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THE STYLIZED FACTS OF PUBLIC INDEBTEDNESS AFTER THE BRETTON WOODS COLLAPSE: GLOBAL EVIDENCE

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ABSTRACT

In this paper, we have constructed a secondary Global Public Debt Database (GPDD) for 1971-2021. In particular, the paper presents detailed stylized facts regarding the public debt indebtedness of the central government in the case of sixty-seven advanced, emerging, low-income and developing economies after the collapse of Bretton Woods. The paper provides a comprehensive literature review of previous contributions centered around public debt sustainability analysis from the perspective of the intertemporal government budget constraint (IGBC) violation. Our results show a higher degree of public debt persistence in the case of advanced economies compared to emerging, low-income and developing economies. We also find that the most indebted countries have the most volatile public debt/GDP ratios.

Keywords: *Global Debt Database (GDD), Global Public Debt Database (GPDD), IMF, Bretton Woods.*

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INTRODUCTION

This article documents detailed stylized facts of public indebtedness in the case of sixty-seven advanced, emerging, low-income and developing economies for 1971-2021. The results show a higher degree of public debt persistence in the case of advanced economies compared to emerging, low-income and developing economies. In addition, the results imply that the most highly indebted countries exhibit the most volatile public debt/GDP ratios.

The structure of the article is as follows: Section 2 reviews relevant studies concerned with public debt sustainability from the perspective of the intertemporal government budget constraint (IGBC) solvency testing; section 3 describes characteristics of public debt data that we use in this study; section 4 documents detailed stylized facts of global public indebtedness after the Bretton Woods collapse; and section 5 concludes.

THEORETICAL BACKGROUND AND LITERATURE REVIEW

Following the notation of Hamilton & Flavin (1986) [26] and Bohn (2007) [8], the present value of public debt B_t at time *t* equals to

$$B_t = \sum_{i=1}^{+\infty} \rho^i \, E_t(R_{t+i} - G_{t+i}) + \lim_{n \to +\infty} \rho^n \, (B_{t+n}) \tag{1}$$

where E_t represents the expectation operator, R_t represents public revenues, G_t represents primary public expenditures, and ρ refers to the discount factor equal to $1/(1+r)$, where the interpretation of r depends on how we express the time series of public debt, public revenues, and primary public expenditures.[1] The expression $\lim_{n \to +\infty} \rho^n \, (B_{t+n})$ represents the transversality condition, which is consistent with the sustainable path of public debt if the following equality holds

$$\lim_{n \to +\infty} \rho^n \, (B_{t+n}) = 0 \tag{2}$$

implying the government cannot finance public indebtedness with future prospective bond issuance (no-Ponzi game condition).

Hamilton & Flavin (1986) [26] empirically evaluate the sustainability of public debt by defining the following null and alternative hypotheses:

$$\begin{cases} H_0 : B_t = \sum_{i=1}^{+\infty} \rho^i \, E_t(R_{t+i} - G_{t+i}) \leftrightarrow \lim_{n \to +\infty} \rho^n \, E_t(B_{t+n}) = 0 \\ \vdots \\ H_1 : B_t \neq \sum_{i=1}^{+\infty} \rho^i E_t(R_{t+i} - G_{t+i}) \leftrightarrow \lim_{n \to +\infty} \rho^n E_t \, (B_{t+n}) > 0. \end{cases} \tag{3}$$

Hamilton and Flavin (1986) [26] were the first to apply Dickey-Fuller's (1979) [18] unit root tests in analyzing whether the IGBC condition holds for the US government in present value terms. They postulate that the non-stationarity of the US public debt implies its unsustainability. 2 The results of their unit root test regressions for the 1960-1984 period align with rejecting the null hypothesis of non-stationarity, implying no violation of the IGBC in present value terms. Kremers (1988) [28], however, argues that the unit root test regressions of Hamilton and Flavin (1986) [26] do not take properly into account the autocorrelation present in the residuals of the US government debt, showing that one cannot reject the non-stationarity of the US public debt on post-World War II data. In a companion paper, Kremers (1989) [29] further shows that it is not likely to reject the non-stationarity of the US public debt even in the more extended 1920-1985 period.

Contrary to Hamilton and Flavin (1986) [26] and Kremers (1988, 1989) [28] [29], Bohn (2007) [8] stipulates three reasons why unit-root IGBC solvency testing is incapable of rejecting public debt sustainability. First, unit root testing is a backward-looking concept, while the IGBC implies that the current public debt value equals the discounted sum of future expected primary surpluses. Second, unit root tests have low power in the case of highly persistent AR (1) processes with the characteristic root

[1] If public debt, revenues, and primary public expenditures are nominal time series, then r represents the nominal interest rate. If public debt, revenues, and primary public expenditures are real time series, then r represents the real interest rate. If public debt, public revenues, and primary public expenditures are shares of GDP, then r represents the difference between the nominal (real) interest rate and the nominal (real) GDP growth rate. See Bohn (2007) [8] for details.

[2] For a comprehensive recent overview of different public debt sustainability concepts, consult D'Erasmo et al. (2015) [16].

close to one, which is the case for most countries analyzed in this paper for the 1971-2021 period. Third, Bohn (2007) [8] shows that even if a stochastic process for public debt $B(t)$ contains m unit roots, $B(t) \sim I(m)$, for any finite $m \geq 0$, $B(t)$ still satisfies the IGBC, implying that the IGBC imposes untestable conditions for the application of unit root tests. However, Bohn (2007) [8] acknowledges that unit root testing might still be economically significant in finite samples since non-stationary public debt could breach any upper threshold from theoretical or policy-oriented considerations.

One of the first papers that tackle non-linear adjustment toward a certain public debt/GDP threshold is Sarno (2001) [41]. Sarno (2001) [41] shows that the US public debt/GDP ratio follows a non-linear exponential smooth transition autoregressive process (ESTAR) over the sample period 1916-1995. Considine and Gallagher (2008) [12] also estimate the ESTAR model specification in the case of the UK for the period 1919-2001 to find evidence against Barro's (1979) [6] tax smoothing hypothesis. While Sarno (2001) [41] and Considine and Gallagher (2008) [12] focus on the cases of the US and the UK by assuming the stationarity of the respective public debt processes, Chortareas et al. (2008) [11] analyze public debt sustainability in the case of 6 Latin American and Caribbean (LAC) countries between 1960 and 2000 by employing unit root tests with different non-linear alternative hypotheses. The results favor sustainable public indebtedness in studied LAC economies when alternative hypotheses explicitly define the form of non-linear mean reversion.

