

## Unbundled debt and economic growth in developed and developing economies: an empirical analysis

Article (Published Version)

Intartaglia, Maurizio, Antoniadou, Andreas and Bhattacharyya, Sambit (2018) Unbundled debt and economic growth in developed and developing economies: an empirical analysis. *World Economy*, 41 (12). pp. 3345-3358. ISSN 0378-5920

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/73164/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

### **Copyright and reuse:**

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

# Unbundled debt and economic growth in developed and developing economies: An empirical analysis

Maurizio Intartaglia<sup>1</sup> | Andreas Antoniadou<sup>2</sup>  | Sambit Bhattacharyya<sup>1</sup>

<sup>1</sup>Department of Economics, University of Sussex, Brighton, UK

<sup>2</sup>Department of International Relations, University of Sussex, Brighton, UK

## 1 | INTRODUCTION

Debt creation is an important mechanism of the capitalist system as it allows states, firms and households to hedge against unanticipated economic shocks. Unanticipated shocks typically arise due to the time-inconsistent nature of demand and supply. Thus, debt creation is a pathway for economic agents towards expenditure smoothing, price stability and long-term economic growth (Cecchetti, Mohanty, & Zampolli, 2011, pp. 2–3). In spite of its obvious theoretical advantages, many studies have disputed the positive effects of debt expansion on growth. For example, Reinhart and Rogoff (2010) find that there is little or no correlation between public debt and growth when the public debt to GDP ratio is below the threshold level of 90%. They also find that above this threshold, the association turns strongly negative.

Following Reinhart and Rogoff (2010), many other scholars have engaged in exploring the public debt–growth relationship, see, for example, Baum, Checherita-Westphal, and Rother (2013), Cecchetti et al. (2011), Eberhardt and Presbitero (2015), Kourtellis, Stengos, and Tan (2013), and Presbitero (2012).<sup>1</sup> Some studies analyse the effect of private debt on growth (Beck, Büyükkarabacak, Rioja, & Valev, 2012; Cecchetti et al., 2011), while others assess the possibility of reverse causation from debt to growth (Lof & Malinen, 2014; Puente-Ajovín & Sanso-Navarro, 2015) and whether the relationship is conditional on the country's level of GDP (Caner et al. 2010; Woo & Kumar, 2015).

In this study, we aim to systematically analyse the effect of debt on economic growth. We unbundle debt into public and private debt. We further disaggregate private debt into household and nonfinancial corporation (NFC) debt. We also account for the effect of total debt (i.e., the sum of public, household and NFC debt) on growth. We address the issue of potential reverse causation by estimating our model using the panel vector autoregressive (PVAR) approach. We also investigate potential heterogeneity in the relationship between debt and growth across developed and developing countries which yields new results. Our paper exploits a panel data set of 48 countries over the period 1961–2015. The data on our main variable of interest, debt, are sourced from Vague (2014).

Our contribution in this paper is threefold. First, we present a coherent empirical framework to estimate the growth effects of public versus private and corporate versus household debt. By

<sup>1</sup>Égert (2015) and Panizza and Presbitero (2013) present excellent reviews of this literature.

dividing our sample into developed and developing countries, we are able to estimate the heterogeneous effects of debt on growth across countries. Second, we estimate our model using the PVAR approach which successfully tackles the issue of endogeneity in this literature. Finally, we bring in new data from Vague (2014) and estimate the growth effect of total debt which yields new result.

Our key findings are as follows. First, debt appears to be harmful to growth in general for the full sample of countries. In particular, our estimates reveal that public debt, private debt, household debt and corporate debt are all associated with lower rates of economic growth. Second, the negative effect of public debt appears to be uniform across developed and developing countries. This however is not the case when it comes to private and total debt. The negative growth effects of private and total debt appear to be mainly restricted to developed countries. Further disaggregation of private debt into household and NFC debt reveals some more new results. Household debt in developing countries appears to be growth facilitating while the same in developed countries hinders growth. Non-financial corporate debt does not seem to matter much for growth in developing countries, whereas it hinders growth in developed countries.

