JEL Codes E31, E62

Keywords public debt, price level, inflation

The idea that rising levels of public debt must, sooner or later, lead to higher inflation still haunts many economists - amateurish as well as professional[1]. The massive "deficit spending" currently necessary in view of the global recession due to the "corona" epidemics may be less than adequate - also because of the instinctive fears of ensuing inflations (or hyperinflations).

Massively rising public debt/GDP ratios during and after the Great Recession have left inflation depressed. Yearly inflation averaged 1.1% for the Euro Area (12 core countries) over the ten year period 2008-2018. The average for Germany was 1.2%, for the USA 1.6% and for Japan 0.4%. Certainly, it is possible to claim that eventually, in some indefinite "long run", the pent up inflation will have to come back (or be brought back to deal with the public debt).
The longer-term data on price levels and debt/GDP are currently available (from the AMECO database) for the USA and Japan. These are shown in Figure 1.

Figure 1 Public debt/GDP (%) and Price Level (2015=100): Japan and USA, 1980/81-2019



Source: AMECO.

[1] An esoteric "Fiscal Theory of the Price Level", developed by Leeper, Woodward, Cochrane and others, sought to link the price level to fiscal (and not merely monetary) policies. Buiter (1999) showed the Theory "fallacious". More recently Farmer and Zabczyk (2019) offered a "requiem" to it.

Evidently, since 1994 Japan's strongly expanding public debt hasn't had much of an observable impact on the price level. If anything, the fast rise in Japan's debt/GDP ratio after 2008 could be linked to a slight deflation prevailing from 2008 through 2013. Things are less obvious for the USA: both have tended to increase secularly and the "plain eye" does not offer any clue as to the direction of eventual "causality".

However, it is possible to statistically test for the presence of Granger causality. Since both items for the USA and the debt/GDP for Japan are non-stationary, testing for Granger non-causality may be executed using the Toda-Yamamoto (1995) Procedure. Table 1 reports the P values for the Granger non-causality tests, applied to the price and debt/GDP levels. The hypothesis that debt level does *not* Granger cause price level is rejected (at the conventional 5% significance level) only for Japan. All remaining hypotheses (including for the US debt level not Granger-causing price level) cannot be rejected. There is statistical evidence that the US public debt level is a poor "leading indicator" for the US price level - while Japan's public debt level is a good leading indicator for Japan's price level. But, paradoxically perhaps, the "impact" in question appears to "negative": high debt level is followed, in due time, by stagnating, or even lowered price level.

Table 1 P values for Granger non-causality tests for Japan and the USA (years 1980/81-2019)

	Japan		USA
price level does not Granger-cause debt/GDP level	0.3901		0.1959
Debt/GDP level does not Granger-cause price level	0.0203		0.0830

Source: Own calculations (via Toda-Yamamoto Procedure) based on AMECO data.

Granger non-causality tests conducted to the *growth rates* of both items are in Table 2. It appears that Granger-causality runs here both ways in Japan: inflation Granger-causes the rate of growth of debt/GDP ratio and growth rate of debt/GDP ratio Granger-causes inflation. For US only one Granger-causality holds: from the inflation rate to the rate of growth of debt/GDP ratio. Of course, the Granger-causality does not, per se, say anything about the strength and direction of the "causal impacts".

Table 2. P values for Granger-non-causality tests applied to the growth rates for Japan and the USA (years 1980/81-2019)

	Japan		USA
inflation rate does not Granger-cause growth rate of the debt/GDP level	0.0275		0.0067
growth rate of the debt/GDP level does not Granger-cause inflation rate	0.0036		0.4821

Source: Own calculations (via auxiliary VAR analyses) based on AMECO data.