Contrary to Chortareas et al. (2008) [11], Legrenzi and Milas (2011) [32] assess public debt sustainability when government debt diverges from time-varying public debt/GDP threshold level in the cases of Greece, Ireland, Italy, Portugal, and Spain (GIIPS), and provide evidence of fiscal sustainability. While Legrenzi and Milas (2011) [32] estimate the logistic smooth transition autoregressive (LSTAR) model specification, Gnegne and Jawadi (2013) [25] estimate the self-exciting threshold autoregressive (SETAR) model specifications to capture non-linearities in the cases of US and UK in the second half of the XX century up to the outbreak of the Great Recession. Finally, Tran (2018) [45], contrary to previous studies that primarily focus on individual countries, employs a panel threshold analysis in assessing public debt sustainability for fourteen emerging economies from 1999-2016.

Threshold regressions are, in essence, breakpoint least squares regressions with data reordered in a non-decreasing fashion concerning the threshold variable (Bai & Perron, 2003) [5].3 Jawadi and Sousa (2013) [27] search for multiple structural breaks in the cases of the US and UK and identify different regimes for which the public debt adjustment is asymmetric, especially since 2003 and around the Great Recession. Cuestas et al. (2014) [15] focus on the first 12-euro area member countries. Their analyses showed that the endogenously determined structural breaks in most cases were again situated around, or shortly after, the outbreak of the Great Recession. Furthermore, Cuestas (2020) [13] distinguishes two groups of countries within Central and Eastern European countries. The first group of countries managed to stabilize public debt/GDP ratios after the 2008 Global Financial Crisis, while the other group of countries (Croatia, Lithuania, Romania, and Slovenia) was less successful in achieving fiscal sustainability.4 Finally, Cuestas and Regis (2018) [14] identified a structural break in 2014 in China, which could signal that Chinese public finances are potentially on an unsustainable fiscal trajectory.

The previous literature on threshold estimation and structural break identification focuses on finding a single public debt/GDP threshold, i.e., a point in time that defines a regime switch in fiscal policy behavior. Using an updated data series from Hamilton and Flavin (1986) [26], Davig (2005) [17] estimates a two-regime Markov-switching autoregression for the present value of the US public debt and finds a regime of exploding discounted public debt in the US from 1981 to 1996.

Using the mildly explosive recursive unit root testing framework of Phillips et al. (2011) [38], Yoon [46] (2012), using data for the entire 1791-2009 period, makes a more substantial claim than Davig (2005) [17]-the US public debt/GDP ratio was explosive due to skyrocketing public indebtedness during the World War II. Apart from the US case, Bystrov and Mackiewicz (2020) [9] extend the analysis to the cases of the UK and Sweden and relate public debt explosiveness with structural changes in economic, political, and institutional factors followed by sharp fiscal adjustments.5 Finally, Esteve and Prats (2022, 2023) [20] [21] date stamp the explosiveness in the case of Spanish public debt for the 1850-2020 period under different assumptions for time-varying unconditional volatility.

[3] Alternatively, breakpoint regressions are equivalent to threshold regressions with time as the threshold variable (Bai & Perron, 2003) [5].
[4] See Matić et al. (2022) [33] for some macro and fiscal characteristics of the Western Balkan economies.
[5] See Totić et al. (2019) [44] for an overview of the EU's structural, political, and institutional factors.

According to Bohn (1998, 2007) [7] [8], univariate time series analyses of public debt/GDP ratios discussed above are prone to an omitted variable bias since they are unrelated to well-established economic theories. Building on the tax-smoothing model of Barro (1979) [6], Bohn (1998, 2007) [7] [8] recommends estimating a fiscal reaction function (FRF) of primary surplus/GDP ratio on lagged public debt/GDP ratio, transitory government spending, and cyclical output fluctuations.6 The positive response of the primary surplus to changes in debt shows that the fiscal policy is satisfying IGBC. In other words, Bohn (1998, 2007) [7] [8] concludes that the positive response of primary surplus/GDP to the public debt/GDP ratio implies a stationary mean-reverting public debt/GDP ratio, even though classical unit root tests are almost powerless in rejecting the non-stationarity of the public debt/GDP ratio in the case of the US after the World War II.7 Building on the work of Bohn (1998, 2007) [7] [8], Mendoza and Ostry (2008) [37] find a positive conditional response of the primary balance to changes in public debt in a panel of emerging and industrial economies. The main policy prescription of Mendoza and Ostry (2008) [37] is that the response of primary surplus to increases in public debt weakens when the public debt/GDP ratio is around 50-60%. Furthermore, using data for 23 advanced economies over the period 1970-2007, Ghosh et al. (2013) [24] support, to a certain extent, the results of Mendoza and Ostry (2008) [37]-their findings show that the marginal response of the primary balance to lagged public debt/GDP starts to fade away around 90-100% public debt/GDP ratio, ultimately entering the negative territory when public debt/GDP ratio approaches 150%. Finally, Mauro et al. (2015) [34] report that, in general, the advanced economies responded by increasing primary balances given the increases in lagged public debt/GDP ratio between 1950-2007, with the notable exceptions of France and Japan, which recorded negative fiscal response coefficients.

Leeper and Li (2017) [31] question the ability of single-equation FRFs to recover fiscal policy behavior since these equations are prone to the simultaneity bias arising from their failure to identify equilibrium conditions via cross-equation restrictions in structural vector autoregressions (SVARs). Although the ability of SVARs to recover fiscal policy behavior remains an open question, as Leeper and Li (2017) [31] emphasize, several studies on the effects of fiscal policy, starting from Favero and Giavazzi (2007) [22], specify SVARs with debt feedback, which explicitly incorporate the IGBC condition in estimating a direct response of taxes, government spending and the cost of debt service to the level of public debt. Favero and Giavazzi (2007) [22] show that failure to incorporate IGBC debt feedback conditions in SVARs results in biased estimates of the dynamic effects of fiscal shocks. In a related paper, Favero and Giavazzi (2009) [23] further show how debt feedback inclusion is vital in VARs with narratively identified tax shocks of Romer and Romer (2010) [39]. While Favero and Giavazzi (2007, 2009) [22] [23] primarily focus on the output response in the presence of debt feedback, Afonso and Sousa (2011a) [3] show that SVARs with debt feedback help investigate the overall macroeconomic effects of fiscal policy in the case of Portugal for the 1979Q1-2007Q4 period.8 Lastly, Cherif and Hasanov (2018) [10] investigate the drivers of the US public debt/GDP ratio dynamics in the presence of debt feedback to establish that following an austerity shock, the public debt/GDP ratio initially declines but returns to its pre-austerity levels.

