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Rising public debt and the short-term interest rates: Is there a link?

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Abstract

ARDL-Bounds models for the European countries, the USA and Japan suggest that increasing public debts may have been of minor importance as determinants of short-term real interest rates. Moreover, the effects in question appear to be negative almost everywhere. Rising public debts seem to have lowered the short-term interest rates, if only rather marginally in most cases. The lingering opinion that fiscal deficits drive up interest rates finds no convincing confirmation in the data.

Keywords: crowding out, public debt, short-term interest rates, ARDL-B

JEL: E43, E62, H62

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1. Introduction

The possibility of fiscal deficits crowding out private spending used to be in the focus of mainstream macroeconomics, especially during the heydays of monetarism, applied as well as theoretical. The 'crowding out' idea also lies behind the concept of 'expansionary fiscal consolidation' (Giavazzi, Pagano 1990) though the latter is based on 'the expectational view of fiscal policy', a hypothesis akin to the 'Ricardian Equivalence' doctrine.[1] Rising fiscal deficits were often supposed to be capable of affecting private spending negatively, primarily, if not exclusively, by driving up the interest rates (Blanchard 1991). The quantification of the effects of fiscal deficits (or public debts) on interest rates absorbed a very large amount of empirical research effort, exhaustively reviewed by Ussher (1998). Surprisingly, the results of that early research were rather ambiguous. "Traditional theories either support deficits having a positive or a neutral effect on interest rates. Various tests of these propositions yield diverse results, and one can find all conclusions – that deficits raise, decrease or do not affect interest rates" (Ussher 1998, p. 1).

More recently the published research on the issue has become quite rare. Laubach (2003), purporting to have found 'new evidence' on fiscal deficits and debts affecting the interest rates positively, possibly remains the last Mohican of this genre. The waning interest in the issue probably reflects the economic reality. Since the early 1980s interest rates have followed decreasing trends while public deficits and debt levels have tended to rise. For example, for the USA the simple correlation between the yearly values of real short-term (3-month interbank) interest rates and the debt/GDP ratios is -0.7502, and the correlation between the deficit/GDP ratio and the yearly increase in the real short-term interest rate (years 1981/82 through 2019) is -0.4552. Similar tendencies have been discerned in other developed countries.

The response to the COVID pandemics involves truly massive increases in public deficits and debts everywhere. So far, these developments have not been followed by negative consequences repeatedly 'promised' by the representatives of macroeconomic orthodoxy such as growing interest rates or ubiquitous sovereign defaults. (High inflation starting in the second half of 2021 seems to follow exogenous energy price shocks rather than delayed effects of the earlier fiscal deficit spending.)

Shortly after the Great Recession which followed the financial crisis erupting in 2007, the fiscal laxity did not provoke much of a determined opposition (at least outside Germany). But as soon as that crisis seemed to have been overcome, the proponents of 'sound fiscal policies' (i.e. austerity) regained the upper hand. For example, Reinhart and Rogoff (2010) paraded evidence strongly suggesting, in their opinion, that high public debt slows down growth – apart from being responsible for runaway inflations and recurring sovereign defaults.[2] The euro area soon returned to the policy of unconditional fiscal prudence – igniting the 'second dip recession' (years 2012–2013) and suppressing growth later on. Thus it is rational to expect that when the memories of the current 'pandemic' calamities fade away the old 'theory' phantoms will certainly be resurrected, among them the 'common wisdoms' about private spending being crowded out by the fiscal deficits. The crowding out idea has already probed a return (Huang, Panizza, Vargese 2018). That attempt, involving mis-interpreted correlation coefficients, was disputed by Podkaminer (2018). Similarly, the idea that rising public debts generate inflation is shown to be inconsistent with empirical evidence (Podkaminer 2020).

[1] Afonso (2006) alleged to have found 'new empirical evidence' in favour of 'expansionary austerity' policies.

[2] As it later turned out (Herndon, Ash, Pollin 2014) the calculations on which they had based their claims were fatally flawed and the data referred to peculiarly selective.

The expectation of the comeback of the old ideas should motivate a renewed examination of empirical evidence on the links between deficits/debts and variables potentially determining the real economic outcomes.

Past attempts to quantify the interest rate effects of public debts/deficits (Ussher 1998) are now of limited significance. First, they used to rely on data partly characterising entirely different economic environments (such as prevailing under the Bretton Woods Accords). There are two more problems with these attempts. The first relates to the tendency to include in the models in question a rather large amount of variables suspected of having an impact on the interest rates – along with the fiscal variables proper. But thus "enriched" models were capable of "yielding diverse results", depending on the model makers' predilections. The answer delivered to a simple question about the interest rate effects of fiscal policies was then typically "it all depends", i.e. not really illuminating. The second problem relates to the types of fairly simplified econometrics quite often applied in the early studies.