Figure 2 Impact Response Functions for Japan

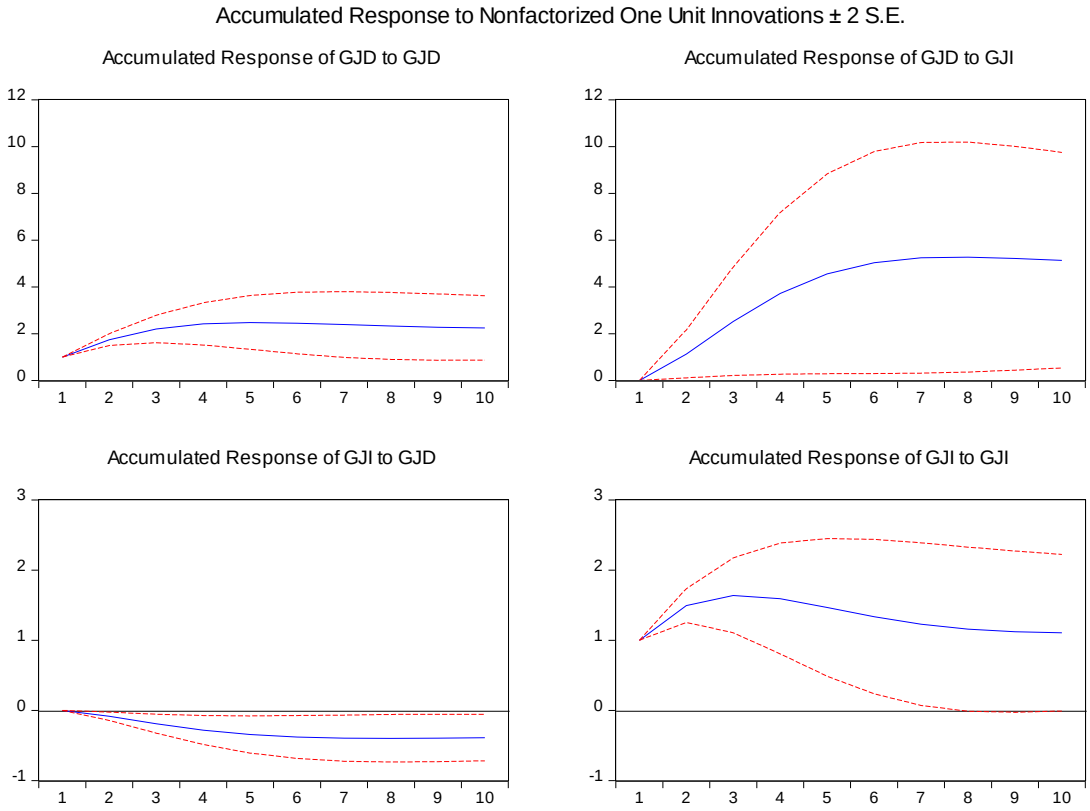
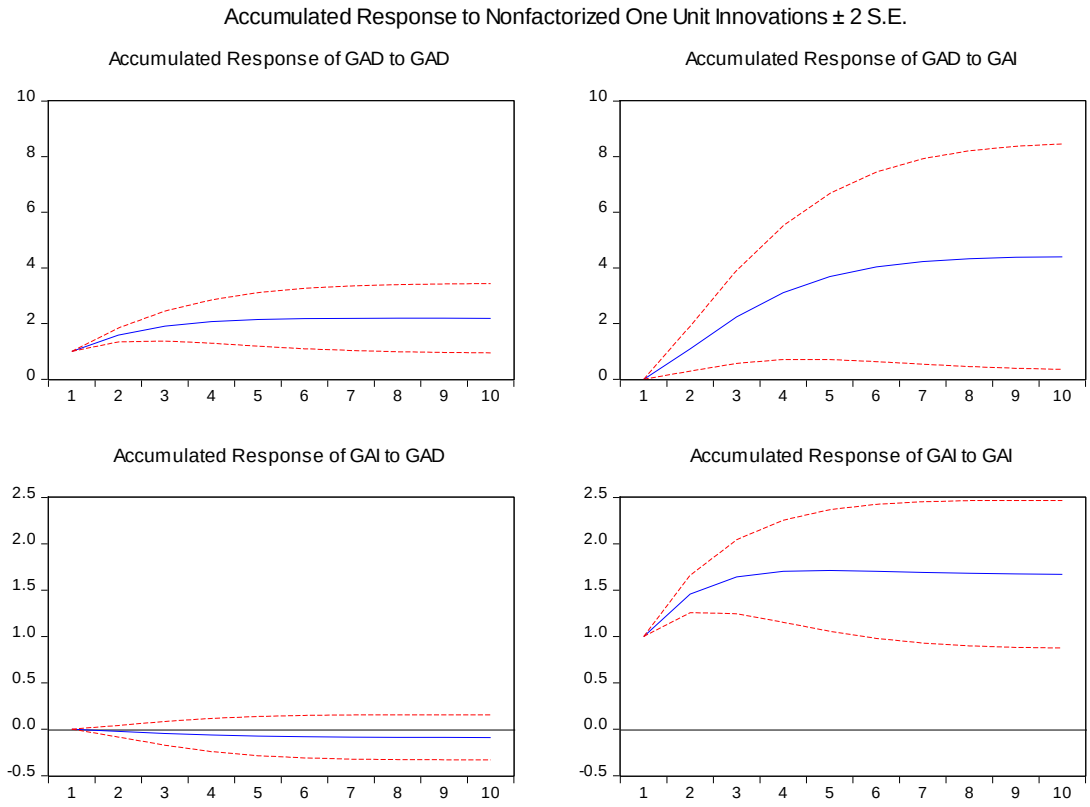