DATA

We base the results of our analyses on the Global Public Debt Database (GPDD), a refined secondary subset of the Global Debt Database (GDD) of Mbaye et al. (2018b) [36].9 The GDD of Mbaye et al. (2018b) [36] covers the debt of the non-financial sector, both private and public, for virtually the entire world (190 countries), dating back to the 1950s. It represents the most comprehensive IMF data source on private and public debt compared to previous IMF data sets regarding global debt (Mbaye et al., 2018b) [36].10

The public indebtedness series in the GDD result from a significant overhaul of Abbas et al. (2011) [1] Historical Public Debt Series (HPDD). The essential features of the GDD's public debt series are: first, the GDD reduces the number of breaks from HPDD by 2/3, also adding, on average, 14 years of continuous homogeneous series, and expanding the HPDD's country coverage by ten low-income and developing countries;11 second, the GDD defines debt as the gross outstanding stock of all liabilities that are debt

6 For a critique of Barro's (1979) [6] tax-smoothing model and an alternative model specification of the FRFs, see Roubini and Sachs (1989) [40].

7 For econometric difficulties in estimating FRFs when primary surplus and public debt have different orders of integration or degrees of persistence, see Lamé et al. (2014) [30].

8 For a narrower focus on the effects of fiscal policy on asset markets in the presence of debt feedback, see Afonso and Sousa (2011b) [4].

9 The Global Debt Database (GDD) is available for free download at the IMF Data Mapper page: https://www.imf.org/external/datamapper/datasets/GDD. See Mbaye et al. (2018b) [36] for details.

10 For other data sets related to private and public indebtedness, see Abbas et al. (2019) [1].

11 Following the methodological approach of Abbas et al. (2011) [1] in the HPDD case, Mbaye et al. (2018b) [36] do not use extrapolation, interpolation, or auxiliary regression in the case of GDD. This methodological approach and greater reliance on IMF country desks and national statistical organizations reduced jumps when switching data sources, with step differences of at most 3 percent of GDP in the first overlapping years. In all other circumstances, the GDD dataset reports and labels data breaks with higher step differences. See Annex I in Mbaye et al. (2018b) [36].

instruments, in line with the System of National Accounts 2008;12 third, the GDD reports separate series for central and general government debt;13 fourth, public debt series in the GDD are consolidated within each institutional sector unless otherwise indicated;14 fifth, the compiled data exhibit high quality due to extensive bilateral cross-checking with IMF country desks, officials of all 190 countries, and other international statistical experts (most notably from BIS).

On the other hand, the crucial characteristics of the GPDD in comparison with GDD are as follows: first, it covers a shorter, but relatively homogeneous, period than GDD by focusing on the post-Bretton Woods era from 1971 up until today in which countries have stopped to peg their national currencies to gold or US dollar; 15 second, it provides debt/GDP measures of public indebtedness for both central and general government by taking into account only those GDD public debt time series without data breaks-with respect to GDD, this methodological approach results in the reduction of the cross-sectional dimension to 67 countries (19 advanced economies, 23 emerging market economies, and 25 low-income and developing countries) in the case of central government debt and 23 countries (17 advanced economies, 4 emerging market economies, and 2 low-income and developing countries) in the case of general government debt; third, it presents explicit calculations of nominal public debt series in local currency units (LCU) for each of the countries, both at the central and the general level of government;16 fourth, it is possible to update the GPDD automatically with the IMF's annual updates of the GDD, as described in Abbas et al. (2019) [2].

RESULTS AND DISCUSSION

Table 1 reports summary statistics for central government debt/GDP ratios of sixty-seven countries classified into advanced economies, emerging market economies, and low-income and developing countries between 1971 and 2021. Complementing the work of Abbas et al. (2011) [1] and Mbaye et al. (2018b) [36], who report summary statistics for the *groups* of countries, we report detailed descriptive statistics at the level of *individual* countries from the GPDD.

Table 1. Summary statistics for debt/GDP ratio, central government (1971-2021)

Statistic/ Country	Start	Min	Mean	Max	End	SD
ADVANCED ECONOMIES						
Australia	32.25	6.07	20.62	43.95	43.95	8.84
Austria	10.59	9.42	44.69	62.90	62.90	16.55
Belgium	44.79	39.43	84.14	116.61	90.71	23.04
Denmark	5.02	4.34	42.75	78.39	29.02	21.47
Finland	4.81	1.67	30.36	57.09	55.31	19.48
France	18.75	2.84	43.21	92.98	91.76	24.81
Germany	7.19	7.09	30.33	52.14	46.27	13.64
Greece	19.00	16.56	95.11	226.22	212.40	61.26
Italy	34.39	34.39	93.97	150.85	146.55	31.30
Japan	8.39	8.39	94.74	221.43	221.32	66.91
Korea	14.68	7.50	21.10	45.33	45.33	8.99
Luxembourg	12.67	0.82	7.03	20.37	20.37	5.34
New Zealand	44.55	16.31	39.86	68.57	50.84	12.73
Norway	21.22	11.29	22.72	38.17	15.75	6.31

[12] National accounts offer broader and more consistent coverage of overall indebtedness at the national level than fiscal or monetary statistics. For other benefits of using national accounts for measuring overall indebtedness at the national level, see Mbaye et al. (2018b) [36].

[13] Under the IMF's "Public Debt Statistics: Guide for Compilers 2011", the central or general government debt series corresponds to gross debt and includes: (i) loans; (ii) debt securities; (iii) currency and deposits; (iv) insurance, pension, and standardized guarantee schemes; (v) other accounts payable; and (vi) special drawing rights.

[14] Note, however, that the liabilities of the central government towards public entities outside the central government do not net out of the central government debt. The authorities consolidate these liabilities only at the general government level, sometimes resulting in a lower general government debt. For more detailed information about intergovernmental fiscal relations between different structures of government, see Dziobek et al. (2011) [19], Seiferling (2013) [43], and Mbaye et al. (2018b) [36].