This paper seeks to examine the link between the fiscal deficits and the real short-term interest rate in a number of industrial countries. The effort involves the application of the ARDL-Bounds approach to the data on the increments in the debt/GDP ratio and in the short-term interest rates in recent decades.

Section 2 presents the detailed results for the USA (years 1982–2019). Section 3 summarises the results for major European countries, Japan and the USA (years 1995–2019). Section 4 discusses the effects of allowing for increments in long-term interest rates. The conclusion (Section 5) is that rising public debts seem to have been of minor importance as determinants of short-term real interest rates. Moreover, the impacts in question appear to be negative in the vast majority of countries considered: rising public debts have tended to lower the short-term interest rates, if only rather marginally in most cases.

2. ARDL-Bounds for the USA (years 1981–2019)

ARDL (Auto Regressive Distributed Lags) models involve regressing a variable on its own lagged values as well as on the lagged and contemporaneous values of an explanatory variable (or a vector of such variables). Standard ARDL models using the OLS technique may produce biased and inconsistent estimates. The modelling methodology developed by Pesaran, Shin and Smith (2001) enables a relatively unproblematic selection of meaningful ARDL models with unbiased parameter estimates and asymptotically valid testing statistics. Their ARDL-Bounds methodology can be applied even if the orders of integration of variables considered are different – provided none of them is higher than 1.

The variables considered in this paper are S, defined as the increase in the 3-month interbank interest rate (deflated by the GDP deflator), and Z, the increase in the (percentage) ratio of public debt to GDP. Both items come from AMECO, the yearly data bank of the Eurostat. For the USA and Japan the S and Z series start in 1981. The unit-root tests (ADF and KPSS) indicate that neither S nor Z for the USA and Japan is integrated of order 2. Thus, it is legitimate to proceed with the steps prescribed by the ARDL-Bounds methodology.

Table 1 reports the outcome of the OLS estimation of an ARDL model for the USA, with lag lengths selected through the Akaike information criterion and assuming away the constant term.[3] (ARDL models without constant terms constitute 'Case 1' considered by Pesaran et al.) Before going through

[3] All calculations/estimations quoted in this paper were conducted using the EViews-9 econometric package.

the rest of this Section it may be worth adding that an ARDL with Z as the dependent variable and S as the explanatory one does not pass the tests required – the results obtained are likely spurious.[4]

Table 1 suggests that an increase in the debt/GDP ratio is associated, contemporaneously, with a decrease in the short-term interest rate (the short-run 'elasticity' of S with respect to Z is negative: -0.18765). That decrease is largely (but not completely) offset one year later. Observe that all regression coefficients ('elasticities') are highly significant statistically. It remains to be checked whether the estimated ARDL from Table 1 is actually informative. To this end a number of additional tests have to be conducted, starting with the Bounds test (reported in Table 2).

The relevant F-statistic value for the case considered turns out to be much higher than the upper bound (6.02) required for the rejection of null of no long-run relationship between the S, S(-1), Z and Z(-1).[5] This strongly indicates that there is a long-run relationship between the variables considered, with valid regression coefficients, as revealed by the OLS in Table 1.

The ARDL model from Table 1 is associated with a long-run ('cointegrating', or 'equilibrium') relationship tying up S and Z. This is given by the equation $S = -0.0463 \cdot Z$ (see the bottom panel in Table 3). The coefficient -0.0463 is interpreted as the 'long-run elasticity' of S with respect to Z.

The upper panel of Table 3 reports the coefficients for the associated equation which regresses D(S) on two items: D(Z) and the value of the previous year's disequilibrium, $[S(-1) + 0.0463 \cdot Z(-1)]$. Both regression coefficients in the Cointegrating Form (upper panel in Table 3) are highly significant. The coefficient for the Cointegration equation (-0.591115) measures the speed of correction of the eventual disequilibrium $[S(-1) + 0.0463 \cdot Z(-1)]$. This coefficient is highly significant and negative, as required.

Further, the correlograms of residuals to the model from Table 1 strongly suggest that the errors to the model from Table 1 are serially independent. The Breusch-Godfrey Serial Correlation LM Test (Table 4) confirms this result while the residual heteroscedasticity is rejected (Table 5).

The roots of the characteristic equation for the regression from Table 1 lie inside the unit circle – the equation is dynamically stable. Finally, the CUSUM and CUSUM of Squares tests (Figures 2–3) indicate remarkable stability of the estimates.