Figure 3 Impact Response Functions for the USA



To learn more about the strengths and directions of "causalities", as contained in the data, one may resort to the VAR (vector auto regression) analysis of the data.[2] Figures 2 and 3 sum up the properties of the VARs calculated for Japan and the USA. Of particular interest are bottom left-hand-side panels, showing the accumulated responses of inflation (GJI for Japan in Figure 2; GAI for the USA in Figure 3) to of one-off "shock" to the rate of growth of the debt/GDP ratio (GJD for Japan in Figure 2; GAD for the USA in Figure 3).

As can be seen, the accumulated impacts to inflation of one-off increase in the rate of growth of debt/GDP ratio are *negative* in both countries. An increase in the rate of growth of the debt/GDP ratios has – on average – been depressing inflation during the period under consideration. On average, such impacts have died out after about 7 years, in both countries. But the two countries have differed on the size of the impact which was much stronger in Japan – and close to nil in the USA. Besides, the two-standard deviations range of impacts for Japan is located below zero. That range for the US is located around zero – the sign of the impact is here much more ambiguous.

The upper right-hand-side panels indicate that the impacts to the rate of growth of the debt/GDP ratio of "shocks" to the inflation rate are unambiguously *positive* in both countries. This suggests that inflation has been *supporting* growth in the debt/GDP ratio – rather than acting to erode it. This is inconsistent with the idea that inflation is a "method" of getting rid of public debt. Observe, that the impact response functions agree with the findings from Table 2. For Japan the data indicates Granger-causality running in both directions while for the USA the Granger-causality runs only from the inflation rate to the rate of growth of the debt/GDP ratio.

For a much larger set of countries AMECO supplies the debt/GDP and the price level data starting in 1995. It is possible to conduct the Granger non-causality tests for all these countries (though for a much shorter time span).

The resulting P values for the Granger non-causality tests are in Table 3. The marked cells in Table 2 suggest *presence* of Granger causality (at the conventional 5% critical level).

It turns out that debt/GDP level is likely to "cause" the price level in only a few, largely marginal, countries (Column 2). These include (i) countries running very conservative fiscal policies with very low levels of public debt (shown in Column 3); (ii) high-debt euro area countries kept fiscally on short leash by the European Commission: Greece, Italy, Portugal and Spain (Ireland had its portion of "trauma" during and after the Great Recession too).