The remainder of the paper is structured as follows. Section 2 offers a review of the existing literature. In particular, we discuss recent evidence on the relationship between public debt and economic growth. This is followed by a discussion of the literature on private debt and growth. Section 3 introduces the empirical model. Section 4 presents the estimation results, and section 5 concludes.

## 2 | THE DEBT AND GROWTH LITERATURE

On the theoretical side, the conventional, neoclassical view on public debt is that regardless of any short-term positive impact on demand and output, an increase in public debt has a negative long-term impact on economic growth as it crowds out investments. Thus, the relationship between public debt and economic growth is negative. Under this paradigm, fiscal deficits and subsequent increase in public debt could have a positive impact on output if and only if there is excess capacity in an economy (Elmendorf & Mankiw, 1999). This conventional view however has been criticised for its neglect of case-specific economic conditions and context. In particular, they said paradigm ignores the issue of the quality of debt spending. For instance, Checherita-Westphal and Rother (2012) argue that debt has a growth-enhancing effect when debt is issued to finance public investments. DeLong and Summers (2012) argue that in case of protracted recessions, fiscal deficits and public debt might have a positive effect both in the short and long term. In a similar vein, Greiner (2013) argue that in the presence of wage rigidities and unemployment, an economy with a higher debt to GDP ratio is more likely to achieve higher balanced growth rate.<sup>2</sup>

On the empirical side, after Reinhart and Rogoff (2010) there has been a surge in research aimed at assessing the relationship between public debt and economic growth. Examples of such studies are Baum et al. (2013), Cecchetti et al. (2011), Checherita-Westphal and Rother (2012), Eberhardt and Presbitero (2015), Égert (2015), Kourtellos et al. (2013), Lof and Malinen (2014), Panizza and Presbitero (2013), Presbitero (2012), Puente-Ajovín and Sanso-Navarro (2015) and Woo and Kumar (2015). Although the majority of the existing studies seem to find negative correlation between public debt and growth, their interpretation of the correlation varies. For instance, with regard to advanced economies, Panizza and Presbitero (2013, p. 4) argue that although there is evidence that “debt may have a negative effect on growth . . . the effect is likely to be small . . .

---

<sup>2</sup>For a recent review of this literature, see Panizza and Presbitero (2013) and Reinhart, Reinhart and Rogoff (2015).

[T]he link between debt and growth depends on many cyclical and structural factors.” In contrast, Kourtellos et al. (2013) argue that the impact of public debt on growth is conditional on the quality of domestic institutions. Lof and Malinen (2014) argue that the negative correlation between public debt and growth is due to a significant reverse effect of growth on debt (i.e., increasing growth has a negative impact on debt), while Égert (2015) presents results that challenge the negative non-linear relationship between public debt and economic growth altogether.

With regard to private debt, the theory and empirical evidence are relatively scarce and marked by the division between mainstream and heterodox economics. Heterodox economists have long called for more attention on private debt as a source of economic instability and crisis, and have criticised the unsustainability of credit-fuelled growth patterns and the negative implications of excessive financialisation. For instance, Keen (2009, 2017), from a post-Keynesian perspective, has illustrated the critical role private debt played in the creation of the global financial crisis, and the radical unsustainability generated by the existing debt-based economic model. Crouch (2009), from an international political economy perspective, has argued that in the post-cold war period, private debt has replaced the role that public debt played in the Keynesian paradigm. A number of Marxian political economists have argued that private debt came to fill in the gap left from the falling real income of the great majority of the population in advanced economies (Harvey, 2011). The unsustainability of this debt-based economic model of modern economies has recently been highlighted by many other economists (King, 2016; Mian & Sufi, 2014; Turner, 2016), as well as researchers from the financial sector (Dobbs, Lund, Woetzel, & Mutafchieva, 2015; Roxburgh et al., 2010; Vague, 2014). In spite of these recent advances, the overall theoretical inquiries into the impact of private debt on growth remain rather underdeveloped.