[15] The GPDD.zip folder is publicly available for free download from the Harvard Dataverse Repository at https://doi.org/10.7910/DVN/XTKNFU. It contains the following files: 1) Central Government Debt (1971-2021).xlsx; 2) General Government Debt (1971-2021).xlsx; and 3) gpdd.do, a STATA file used to compute the central government debt stylized facts presented in Table 1 and Table 2 of this article.

[16] For details of the nominal public debt calculations, refer to Central Government Debt (1971-2021).xlsx and General Government Debt (1971-2021).xlsx files. Each country has its spreadsheet in both Excel files with the underlying public debt/GDP and nominal GDP data. Nominal GDP series come from the Penn World Table (9.0), national statistical sources, and the IMF's World Economic Outlook (WEO), as in Mbaye et al. (2018a) [35].

Statistic/ Country	Start	Min	Mean	Max	End	SD
Portugal	16.78	14.68	66.22	139.05	131.92	37.43
Singapore	42.08	34.57	83.01	163.89	163.89	26.59
Spain	16.87	7.99	43.61	107.54	106.22	28.32
Sweden	17.07	17.07	47.15	80.55	39.31	16.62
US	32.45	27.51	54.41	119.36	115.28	23.06
EMERGING MARKET ECONOMIES						
Algeria	31.83	7.09	48.06	104.04	62.99	27.32
Argentina	14.02	10.52	50.33	147.20	80.93	30.80
The Bahamas	7.47	6.24	24.62	90.71	90.71	19.32
Barbados	22.79	21.56	67.48	159.13	141.88	42.13
Bolivia	62.91	27.74	74.97	192.10	62.73	37.97
Brazil	20.10	20.10	57.54	107.66	87.75	21.28
Chile	19.88	3.90	25.68	87.79	36.29	20.15
Colombia	14.68	6.75	22.30	51.91	51.23	12.09
Costa Rica	30.42	18.22	34.03	68.31	68.31	10.65
El Salvador	10.36	10.36	44.85	112.07	58.99	24.10
Gabon	15.47	15.47	51.92	93.64	65.77	22.68
Guatemala	13.22	12.09	25.92	61.25	30.77	11.73
Jordan	30.58	30.58	84.82	222.03	91.90	41.35
Malaysia	39.88	29.30	50.59	94.74	63.40	16.01
Morocco	28.78	24.59	61.54	104.00	68.94	19.03
Pakistan	36.81	32.88	54.55	98.34	74.91	13.19
Paraguay	34.53	7.32	24.72	57.05	31.62	11.18
South Africa	33.80	24.04	36.28	69.00	68.98	9.95
Sri Lanka	37.20	34.51	70.62	103.08	103.08	15.54
Swaziland	19.78	10.49	21.95	45.82	45.82	9.61
Thailand	21.55	3.67	24.41	52.76	52.76	10.02
Tunisia	36.01	27.27	47.72	82.85	81.79	12.58
Turkey	17.87	12.02	32.68	72.06	37.91	12.75
LOW-INCOME AND DEVELOPING COUNTRIES						
Benin	4.79	3.86	31.57	64.61	49.94	15.80
Burkina Faso	2.46	2.46	28.80	55.12	52.37	14.05
Burundi	6.93	6.93	71.06	172.74	66.56	49.67
CAR	20.38	19.67	52.43	103.44	47.61	26.61
Chad	15.74	11.32	35.90	67.98	55.96	14.13
Republic of the Congo	36.50	30.20	112.91	231.14	103.64	60.10
Ghana	15.48	8.58	34.76	82.12	82.12	20.48
Grenada	68.29	22.59	58.82	105.44	70.33	24.16
Guyana	42.36	38.28	123.65	316.16	42.90	86.47
Haiti	10.95	8.92	32.84	118.86	24.23	24.70
Honduras	14.87	14.87	48.63	94.33	55.79	21.73
Kenya	9.95	9.95	36.05	67.95	67.83	14.48
Lesotho	5.98	4.54	55.94	118.76	53.52	31.34
Madagascar	27.97	11.00	62.54	127.54	53.13	34.04
Mali	61.96	18.07	57.51	105.04	51.95	25.65
Nepal	1.30	1.30	32.56	55.79	45.81	16.77
Niger	7.38	7.37	35.90	82.10	51.21	21.04
Nigeria	5.22	3.94	26.16	69.01	32.70	20.87
Papua New Guinea	8.80	8.80	29.16	50.93	50.93	10.93
Rwanda	5.59	5.59	38.24	92.12	66.58	26.94
Samoa	6.24	6.23	48.23	96.34	46.30	16.66
Senegal	15.10	14.21	43.11	77.34	73.16	18.76
Sierra Leone	21.81	21.78	75.49	168.62	79.29	40.97
Togo	9.59	7.84	51.15	78.96	63.75	16.73
Zambia	2.05	2.05	44.88	260.96	119.14	57.59

Notes: Authors' calculations.

We emphasize four stylized facts from Table 1. First, we observe the minimal public indebtedness in the case of Luxembourg in 2005 of just 0.8% of GDP, while we find the maximum public indebtedness in the case of Guyana in 1992 of a staggering 316.6% of GDP. Second, we witness the average public indebtedness close to, or above, 100% of GDP in the cases of Italy (93.97%), Japan (94.74%), Greece (95.11%), the Republic of the Congo (112.91%) and the Guyana (123.65%). Third, the most highly indebted countries also exhibit the most volatile public debt/GDP ratios, with standard deviations higher than fifty percentage points of GDP: Republic of the Congo (60.10%), Greece (61.26%), Japan (66.91%), and Guyana (86.47%). Fourth, by comparing public debt levels at the start (the year 1971) and the end (the year 2021) of our sample period, we observe that the decreasing trend (in % of GDP) is present in the cases of Mali (from 61.96 to 51.95), Norway (from 21.22 to 15.75) and Paraguay (from 34.53 to 31.62), no trending behavior is present in the cases of Bolivia (from 62.91 to 62.73) and Guyana (from 42.36 to 42.90), while all other countries exhibit increasing time trend, with the highest absolute increases over 100 percentage points of GDP in the cases of Italy (from 34.39 to 146.55), Portugal (from 16.78 to 131.92), Zambia (from 2.05 to 119.14), Barbados (from 22.79 to 141.88), Singapore (from 42.08 to 163.89), Greece (from 19.00 to 212.40) and Japan (from 8.39 to 221.32).