The final conclusion following the testing is that there is a strong statistical evidence that the changes in the US real short-term interest rates have been responding negatively to the contemporaneous changes in the public debt/GDP (percentage) ratio. In any case, the effects in question are rather small. A 1 percentage point (p.p.) increase in the debt/GDP ratio contemporaneously lowers the real short--term interest rate by about 0.19 p.p., on average. Observe, that the contemporaneous rise of 0.19 p.p. is then offset by a 0.16 p.p. decline the next year. Over a two-year period a one p.p. one-off increase in the debt/GDP ratio is expected to lower the short-term real interest rate by a mere 0.0274 p.p. (-0.0274 = -0.1877 + 0.1603). This is a negligible quantity: the average real short-term interest rate for

[4] Two remarks are now in order: 1) the ARDLs regressing the short-term real interest rates on the increments in the debt/GDP ratio fail the Bounds tests; 2) 'annus horribilis' (2009) saw an extraordinarily large rise in Z, associated with an unusually large decline in S. In an attempt to allow for this fact, the ARDL models with a dummy variable equal 1 for 2009 and 0 for the remaining years were also tried – without materially affecting the outcomes and conclusions derived from ARDL models without this dummy.

[5] The 1% critical upper Bound (6.02), coming from Pesaran, Shin and Smith (2001), is meant to apply to ARDL with very long time series. Narayan (2004) proposed the bounds for series with lengths ranging from 30 to 80. Narayan calculated the Bounds for Cases II and III – but not for the Case I we are dealing with. For our 38 observations (1982–2019) Narayan's Case II 1% critical Bound is 6.49 rather than Pesaran's 5.58. For Case III it is 8.95 rather than 7.84, respectively. Extrapolating, for Case I the 1% upper Bound for 38 observations might be about 7. The calculated F statistic (10.07) is much higher than 7. For 80 observations Narayan's 1% critical Bounds are 5.92 and 8.26 (for Cases II and III, respectively).

the years 1960 through 2019 was 1.96% (median: 2.21%). Moreover, the sum of the short-run elasticities (-0.0274) is statistically insignificant: the probability of its being zero is 0.4418.

3. ARDL results for the years 1996–2019

AMECO provides data for the short-term real interest rates and debt/GDP ratios for almost all European countries, the USA and Japan. For a few cases (e.g. Italy) the data quoted start as early as 1961. However, for individual European countries (including Italy) the definitions of the short-term interest rate were subject to changes (sometimes quite radical) over the years. The definitions were finally settled (as three-month interbank rates) starting from 1995. Thus, only for Japan (and the USA) it is possible to run the ARDL model with the time series spanning a relatively longer time period (38 years). For Croatia, Iceland and Turkey the data required are available for 12–15 years only. It seems inappropriate to run ARDL models for these three countries if only because one would have to severely limit the maximum number of lags in the ARDL models (at present that number is set at 4). Other countries not studied include the smallest ones: Malta, Cyprus and the three Baltic republics, as well as the least advanced: Bulgaria and Romania.[6] It goes without saying that because of the length of the time series (24 years at most) the estimates for the remaining countries reported in Table 6, must be viewed with some caution.

The unit root tests strongly reject the nonstationarity of the D(S) and D(Z) variables for all but one country – the United Kingdom. The ADF test statistic for D(Z) for the UK is -2.8 (with a P-value of 0.0606). Thus, the ADF test rejects unit root in the British D(Z) – but only at a 10% significance level. However, the KPSS test statistic (0.118) does not reject the stationarity of the British D(Z) with a P-value much greater than 0.20. Eventually it is assumed that no variable (S, Z) is integrated of order 2 for any country, which is the precondition for running ARDL models capable of undergoing valid Bounds tests.

Table 6 reports the most relevant ARDL parameter estimates for the European countries, the USA and Japan, and years 1995–2019 (as well as such parameter estimates for the USA and Japan, for the years 1982–2019).

The first column reports the F statistics for the Bound test. For Belgium the F statistic (3.9) is evidently too low and does not reject the hypothesis of ‘no long-run relationship’ between the variables in question, even at a 5% significance. (Pesaran’s upper bound for rejecting the hypothesis at a 5% significance is 4.11, for the shorter samples the bound must be substantially higher.) Consequently, the ARDL parameters for Belgium do not feature in Table 6. For the remaining countries, excepting Spain, the F statistics reject the ‘no long-run relationship’ at less than 1% significance. For Spain the F statistic (6.7) is larger than Pesaran’s 2.5% upper bound (4.92) and even the 1% upper bound (6.02). Also the F statistic for the USA is now relatively low (7.4). Nevertheless, most probably the ‘no long-run relationship’ for Spain and the USA would still be rejected at 2.5% significance if the bounds applicable to short time series were available.[7]

ARDL models for all countries reported in Table 6 satisfy the requisite additional residual and stability tests, with flying colours. None is dynamically unstable. (Details on these tests are available

[6] Time series for Bulgaria, Cyprus, Latvia and Lithuania are quite short (20–21 years). The three of the former countries (as well as Romania) suffered major crises – some even well before the Great Recession. Their fiscal and monetary (and social) policies were guided by ‘friendly’ (but single-minded) IMF supervisors.