The same applies for empirical studies in this domain.<sup>3</sup> Some notable examples are as follows. Cecchetti et al. (2011), focusing on 18 OECD countries for the period 1980–2010, find evidence for a potential threshold of 90% and 85% of GDP for NFC and household debt, respectively, beyond which debt becomes a drag on economic growth. Using a similar pool of countries, Puente-Ajovín and Sanso-Navarro (2015) examine the possible presence of Granger causality between private debt and growth. They find strong evidence that higher levels of private debt Granger-cause slower growth, especially with regard to household debt. It is also worth mentioning here that the scoreboard of indicators adopted by the EU in 2011 to monitor macroeconomic imbalances includes a threshold of 133% of GDP for private sector debt. Beck et al. (2012) using a data set of 45 developed and developing economies, for the period 1994–2005, find that NFC debt is positively linked to GDP per capita growth (and reduction in income inequality), whereas there is no significant relationship between household borrowing and GDP growth (or income inequality). In a similar vein, Garcia-Escribano and Han (2015) focusing on 31 emerging markets for the period 2002–12 find that increases in consumer, mortgage and NFC credit have significant positive effects on real GDP growth, with the strongest impact coming from consumer credit.

In addition to the above, a literature also focuses on the heterogeneity of the debt-growth relationship between developed and developing countries. Reinhart and Rogoff (2010) argue that the public debt threshold of 90% in advanced economies apply to emerging markets too. In a panel of 24 emerging market economies over the period 1900–2009, they show that median GDP growth is around 4%–4.5% for levels of debt below 90% of GDP, but falls to 2.9% for higher debt (p. 576). Caner, Grennes, and Koehler-Geib (2010), using a large data set of both developed and developing countries for the period 1980–2008, report a similar negative non-linear relationship between public debt and growth for both groups of countries, but with significant differences in the debt

<sup>3</sup>For a brief review of this literature, see Beck et al. (2012) and Garcia-Escribano and Han (2015).

threshold: 77% for developed and 64% for developing countries. Woo and Kumar (2015) also reach similar conclusions. They also find that in countries that have a high portion of public debt denominated in a foreign currency—a problem traditionally associated with developing economies—the negative impact of increased debt on growth is much stronger.

In contrast, Abbas and Christensen (2010) focusing on a data set of 93 low-income and emerging markets for the period 1975–2004 find a robust positive linear relationship between public debt and economic growth: with one standard deviation increase in public debt leading to a 0.1 standard deviation increase in economic growth. They also find that the quality of domestic debt (whether it is in marketable securities, positive real interest rates and debt issued to the non-bank sector) matters a great deal towards its impact on growth. Other notable studies reporting positive effects are Égert (2015) and Fincke and Greiner (2015).

### 3 | EMPIRICAL STRATEGY AND DATA

Our investigation focuses on an unbalanced panel of developed and developing countries. The maximum coverage is 48 countries spanning over the years 1960–2015.<sup>4</sup> We have included countries with data for at least 10 consecutive years. Table A1 presents the list of countries included in our sample.

To assess the relationship between debt and economic growth, we estimate the following model:

$$Growth_{it} = \alpha + \beta Debt_{it} + \delta_t + \varphi_i + \varepsilon_{it}, \quad (1)$$

where subscripts  $i$  and  $t$  represents country and time period, respectively,  $Growth_{it}$  is the 1-year lag difference of per capita real GDP (constant 2010 US\$) for country  $i$  at time  $t$ ,  $Debt_{it}$  is the specific indicator of debt also measured as lagged difference for country  $i$  at time  $t$ ,  $\delta_t$  and  $\varphi_i$  are the country and year fixed effects, and  $\varepsilon_{it}$  is the stochastic error term.

The growth impact of debt is revealed by the sign and significance of the coefficient  $\beta$ . A negative coefficient is indicative of an adverse effect of debt on economic growth. Conversely, a positive coefficient implies that higher levels of debt could be beneficial to growth.

For the sake of parsimony, we do not include any additional control variables in the main specification. However, we use 1-year lagged GDP to test the robustness of our results.

We consider both public and private debt, and the latter further divided into household and NFC debt. We also focus on total debt, defined as the sum of public and private debt but excluding financial sector debt. All measures of debt are expressed as share of GDP.