The hypothesis on the growth rate of the debt/GDP ratio Granger-causing inflation rate is invalid in 19 out of 27 counties (for which conclusive inferences can be drawn). In only 8 cases there is evidence of Granger-causality running from the growth rate of the debt/GDP ratio to the inflation rate (last column in Table 3). 4 of these cases (Ireland, Greece, Italy and Latvia) have had hard times since 2007 and two have been fiscally conservative (Luxembourg and Sweden). Of course, here the presence of Granger-causality does not mean that a positive "shock" to the rate of growth of the debt/GDP ratio is followed by positive increments to the inflation rate. As demonstrated earlier (Table 2 and Figures 2-3) the responses in

[2] Inflation and growth rates of the debt/GDP are both stationary for both countries, over the period 1980/81-2019. The use of VAR analyses is therefore legitimate here.

question may be *negative*. Actually, the responses of inflation rates to rising debt/GDP ratios appear negative for Luxembourg and Sweden.

Table 3 P values for Granger non-causality tests (years 1995-2019)

	Price Level does not Granger cause Debt Level	Debt Level does not Granger cause Price Level	Debt/GDP 2019 (%)	Inflation does not Granger cause Growth rate of Debt	Growth rate of Debt does not Granger cause Inflation
Belgium	0.7677	**0.0432**	100	0.9292	0.1282
Bulgaria	0.3900	0.6780	21	0.5001	0.1747
Czechia	0.2157	0.5249	31	**0.0000**	0.9123
Denmark	na	na	33	na	na
Germany	na	na	59	**0.0000**	0.2684
Estonia	**0.0036**	0.1812	9	**0.0008**	0.1043
Ireland	0.8244	**0.0332**	59	0.3491	**0.0007**
Greece	**0.0066**	**0.0000**	175	0.0705	**0.0029**
Spain	0.0679	**0.0002**	97	**0.0102**	0.2303
France	**0.0072**	0.3359	99	**0.0003**	0.9693
Italy	0.3893	**0.0118**	136	**0.0050**	**0.0413**
Cyprus	na	na	94	na	na
Latvia	na	na	36	0.0820	**0.0000**
Lithuania	**0.0250**	**0.0441**	36	**0.0003**	0.5711
Luxembourg	0.4851	**0.0001**	20	0.9310	**0.0008**
Hungary	0.2867	0.1617	68	0.0602	0.8680
Malta	0.4375	0.7673	43	0.4836	0.7677
Netherlands	na	na	49	0.8379	0.0974
Austria	na	na	70	0.0579	**0.0329**
Poland	na	na	47	0.5140	0.4598
Portugal	0.6714	**0.0000**	120	0.1355	0.4633
Romania	0.2083	0.9646	35	0.1840	0.8011
Slovenia	0.0754	0.6824	67	0.1922	0.5922
Slovakia	0.7392	0.7392	48	0.3392	0.8558
Finland	**0.0000**	0.4952	59	**0.0100**	0.9253
Sweden	0.4835	**0.0078**	35	0.1224	**0.0088**
UK	na	na	85	0.6798	0.1531
Japan	0.9872	0.1260	237	0.3302	**0.0456**
US	0.6145	0.1469	111	0.8019	0.1264

Source: Own calculations (via auxiliary VAR analyses and Toda-Yamamoto Procedure) based on AMECO data. (na: not available - time series too short (Denmark) or unstable auxiliary VARs).

For the remaining 6 countries the VAR analysis from which the impact response functions are derived cannot be legitimately conducted. For these countries at least one of the growth rate series is non-stationary. (This does not preclude the application of the Toda-Yamamoto procedure to test the Granger-causality, but invalidates simple VAR analyses.)

Concluding, the Granger non-causality tests applied to data for a large set of countries indicate that public debt/GDP ratio is, generally, a poor “leading indicator” for the price level and the growth rate of the public debt/GDP ratio is, generally, a poor “leading indicator” for the inflation rate. Moreover, in a few cases the rising debt/GDP ratio appears to have depressed inflation. The widespread conviction that expanding public debt must sooner or later lead to higher inflation is empirically unfounded.

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