[7] For 30 observations Narayan’s (2004) 1% upper bounds for Pesaran’s Cases II and III are 6.78 and 9.29, respectively, and for the 5% upper bounds 4.66 and 6.35, respectively.

on request from the author.) The speed-of-adjustment coefficients featuring in the Cointegrating Forms are all negative, as required, and are highly significant (at P-values less than 0.05%).

For Hungary, Greece and the Netherlands the short-run 'elasticities' of S with respect to contemporaneous Z are positive – with the lagged values of Z playing no role. However, only for Hungary this 'elasticity' is significant (at less than 1%) while the 'elasticities' for Greece and the Netherlands are very small (apart from being statistically insignificant, with P-values equal 0.5708 and 0.4241, respectively).

For the remaining European countries (as well as for the USA and Japan) the sums of short-term elasticities are negative. The statistical significance and the size of the summary effects vary from country to country. The strongest (and statistically significant) summary negative effects have been obtained for Norway, Slovakia, Finland and France. The summary effect for the USA is very small, and statistically insignificant (similarly as for the longer period, 1982–2019).

All in all, Table 6 strongly supports the view that a rising debt/GDP ratio has, on the whole, rather small effects on the short-term interest rates. Moreover, the eventual effects tend to be negative. Contrary to what is so often believed, a rising debt/GDP ratio has tended to lower, even if marginally, the short-term interest rates.

4. ARDL models allowing for the long-term interest rates

Admittedly, the ARDL models with the increments in the debt/GDP ratio as the sole explanatory variable abstract from other possible 'causal' factors. One such possible factor is the stance of the monetary policy. This stance is likely to be reflected in the long-term interest rates. Arguably, the conclusions concerning the impact of increments in the debt/GDP ratio on the changes in the short--term interest rates could be different if the ARDL models include an additional variable (L) defined as the increment in the long-term real interest rates.[8]

The long-term real interest rates, defined as the yields on 10-year government bond deflated by the GDP deflator, are available from AMECO for 1995–2019, for most countries from Table 6.

To check the robustness of the estimates from Table 6, ARDL models with two explanatory variables were analysed. Table 7 shows the estimated ARDL model (with Z and L as explanatory variables) for the USA.

The sum of short-run 'elasticities' with respect to the Z variable is now -0.0171 (-0.1668 + 0.1497). The probability of this sum being equal zero is 0.6656. Effectively, on average, the change in the debt/GDP ratio has no effect on the short-term interest rate. (However, the effect of a one-off increment in the long--term real interest rate is positive, quite large (0.5984) and statistically significant at the 5% level.) What really matters here is that the estimates concerning the effects of changes in the debt/GDP ratio obtained from the extended ARDL model for the USA qualitatively support those following the simple ARDL.[9]

[8] Arguably, the two regressors (L and Z) are not independent (with L quite likely being 'a function' of Z). The ARDL-B approach copes well with this type of endogeneity as long as the residuals are serially uncorrelated (which is the standard requirement anyway). Moreover, if there is a long-run relationship ('cointegration') between the variables (the dependent one and the regressors), the OLS estimates are super-consistent even if the regressors themselves are correlated.

[9] Of course, the extended ARDL model is capable of providing a better 'fit' – it should track S better that the simple one. Arguably, by adding sufficiently large number of various additional variables one could further improve that 'fit'. But, remember, our goal is not so much to provide the best possible model 'explaining' S but a possibly simple model focusing on the role that a single variable of interest (Z in our case) plays as the factor determining S.

The extended ARDL models were run for the countries from Table 6. It appears that allowing for the increment in the long-term interest rates as the second explanatory variable reduces the number of countries for which ARDL models produce meaningful results. For some countries the L time series available are too short, for some the Bound tests fail and there are clear signs of autocorrelated residuals (see the Notes to Table 8).

But the extended ARDL models still 'work' for 13 countries: these pass the Bound and other requisite tests. For these countries Table 8 reports the sums of the short-run 'elasticity' estimates derived from the extended ARDL models, together with the sums from the original ARDL models (from Table 6).

According to Table 8 the sum of the short-run 'elasticities' with respect to Z, which in the simple ARDL is negative for Japan, turns positive in the extended ARDL. However, both sums are very close to zero – and are statistically insignificant anyway. On the other hand, the respective sum for Greece emerges from the extended ARDL model as negative, relatively much larger, and statistically significant. The sums for the remaining countries continue to be negative. However, while according to the simple ARDLs only two of those sums were statistically significant (at the 5% level), according to the extended ARDLs those sums are statistically significant for eight countries (two of them at 1%, five at 5% and one at 10%). It may be also worth noting, that the extended ARDLs suggest that increments in the long-term interest rates exert positive impacts on the increments in the short-term interest rates. These impacts are quite large (and statistically highly significant). This result is unsurprising: as a rule, both variables (S and L) are highly correlated (with the correlation coefficient well in excess of +0.70 in most cases). But the most important fact worth stressing at this stage is that allowing for the variable relating, even if indirectly, to the monetary policy, only strengthens the conclusions on the effects (highly likely negative) of a rising debt/GDP ratio on the short-term money market interest rates.