A common challenge with an empirical model of this nature is potential reverse causation. If a feedback effect is at work, the orthogonality condition between regressors and the error term would not hold rendering the estimate  $\hat{\beta}$  biased. Therefore, it is important to test empirically the two-way relationship between debt and growth. We do this using a panel VAR methodology. In particular, current values of growth and debt are allowed to depend on the past values of each other. We use the following first-order panel VAR:

$$y_{it} = \Gamma_0 + \Gamma_1 y_{it-1} + F_i + E_{it}, \quad (2)$$

<sup>4</sup>We use the data set on debt compiled by Vague (2014). This data set is available at <http://debt-economics.org/> and is based on data from the World Bank, IMF, BIS and Reinhart and Rogoff (2010). Reinhart and Rogoff (2010) data set is available at <http://www.carmenreinhart.com/data/>.

where  $y_{it}$  is a two-variable vector including *Growth* and *Debt*.  $F_i$  and  $E_{it}$  are vectors of country-fixed effects and idiosyncratic errors, respectively. Following estimation of model (2), we proceed to run Granger causality tests and explore impulse response function.

Our basic model uses year-on-year changes which resembles Minsky and a Keynesian demand-led growth framework (Bezemer, Grydaki, & Zhang, 2014; Minsky, 1957). Note that the Minsky model focuses on endogenous business cycles as opposed to the neoclassical steady state growth rates. Minsky models posit a negative effect of debt on growth and a positive effect of growth on debt. Therefore, reverse causation should be an issue here which we tackle using PVAR. We also do not include debt squared in the specification as the Minsky model does not stipulate a non-linear effect of debt.

## 4 | EVIDENCE

### 4.1 | Unbundled debt and economic growth

We open by examining the time-series properties of the key variables used in the paper. Table 1 displays the results of Fisher-type Augmented Dickey–Fuller unit-root tests. It is apparent from the tests that all variables are  $I(1)$ . Because our variables are measured as first difference, non-stationarity is unlikely to be a problem here.

Note that we use a constant term and a time trend here while acknowledging that there is no theoretical justification for preferring one specification over another. Nonetheless, we also check our results by excluding the trend and our results remain unaffected. In Table 1, we use one lag but we also rerun the test using up to three lags and the results are robust.

A common criticism of the Fisher-type augmented Dickey–Fuller panel unit-root test is that they fail to take account of cross-sectional dependence. Following Levin, Lin, and Chu (2002), we use the “demean” option which subtracts cross-sectional averages from the series to alleviate the impact of cross-sectional dependence. Furthermore, we also run an additional panel unit-root test proposed by Pesaran (2003) which is robust to cross-sectional. Again our  $I(1)$  result survives.

Since we estimate our model in first difference, are we ignoring the possibility of a long-run cointegrating relationship between GDP and debt? Following Westerlund (2007), we test for long-

**TABLE 1** Unit-root test

	<b>GDP</b>	<b>Public debt</b>	<b>Private debt</b>
Inverse chi-squared	0.072	0.308	0.996
Inverse normal	0.119	0.806	1.000
Inverse logit $t$	0.129	0.764	0.999
Modified inv. chi-squared	0.066	0.322	0.992
	<b>Growth GDP</b>	<b>Growth public debt</b>	<b>Growth private debt</b>
Inverse chi-squared	0.000	0.000	0.000
Inverse normal	0.000	0.000	0.000
Inverse logit $t$	0.000	0.000	0.000
Modified inv. chi-squared	0.000	0.000	0.000

*Notes:* The table illustrates the  $p$ -values from Fisher-type ADF unit-root test. Growth rates are measured in first differences. Each line refers to a specific transformation used to combine the  $p$ -values from unit-root tests computed for each panel individually. Constant and time trend term included.

run cointegrating relationship between GDP and debt by running the panel and the mean group statistics. We obtain the critical values through bootstrapping (100 replications) to control for cross-sectional dependence. All tests indicate that GDP is not cointegrated with public debt and private debt. Therefore, our choice of vector autoregression (VAR) model over a vector error correction mechanism (VECM) framework is entirely justified.