Table 2 reports the results of the correlation analysis for the group of countries already presented in Table 1. The number of columns in Table 2 refers to the number of lags calculated according to the Schwert (1989) [42] criterion, $lags = [12 \times ((T+1)/100)^{0.25}]$, in which T is the sample size and $[\cdot]$ denotes the floor function. For each of the countries, the first cell entry in each column denotes the respective autocorrelation coefficient, the second cell entry refers to the corresponding partial autocorrelation coefficient, the third cell entry reports the Ljung-Box portmanteau Q-statistic at lag k for the null hypothesis that there is no autocorrelation up to the prespecified lag k and the fourth cell entry denotes the p-value associated with the Q-statistic.

Table 2. Autocorrelations & partial autocorrelations for debt/GDP, central government

Lags/ Country	1	2	3	4	5	6	7	8	9	10
ADVANCED ECONOMIES										
Australia	0.87	0.69	0.54	0.42	0.30	0.20	0.10	0.02	-0.07	-0.15
	1.01	-0.65	0.02	0.13	-0.02	-0.17	-0.20	-0.05	-0.44	0.15
	40.84	67.28	83.81	94.05	99.52	101.87	102.5	102.52	102.81	104.27
	(0.00)	(0.00)	(0.00)	(0.00)	0.0000	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Austria	0.93	0.86	0.79	0.72	0.65	0.59	0.53	0.46	0.40	0.34
	0.96	-0.12	0.16	0.07	-0.12	0.26	0.06	-0.10	0.03	0.13
	47.19	87.96	123.55	153.56	178.7	199.52	216.51	230.06	240.34	247.77
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Belgium	0.95	0.89	0.80	0.70	0.58	0.46	0.33	0.21	0.09	-0.02
	0.95	-0.49	-0.45	-0.14	-0.11	0.13	-0.082	-0.09	-0.13	-0.26
	49.05	92.41	128.66	156.81	176.77	189.5	196.37	199.15	199.68	199.71
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Denmark	0.94	0.85	0.73	0.60	0.47	0.34	0.22	0.12	0.04	-0.04
	0.95	-0.61	-0.15	-0.04	0.14	-0.11	-0.17	0.07	-0.15	-0.40
	47.64	87.46	117.67	138.49	151.38	158.4	161.45	162.43	162.54	162.62
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Finland	0.94	0.85	0.77	0.68	0.60	0.52	0.45	0.39	0.33	0.28
	0.97	-0.50	0.23	-0.14	0.23	0.01	0.04	-0.02	0.06	-0.03
	47.92	88.18	121.61	148.53	169.81	186.37	199.08	208.8	216.03	221.16
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
France	0.94	0.88	0.83	0.77	0.72	0.66	0.60	0.54	0.48	0.42
	1.02	-0.12	0.02	0.18	-0.11	0.22	-0.06	-0.08	0.25	0.15
	48.19	90.81	129.38	163.84	194.19	220.43	242.77	261.18	275.91	287.4
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Germany	0.94	0.88	0.83	0.77	0.71	0.66	0.60	0.55	0.50	0.44
	0.97	-0.24	0.04	0.10	0.10	0.14	0.19	0.08	0.23	0.56
	48.11	90.91	129.34	163.29	193.27	219.34	241.76	260.59	276.02	288.56
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Greece	0.93	0.86	0.80	0.73	0.67	0.60	0.54	0.47	0.40	0.34
	1.01	0.26	-0.24	0.07	0.11	0.03	0.09	-0.14	0.47	-0.49
	47.30	88.33	24.35	155.12	181.42	203.27	221.1	234.84	245.19	252.63

Lags/ Country	1	2	3	4	5	6	7	8	9	10
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Italy	0.92	0.84	0.77	0.70	0.63	0.56	0.48	0.41	0.34	0.26
	0.98	-0.15	-0.13	-0.14	0.01	0.17	0.003	-0.12	-0.15	0.35
	46.07	84.82	118.38	146.51	169.88	188.58	202.95	213.57	220.83	225.37
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Japan	0.94	0.88	0.83	0.77	0.71	0.65	0.59	0.53	0.47	0.40
	1.02	-0.31	-0.09	0.14	-0.09	0.33	-0.15	0.05	0.01	-0.09
	48.08	90.94	129.44	163.61	193.47	219.05	240.65	258.33	272.39	283.09
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Korea	0.90	0.80	0.74	0.68	0.62	0.56	0.48	0.40	0.31	0.24
	1.06	-0.27	-0.04	0.07	0.17	-0.40	-0.05	0.02	-0.08	0.11
	43.68	79.44	110.01	136.42	159.31	177.94	192.16	202.24	208.63	212.47
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Luxembourg	0.89	0.78	0.67	0.57	0.47	0.39	0.32	0.24	0.17	0.10
	1.02	-0.14	-0.48	0.02	0.13	-0.02	0.27	-0.04	-0.01	-0.23
	42.77	76.26	101.31	119.97	132.77	142.12	148.48	152.18	154.05	154.73
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
New Zealand	0.94	0.84	0.75	0.67	0.59	0.53	0.44	0.35	0.24	0.12
	0.96	-0.64	0.28	-0.20	0.28	-0.31	-0.19	-0.03	-0.22	-0.06
	47.99	87.13	118.9	144.57	165.39	181.99	194.04	201.56	205.2	206.13
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Norway	0.82	0.59	0.39	0.27	0.23	0.27	0.33	0.27	0.20	0.13
	0.84	-0.27	0.04	0.10	0.08	0.27	0.07	-0.30	0.12	0.04
	36.11	55.34	63.98	68.33	71.41	75.96	82.80	87.48	89.99	91.16
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Portugal	0.94	0.86	0.80	0.72	0.64	0.56	0.48	0.40	0.31	0.23
	1.00	-0.18	-0.25	0.17	0.12	0.21	-0.05	0.08	-0.13	0.09
	47.645	88.68	124.36	154.2	178.48	197.57	211.96	222.17	228.48	231.94
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Singapore	0.85	0.70	0.60	0.53	0.47	0.42	0.38	0.36	0.33	0.29
	1.05	-0.33	0.25	-0.05	0.11	0.12	0.01	0.03	0.14	0.15
	39.11	66.39	86.64	102.83	115.74	126.23	135.34	143.49	150.73	156.19
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Spain	0.92	0.82	0.75	0.65	0.56	0.46	0.37	0.27	0.18	0.10
	1.03	-0.40	-0.11	-0.06	0.24	0.25	0.112	-0.03	-0.46	0.53
	46.03	83.62	114.99	139.62	157.94	170.74	179.01	183.69	185.75	186.42
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sweden	0.93	0.81	0.66	0.50	0.36	0.22	0.12	0.05	0.01	-0.012
	0.93	-0.67	0.07	-0.04	0.04	0.15	-0.03	0.12	-0.004	-0.26
	46.50	82.47	106.88	121.44	128.91	131.93	132.8	132.95	132.95	132.96
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
US	0.90	0.77	0.70	0.62	0.54	0.46	0.38	0.30	0.21	0.13
	1.05	-0.09	-0.32	0.63	-0.34	0.39	-0.05	0.12	0.31	0.47
	43.62	76.61	103.87	125.81	143.01	155.75	164.66	170.22	173.05	174.11
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
EMERGING MARKET ECONOMIES										
Algeria	0.95	0.85	0.74	0.63	0.53	0.42	0.32	0.22	0.12	0.005
	0.95	-0.42	-0.22	0.05	-0.001	-0.38	0.07	-0.09	-0.31	-0.24
	48.23	88.60	119.75	142.68	159.14	169.6	175.81	178.93	179.84	179.84
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Argentina	0.73	0.53	0.28	0.14	0.03	-0.04	-0.11	-0.22	-0.27	-0.26
	0.75	0.04	-0.23	0.06	-0.04	-0.06	-0.06	-0.19	-0.01	0.09
	28.99	44.56	48.99	50.14	50.21	50.29	51.07	54.11	58.79	63.13
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
The Bahamas	0.85	0.70	0.63	0.55	0.49	0.43	0.37	0.31	0.245	0.20
	1.11	0.55	-0.44	0.35	0.19	0.15	1.08	-1.24	1.01	0.17
	38.88	65.75	88.14	105.58	119.6	130.52	138.99	144.95	148.8	151.5
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Barbados	0.94	0.88	0.84	0.79	0.71	0.63	0.55	0.48	0.40	0.34
	1.001	-0.08	0.32	-0.24	-0.15	0.17	0.39	-0.16	0.14	0.91