5. Concluding remarks

The lingering opinion that fiscal deficits should drive up interest rates is not confirmed by the data.

The calculations reported suggest that changing debt/GDP must have had rather small effects on the short-term real interest rates. In any case these effects have tended to be negative.

Quite certainly further work is still desirable. One possible extension could attempt to work with cyclically adjusted quarterly data. Of course, the availability of quarterly fiscal data cannot be taken for granted. Also, it would be useful to examine the possibility of non-linear interest rate effects of changing debt/GDP ratios (and the eventuality that the responses to a rising ratio quantitatively differ from the responses to a falling ratio). Last, but not least, some other items suspected of playing an important role could be considered as explanatory variables – together with the increments in the debt/GDP ratio.

The usual 'theoretical' intuition behind the expectation of higher fiscal deficits driving up higher interest rates boils down to a variant of the 'loanable funds' doctrine. Given a fixed amount of 'loanable money', higher public spending lowers the amount of money available to the private sector – thus bidding up its price: the interest rates.

A 'theoretical rationale' for the empirical regularity detected in this paper is different. It does not assume a fixed amount of 'loanable funds'. Essentially, the mechanism capable of lowering the interest rates under a fiscal expansion is quite straightforward. One way or another a normal fiscal relaxation boils down to injecting some additional monetary resources into the private sector. Unless this is successfully sabotaged by a monetary authority keen on 'sterilising' the injections, the fiscal relaxation normally[10] should ease the monetary conditions – thus being conducive to a lowering of the short-term interest rates.

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[10] A fiscal relaxation normally benefits a country's own private sector. However, this is not the case when the rise in the fiscal deficit is due to increasing foreign debt service payments (especially if the latter are in foreign exchange). Increasing costs of servicing the foreign debt (implying a rise in the overall fiscal deficit) may require an increased flow of monetary resources away from the domestic private sector (e.g. by means of higher taxation). In such, admittedly 'abnormal' situations higher deficits no longer represent a regular fiscal relaxation (and may not be expected to lower the domestic interest rates).

Appendix

Table 1
The ARDL model for the USA

Dependent variable: S

Method: ARDL

Sample (adjusted): 1982–2019

Included observations: 38 after adjustments

Maximum dependent lags: 4 (automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): Z

Fixed regressors: none

Number of models evalulated: 20

Selected model: ARDL (1, 1)

Note: final equation sample is larger than selection sample

HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	**Coefficient**	**Std. error**	**t-Statistic**	**Prob.**
S(-1)	0.408885	0.081978	4.987719	0.0000
Z	-0.187650	0.038345	-4.893671	0.0000
Z(-1)	0.160266	0.060184	2.662922	0.0116
R-squared	0.438856	Mean dependent variable		-0.089857
Adjusted R-squared	0.406791	S.D. dependent variable		0.970217
S.E. of regression	0.747262	Akaike info criterion		2.330854
Sum squared resid	19.54400	Schwarz criterion		2.460137
Log likelihood	-41.28623	Hannan-Quinn criterion		2.376852
Durbin-Watson stat	1.979814			

Table 2
ARDL Bounds test

Null hypothesis: no long-run relationships exist		
Test statistic	**Value**	**k**
F-statistic	10.07096	1
	Critical value bounds	
Significance	**I0 Bound**	**I1 Bound**
10%	2.44	3.28
5%	3.15	4.11
2.5%	3.88	4.92
1%	4.81	6.02

Table 3
ARDL cointegrating and long-run form

Dependent variable: D(S)				
		Cointegrating form		
Variable	**Coefficient**	**Std. error**	**t-Statistic**	**Prob.**
D(Z)	-0.187650	0.039256	-4.780218	0.0000
CointEq(-1)	-0.591115	0.129869	-4.551636	0.0001
Cointeq = S - (-0.0463*Z)				
		Long-run coefficients		
Variable	**Coefficient**	**Std. error**	**t-Statistic**	**Prob.**
Z	-0.046327	0.057376	-0.807427	0.4249

Table 4
Breusch-Godfrey serial correlation LM test

F-statistic	0.375299	Prob. F(2.33)	0.6900
Obs*R-squared	0.845103	Prob. Chi-Square(2)	0.6554

Table 5
Heteroskedasticity test: Breusch-Pagan-Godfrey

F-statistic	0.470865	Prob. F(3.34)	0.7046
Obs*R-squared	1.515806	Prob. Chi-Square(3)	0.6786
Scaled explained SS	1.067716	Prob. Chi-Square(3)	0.7849