Lags/ Country	1	2	3	4	5	6	7	8	9	10
	47.89	90.44	130.31	166.33	195.63	219.21	237.89	252.27	262.7	270.2
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Bolivia	0.94	0.86	0.76	0.63	0.52	0.41	0.31	0.23	0.17	0.10
	0.94	-0.16	-0.22	-0.22	0.15	-0.03	-0.02	-0.06	0.04	-0.15
	47.33	87.87	119.94	142.49	158.15	168.16	174.21	177.63	179.37	179.97
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Brazil	0.66	0.39	0.38	0.30	0.25	0.17	0.03	-0.01	-0.01	-0.11
	0.69	-0.04	0.36	-0.04	0.24	-0.09	-0.05	0.01	-0.16	0.06
	23.31	31.62	39.64	44.84	48.4	50.21	50.28	50.28	50.67	51.51
	(0.00)	(0.00)	(0.00)	(0.00)	3(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Chile	0.93	0.79	0.63	0.47	0.32	0.20	0.11	0.04	-0.04	-0.12
	0.93	-0.56	-0.02	-0.004	0.03	-0.14	0.24	-0.38	-0.15	0.25
	46.72	81.24	103.46	116.01	122.22	124.59	125.37	125.47	125.6	126.63
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Colombia	0.91	0.79	0.70	0.60	0.50	0.42	0.34	0.29	0.27	0.27
	1.03	-0.37	-0.34	0.31	0.27	-0.10	0.30	0.20	0.42	0.10
	44.67	79.33	106.8	127.16	142.16	152.77	159.98	165.32	170.04	174.8
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Costa Rica	0.81	0.62	0.46	0.32	0.19	0.06	-0.02	-0.10	-0.17	-0.20
	1.03	0.02	-0.32	-0.01	-0.03	-0.225	0.08	-0.06 77.96	-0.18	0.24
	35.70	57.19	69.05	74.89	77.04	77.30	77.34	(0.00)	79.75	82.46
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)
El Salvador	0.90	0.77	0.61	0.41	0.20	0.01	-0.15	-0.30	-0.43	-0.52
	0.91	-0.31	-0.27	-0.24	-0.22	0.04	0.16	-0.17	-0.25	-0.14
	44.30	76.99	97.67	107.57	110.02	110.02	111.48	117.12	128.87	146.42
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Gabon	0.82	0.62	0.44	0.28	0.10	-0.02	-0.06	-0.09	-0.07	-0.12
	0.83	-0.16	-0.07	-0.07	-0.23	0.08	0.04	-0.12	0.18	-0.23
	36.36	57.38	68.24	72.79	73.33	73.36	73.62	74.13	74.49	75.44
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Guatemala	0.92	0.81	0.65	0.46	0.28	0.08	-0.091	-0.24	-0.37	-0.47
	0.92	-0.30	-0.38	-0.24	0.06	-0.25	0.06	-0.05	-0.08	-0.15
	45.80	81.81	105.66	118.01	122.6	123	123.5	127.24	136.26	150.86
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Jordan	0.92	0.77	0.62	0.49	0.38	0.26	0.18	0.09	-0.01	-0.10
	0.92	-0.59	0.27	0.012	-0.20	0.07	-0.05	-0.11	-0.12	0.02
	45.71	78.56	100.2	114.17	122.73	127.3	129.26	129.74	129.74	130.44
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Malaysia	0.93	0.80	0.66	0.49	0.31	0.11	-0.07	-0.22	-0.34	-0.43
	0.94	-0.54	0.01	-0.27	-0.24	-0.15	0.04	0.06	0.02	0.05
	46.61	81.97	106.31	120.25	125.9	126.68	126.98	130.09	137.67	149.8
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Morocco	0.92	0.83	0.70	0.56	0.42	0.28	0.14	0.02	-0.12	-0.24
	0.93	-0.14	-0.41	-0.16	-0.14	-0.01	-0.23	-0.07	-0.24	-0.09
	45.99	83.85	111.66	129.71	139.92	144.51	145.73	145.75	146.66	150.51
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pakistan	0.55	0.51	0.38	0.32	0.25	0.20	0.16	0.09	0.012	-0.02
	0.58	0.27	-0.10	0.05	-0.03	0.02	-0.03	-0.10	-0.09	0.023
	16.25	30.56	38.52	44.54	48.35	50.75	52.35	52.85	52.86	52.89
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Paraguay	0.81	0.69	0.48	0.29	0.12	-0.03	-0.11	-0.16	-0.15	-0.10
	0.82	0.09	-0.38	-0.23	0.003	-0.003	0.05	-0.03	0.04	0.00
	35.84	62.10	74.86	79.52	80.32	80.38	81.13	82.83	84.18	84.91
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
South Africa	0.84	0.64	0.50	0.37	0.25	0.12	0.00	-0.11	-0.20	-0.27
	1.08	-0.44	-0.09	-0.06	-0.07	-0.24	-0.16	-0.15	0.26	-0.25
	38.28	60.83	74.70	82.39	85.97	86.92	86.92	87.70	90.36	95.35
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sri Lanka	0.84	0.70	0.56	0.42	0.32	0.23	0.18	0.15	0.11	0.09
	0.92	-0.03	-0.17	0.02	0.12	-0.002	-0.05	0.05	0.16	-0.09