Table 6

Selected parameter estimates for ARDL models for major European countries, the USA and Japan, 1996–2019

	Short-run 'elasticities'							Long-run 'elasticity'
	F-stat.	**Z**	**Z(-1)**	**Z(-2)**	**Z(-3)**	**Z(-4)**	**Sum**	
				1982–2019				
USA	**10.7**	-0.1877	0.1603				-0.0274	-0.0463
Japan	**24.9**	-0.0162					-0.0162	-0.0138
				1996–2019				
USA	**7.4**	**-0.1596**	0.1377				-0.0219	-0.0334
Japan	**8.35**	-0.0118					-0.0118	-0.0107
Czechia	**13.34**	0.0812	-0.2082				-0.127	-0.075
Denmark	**42.47**	0.0472	-0.15				-0.1028	-0.0623
Germany	**17.93**	-0.1626					-0.1626	-0.111
Ireland	**16.89**	**0.1416**	-0.1446				-0.003	-0.0026
Greece	**12.54**	0.0093					0.0093	0.009
Spain	6.73	-0.0136	**-0.091**	**0.1796**	**-0.1219**		-0.0469	-0.0682
France	**10.04**	-0.0447	**-0.1012**	**0.0615**			**-0.0844**	**-0.0858**
Italy	**10.23**	-0.1629	**0.135**				-0.0279	-0.0319
Luxembourg	**13.85**	-0.2304					-0.2304	0.2289
Hungary	**14.9**	**0.2162**					0.2162	**0.1511**
Netherlands	**12.03**	0.0353					0.0353	0.0321
Austria	**10.39**	**-0.1699**	0.043				-0.1269	-0.1206
Poland	**11.0**	-0.0532	-0.3437				-0.3969	-0.3979
Portugal	**10.06**	0.0599	-0.0842				-0.0243	-0.0167
Slovenia	**16.13**	**-0.1141**	**0.2045**	**-0.1177**			-0.0273	-0.0227
Slovakia	**12.6**	0.1076	-0.3089	0.2097	-0.2423		**-0.2339**	**-0.1919**
Finland	**12.32**	-0.1183					**-0.1183**	-0.08
Sweden	**17.77**	-0.0918					-0.0918	-0.0695
UK	**8.98**	-0.1312	-0.1137	0.2806	-0.2674	0.1489	-0.2317	-0.0514
Norway	**25.57**	**-0.1487**					**-0.1487**	**-0.128**

Note: P-values for the underlined bold-font estimates are less than 1%; less than 5% for the bold-font ones and less than 10% for the underlined ones.

Source: own calculations.

Table 7
ARDL model regressing S on Z and L for the USA (years 1996–2019)

Dependent variable: S
Method: ARDL
Sample: 1996–2019
Included observations: 24
Maximum dependent lags: 4 (automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): Z L
Fixed regressors:
Number of models evalulated: 100
Selected model: ARDL(1, 1, 0)
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	**Coefficient**	**Std. error**	**t-Statistic**	**Prob.**
S(-1)	0.279858	0.106837	2.619487	0.0164
Z	-0.166786	0.039580	-4.213866	0.0004
Z(-1)	0.149652	0.057521	2.601676	0.0171
L	0.598420	0.278907	2.145592	0.0444
R-squared	0.538742		Mean dependent var	-0.131592
Adjusted R-squared	0.469553		S.D. dependent var	0.977260
S.E. of regression	0.711756		Akaike info criterion	2.308848
Sum squared resid	10.13193		Schwarz criterion	2.505191
Log likelihood	-23.70618		Hannan-Quinn criterion	2.360938
Durbin-Watson stat	1.774748			

Table 8

The sums of short-term 'elasticities' from ARDL models without and with the increment in the long-term real interest rates (L) as the second explanatory variable

	A	B	C
USA	-0.0219	-0.0171	*0.5984*
Japan	-0.0118	0.0009	**0.8133**
Czechia	-0.127	**-0.1357**	**1.42**
Germany	-0.1626	-0.0212	**3.146**
Ireland	-0.003	**-0.1498**	**2.69**
Greece	0.0093	**-0.0167**	0.3252
France	**-0.0844**	**-0.0706**	**0.4536**
Italy	-0.0279	-0.0256	**0.5968**
Luxembourg	-0.2304	**-0.1432**	**1.372**
Poland	-0.3969	-0.3119	**4.13**
Portugal	-0.0243	**-0.048**	**0.5874**
Finland	**-0.1183**	-0.1	0.3643
Sweden	-0.0918	**-0.276**	**3.784**

Notes:
P-values for the underlined bold-font estimates are less than 1%; less than 5% for the bold-font ones and less than 10% for the underlined ones.
Column A: the sums of short-run elasticities of S with respect to Z from the ARDL model without the increment in the long-term interest rates as an explanatory variable (as in Table 6).
Column B: the same sums from the ARDL model with the increment in the long-term real interest rate as the explanatory variable.
Column C: the sums of short-run 'elasticities' of S with respect to increments in the long-term real interest rates.
ARDL models for the remaining countries from Table 6 either do not pass the Bound tests (Spain, the Netherlands and Austria) or are otherwise inconclusive (time series on the long-term interest rates are too short or residuals are autocorrelated). Also the extended ARDL model for Belgium fails the Bound tests, while the extended ARDL for the USA narrowly passes the Bound test at about 2.5% significance level.