Lags/ Country	1	2	3	4	5	6	7	8	9	10
	38.15	64.93	82.75	92.94	99.10	102.41	104.35	105.69	106.53	107.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Swaziland	0.82	0.62	0.44	0.28	0.14	0.04	-0.04	-0.14	-0.23	-0.29
	0.94	-0.22	-0.02	-0.14	-0.10	0.003	-0.14	-0.40	0.11	-0.004
	36.39	57.75	68.82	73.33	74.55	74.65	74.74	76.04	79.50	84.92
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Thailand	0.84	0.65	0.50	0.33	0.17	0.034	-0.08	-0.17	-0.23	-0.25
	1.00	-0.56	0.06	-0.20	0.07	0.02	0.01	-0.023	0.09	0.07
	38.17	61.63	75.78	82.04	83.66	83.74	84.15	85.95	89.26	93.35
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Tunisia	0.86	0.73	0.64	0.492	0.36	0.27	0.19	0.14	0.09	0.021
	1.02	0.25	-0.11	-0.34	-0.10	-0.03	-0.17	0.12	-0.05	-0.11
	40.43	69.90	92.80	106.71	114.45	118.73	120.86	122.05	122.62	122.65
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Turkey	0.86	0.72	0.57	0.43	0.32	0.23	0.21	0.13	0.041	-0.03
	0.86	-0.02	-0.14	-0.04	0.06	-0.01	0.20	-0.23	-0.20	0.019
	39.73	68.56	86.81	97.38	103.53	106.76	109.46	110.6	110.71	110.77
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
LOW-INCOME AND DEVELOPING COUNTRIES										
Benin	0.87	0.75	0.64	0.51	0.38	0.26	0.12	-0.02	-0.14	-0.24
	0.90	0.002	-0.06	-0.11	-0.12	-0.11	-0.18	-0.26	-0.11	-0.03
	41.09	72.27	95.11	110.14	118.75	122.68	123.57	123.6	124.85	128.66
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Burkina Faso	0.87	0.76	0.65	0.54	0.43	0.34	0.24	0.15	0.07	0.02
	0.93	-0.06	0.03	-0.21	-0.01	-0.07	-0.05	-0.15	0.04	0.12
	41.39	72.92	96.77	113.31	124.43	131.26	134.82	136.27	136.64	136.66
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Burundi	0.93	0.86	0.78	0.70	0.58	0.47	0.37	0.28	0.18	0.08
	0.93	-0.10	-0.03	-0.11	-0.38	0.02	-0.05	0.22	-0.21	-0.14
	47.15	87.96	122.63	150.89	170.97	184.45	192.73	197.77	199.93	200.35
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CAR	0.89	0.78	0.65	0.51	0.38	0.28	0.21	0.14	0.09	0.03
	0.89	-0.04	-0.15	-0.20	0.02	0.09	0.14	-0.08	-0.06	-0.16
	42.69	76.19	100.37	115.27	123.81	128.45	131.18	132.5	132.99	133.04
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Chad	0.88	0.70	0.52	0.33	0.18	0.03	-0.09	-0.19	-0.23	-0.26
	0.91	-0.32	-0.06	-0.28	0.18	-0.15	-0.15	-0.11	0.18	-0.14
	41.55	68.77	84.28	90.67	92.49	92.57	93.08	95.45	98.91	103.38
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Republic of the Congo	0.90	0.79	0.70	0.62	0.49	0.37	0.27	0.18	0.07	-0.04
	0.90	-0.08	0.09	-0.02	-0.36	-0.02	0.008	-0.009	-0.13	-0.21
	43.70	78.27	106.18	128.45	142.65	150.69	155.03	157.12	157.47	157.6
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ghana	0.87	0.73	0.62	0.50	0.42	0.33	0.23	0.13	0.05	0.001
	0.98	-0.16	0.05	-0.18	0.28	-0.25	0.03	-0.22	0.16	0.03
	40.82	69.95	91.83	106.33	116.7	123.25	126.52	127.65	127.8	127.8
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Grenada	0.94	0.87	0.77	0.69	0.6	0.53	0.46	0.39	0.31	0.23
	0.95	-0.19	-0.39	0.21	0.04	-0.03	0.09	-0.29	-0.08	-0.06
	48.06	89.90	123.51	150.62	171.73	188.34	201.43	210.78	217.03	220.48
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Guyana	0.93	0.89	0.80	0.70	0.61	0.52	0.43	0.32	0.22	0.11
	0.95	0.11	-0.45	-0.16	-0.006	0.11	-0.05	-0.43	-0.22	0.07
	47.27	90.54	126.19	154.79	176.39	192.72	204.22	210.88	214.03	214.84
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Haiti	0.85	0.63	0.50	0.38	0.20	-0.00	-0.09	-0.11	-0.12	-0.12
	0.85	-0.32	0.30	-0.32	-0.14	-0.20	0.25	-0.08	0.19	-0.04
	38.70	60.40	74.58	82.88	85.13	85.13	85.67	86.44	87.41	88.37
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Honduras	0.90	0.81	0.72	0.59	0.47	0.37	0.25	0.14	0.04	-0.07