Source: own calculations.

Figure 1
Actual S and its fitted values for the ARDL model from Table 1

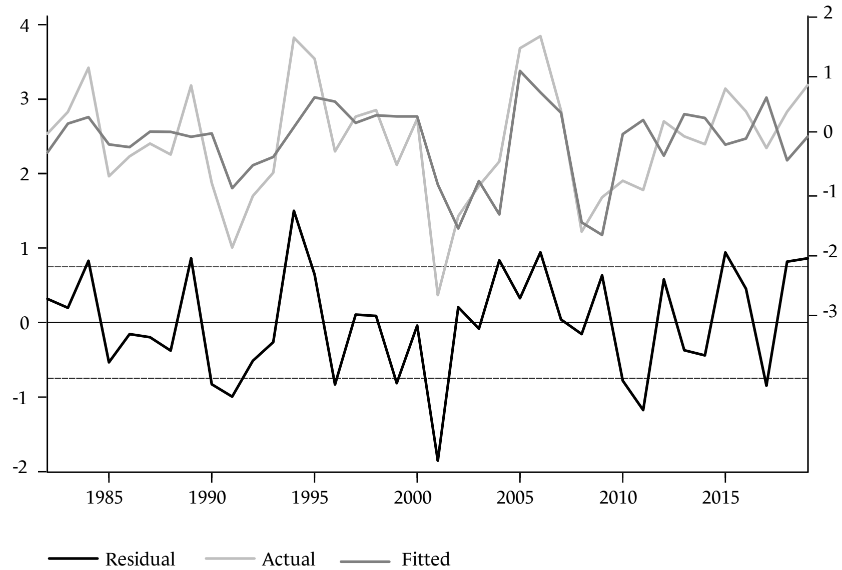


Figure 2
CUSUM Test

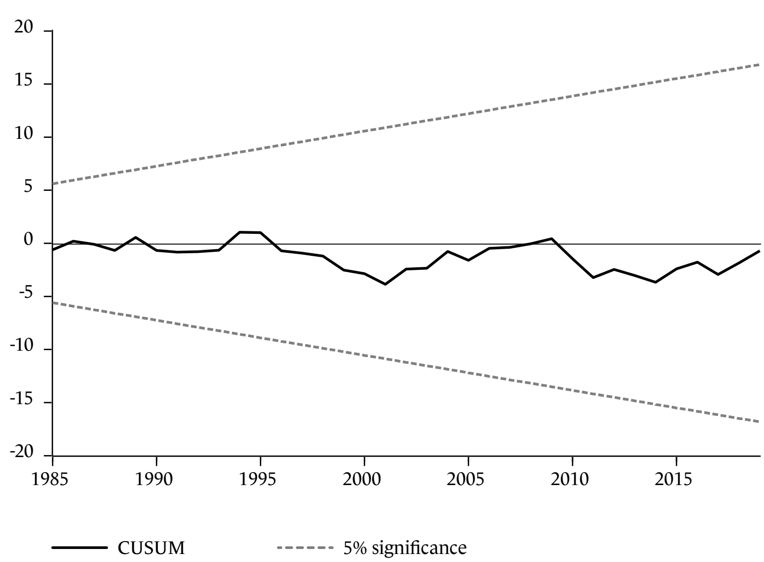
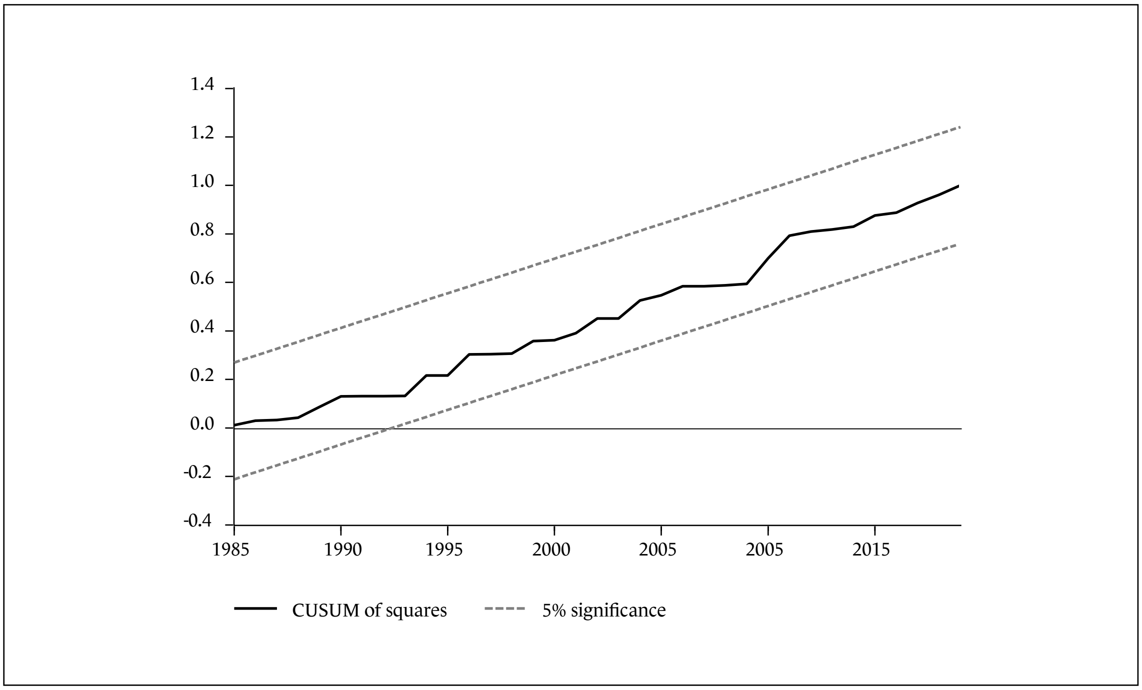