Lags/ Country	1	2	3	4	5	6	7	8	9	10
	0.91	-0.01	-0.019	-0.35	0.04	-0.01	-0.15	-0.01	-0.14	-0.20
	44.13	80.28	109.4	129.18	142.42	150.74	154.51	155.84	155.94	156.31
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.87	0.73	0.61	0.51	0.42	0.34	0.28	0.22	0.16	0.10
Kenya	0.97	-0.10	-0.13	0.14	0.09	0.07	-0.14	-0.07	0.02	-0.01
	41.11	70.72	91.88	106.71	116.89	124.04	128.82	131.77	133.34	133.99
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.91	0.80	0.69	0.57	0.46	0.33	0.22	0.11	0.02	-0.05
Lesotho	0.91	-0.12	-0.08	-0.13	0.06	-0.20	-0.04	-0.03	0.02	-0.04
	44.64	80.38	107.44	126.05	138.46	145.22	148.24	149.08	149.12	149.26
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.92	0.85	0.76	0.68	0.57	0.45	0.33	0.19	0.08	-0.01
Madagascar	0.93	0.01	-0.14	-0.06	-0.21	-0.12	-0.13	-0.26	0.07	0.12
	46.19	86.34	119.28	145.92	165.2	177.49	184.38	186.75	187.14	187.15
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.93	0.86	0.78	0.69	0.59	0.49	0.38	0.25	0.16	0.08
Mali	0.93	-0.07	-0.11	-0.05	-0.22	-0.04	-0.12	-0.24	0.26	-0.14
	46.97	87.64	121.65	149.28	169.6	183.78	192.45	196.36	198.1	198.5
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.94	0.87	0.79	0.71	0.63	0.55	0.47	0.38	0.28	0.18
Nepal	0.95	-0.35	-0.13	-0.28	-0.012	-0.15	0.11	-0.12	0.03	-0.37
	47.72	89.21	124.84	154.17	177.7	195.86	209.32	218.37	223.55	225.75
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.91	0.81	0.70	0.56	0.43	0.29	0.16	0.04	0.062	-0.15
Niger	0.92	-0.13	-0.13	-0.28	-0.03	-0.06	-0.03	-0.06	-0.04	-0.04
	44.62	80.71	108.33	126.65	137.47	142.69	144.29	144.41	144.66	146.15
	(0.00)	(0.00)	(0.00	(0.00	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.91	0.77	0.62	0.49	0.37	0.26	0.17	0.09	0.02	-0.05
Nigeria	0.91	-0.35	-0.10	0.10	-0.15	0.07	-0.10	-0.02	-0.06	-0.04
	44.89	78.07	100.09	114.11	122.07	126.3	128.09	128.62	128.64	128.78
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.86	0.71	0.60	0.47	0.33	0.19	0.08	-0.05	-0.16	-0.20
Papua New Guinea	0.93	-0.20	0.02	-0.28	-0.26	-0.01	0.22	-0.32	0.12	0.29
	39.69	67.49	87.99	100.9	107.34	109.5	109.92	110.07	111.79	114.43
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.91	0.80	0.70	0.59	0.48	0.34	0.23	0.12	0.01	-0.10
Rwanda	0.93	-0.17	-0.07	-0.12	-0.06	-0.31	0.14	-0.13	-0.013	-0.34
	44.56	79.79	107.14	126.98	140.33	147.29	150.45	151.31	151.32	152.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.84	0.68	0.54	0.37	0.21	0.08	-0.01	-0.09	-0.15	-0.18
Samoa	0.84	-0.08	-0.03	-0.25	-0.01	-0.05	0.03	-0.07	-0.08	-0.0003
	38.05	63.70	80.24	88.06	90.71	91.12	91.13	91.61	93.09	95.22
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.77	0.55	0.45	0.29	0.19	0.15	0.09	0.02	-0.09	-0.22
Senegal	0.81	-0.07	0.20	-0.24	0.24	-0.12	0.10	-0.23	-0.08	-0.35
	31.96	48.83	60.19	64.95	67.18	68.57	69.04	69.05	69.55	72.85
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.88	0.81	0.73	0.67	0.55	0.43	0.33	0.21	0.07	-0.03
Sierra Leone	0.88	0.18	-0.03	0.04	-0.29	-0.20	-0.04	-0.27	-0.20	0.03
	42.25	78.48	108.52	134.17	152	163.31	170.1	172.75	173.09	173.16
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.81	0.57	0.34	0.19	0.06	-0.01	-0.06	-0.10	-0.12	-0.15
Togo	0.82	-0.23	-0.09	0.15	-0.04	0.09	-0.07	-0.24	0.10	-0.11
	35.47	53.62	60.28	62.30	62.51	62.52	62.73	63.41	64.28	65.74
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.77	0.55	0.35	0.18	0.02	-0.09	-0.13	-0.17	-0.15	-0.14
Zambia	0.79	-0.05	-0.12	-0.10	-0.10	-0.04	0.08	-0.09	0.04	-0.04
	31.70	48.5	55.60	57.41	57.44	57.93	59.00	60.78	62.32	63.67
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Notes: *authors' calculations. First cell entry: autocorrelation coefficient; second cell entry: partial autocorrelation coefficient; third cell entry: Ljung-Box portmanteau Q-statistics at lag k for the null hypothesis that there is no autocorrelation up to the prespecified lag k; fourth cell entry: p-values associated with the Ljung-Box Q-statistics at lag k.*

Four findings from Table 2 are worth mentioning. First, central government debt/GDP series exhibit a highly persistent autocorrelation profile over a 10-year lag window. Second, sampled autocorrelation coefficients are statistically significant up to a 10-year lag. Third, there exists a higher degree of public debt persistence in the case of advanced economies compared to emerging, low-income and developing economies. Fourth, the unit value for the first lag partial autocorrelation coefficient (PAC) lies within the 95% confidence interval ($\pm 2/\sqrt{T} \approx 0.28, T = 51$) of the reported first lag PAC in all countries analyzed, except in the cases of Brazil and Pakistan.

CONCLUSION

This paper adds three potential contributions to the literature on public debt sustainability. First, building on the global debt database (GDD) of Mbaye et al. (2018b) [36], we have derived a secondary global public debt database (GPDD) for the 1971-2021 period, which is publicly available at the Harvard Dataverse Repository. Second, we have presented detailed stylized facts regarding the public debt indebtedness of the central government in the case of sixty-seven advanced, emerging, low-income and developing economies. Third, we have provided a comprehensive literature review of previous contributions centered around public debt sustainability analysis from the IGBC violation perspective. The results of this paper might be helpful to researchers and fiscal practitioners concerned with analyzing global fiscal policy behavior after the Bretton Woods collapse.

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