Figure 3
CUSUM of squares test



Czy rosnący dług publiczny pozytywnie wpływa na krótkookresowe stopy procentowe?

Streszczenie

Możliwość „wypychania" (*crowding out*) wydatków prywatnych przez rosnące wydatki publiczne jest poważnie rozważana w makroekonomii głównego nurtu (*mainstream*). Sądzi się, że efekt wypychania może się pojawiać w rezultacie stóp procentowych pozytywnie reagujących na rosnące wydatki i deficyty fiskalne. Zwiększone stopy procentowe miałyby z kolei hamująco oddziaływać na wydatki prywatne (konsumpcyjne i inwestycyjne). Oszacowywaniu wpływu wzrostu deficytów na stopy procentowe poświęcono, w latach 70. i 80. XX w., olbrzymią ilość badań empirycznych, jednak nie doprowadziły one do jednoznacznych wniosków. W późniejszym okresie temat ten nie był przedmiotem intensywniejszych badań empirycznych.

Obserwowany w ostatnich latach skokowy wzrost długów publicznych związanych z pandemią (oraz, prawdopodobnie, z wojną w Ukrainie) może nasilić obawy, że wystąpi zjawisko wypychania. Uzasadnia to ponowne podjęcie badań w tym zakresie.

Badania relacjonowane w tym tekście mają na celu weryfikację hipotezy, według której krótkookresowe realne stopy procentowe (rynku pieniężnego) nie reagują pozytywnie na rosnące poziomy długów publicznych (w relacji do PKB).

W badaniu wykorzystano szeregi czasowe dla krajów europejskich, USA i Japonii, dostępne w bazie rocznych danych makroekonomicznych AMECO. Zastosowano w nim metodologię ARDL-B (Auto Regressive Distributed Lags – Bounds). Metodologia ta ma szereg zalet, których nie miały wcześniejsze metody ekonometryczne używane do badania wpływu deficytów fiskalnych na stopy procentowe.

Wyniki uzyskane zgodnie z metodologią ARDL-B wskazują, że wpływ zmian poziomu długu publicznego na poziom krótkookresowych stóp procentowych jest minimalny. Co istotne, w zdecydowanej większości przypadków jest on ujemny. Oznacza to, że wzrost poziomu długu publicznego redukuje (minimalnie) stopy procentowe. Wniosek ten dodatkowo potwierdzają modele ARDL-B, uwzględniające także długookresowe stopy procentowe jako zmienne objaśniające.

Wyniki badania sugerują, że obawy związane z możliwością wypychania wydatków prywatnych przez wydatki publiczne (za pośrednictwem rosnących krótkookresowych stóp procentowych) wydają się nieuzasadnione. Wniosek ten powinien mieć znaczenie dla procesu podejmowania decyzji makroekonomicznych.

Dalsze badania w omawianym zakresie byłyby niewątpliwie wskazane. Celowe byłoby np. uwzględnienie większej próbki krajów (pozaeuropejskich). Istnieje także możliwość podejścia panelowego (Panel ARDL-B), które pozwoliłoby na wykrycie ewentualnych związków czasowo-przestrzennych (np. pomiędzy stopami procentowymi obserwowanymi w różnych krajach).

Słowa kluczowe: efekt wypychania, dług publiczny, krótkookresowe stopy procentowe, ARDL-B