The estimation results related to model (1) are displayed in Table 2. As shown in column (1), the coefficient estimate of public debt is negative and statistically significant at the 1% level. The coefficient implies that a one percentage point increase in public debt reduces GDP growth by 0.02%. Results are qualitatively similar when we use private debt (column (2)) and its components, namely household debt (column (3)) and NFC debt (column (4)) as explanatory variables. In column (5), we aggregate public and private debt and find a negative and statistically significant coefficient.

It is possible that our estimates are capturing a feedback effect from growth to debt rather than an exclusive effect of debt on growth. To empirically assess the extent of feedback effect, we estimate model (2) using the panel VAR approach. Note that under this methodology, we are not concerned about the coefficient estimates per se. Instead, we are more interested in the direction of causality. Therefore, following the estimation of model (2) we run Granger causality tests to check the direction of causality between the variables under study. The  $p$ -values are displayed in Table 3.

We find that both public debt and private debt Granger-cause growth at the confidence level of 5% (Column (1)). In contrast, neither public nor private debt Granger-causes growth. We further investigate the causality issue through impulse response functions (IRFs). Figure 1 displays the response over 10 years of growth to one-standard deviation shock on public debt. The black line denotes the point estimates of the response, whereas the lighter bands are the 95 percentile confidence interval. The growth impact of a shock in public debt is limited to 2 years, at most, but it is significantly different from zero. Figure 2 depicts the response of public debt to one-standard deviation shock on growth. The confidence intervals discard the possibility of reverse causation. A similar story holds for private debt, as depicted in Figures 3 and 4. Overall, based on these estimates we are reasonably confident that our cross-country estimates are not picking up a feedback effect from growth to debt.

So far our estimates suggest that debt, both public and private, is harmful to growth. However, our estimates might conceal potential heterogeneity arising from a country's level of economic development. To account for such heterogeneity, we re-estimate model (1) separately for the

**TABLE 2** Debt and growth (Vague)

	(1) Public debt	(2) Private debt	(3) Household debt	(4) NFC debt	(5) Total debt
Debt <sub>t</sub>	−0.020*** (0.006)	−0.010** (0.004)	−0.036*** (0.012)	−0.016*** (0.006)	−0.033*** (0.008)
Country FE	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes
Observations	1,762	1,823	1,187	1,169	1,957
Countries	48	46	42	42	48
$R^2$	.268	.253	.290	.302	.263

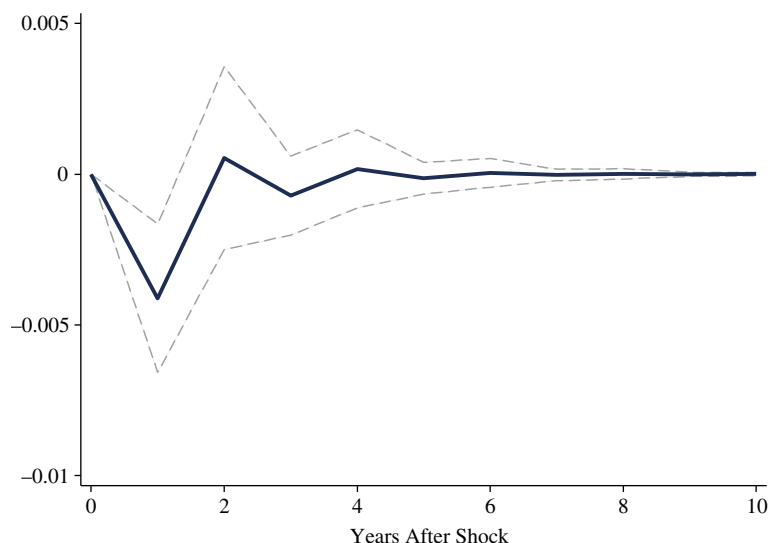
*Notes:* The table reports fixed effect estimates. Column (1) reports public debt. Column (2) reports private debt. Column (3) reports household private debt. Column (4) reports private debt of nonfinancial corporations. Column (5) reports public and private debt. The figures in the parentheses are clustered standard errors with clustering at the country level. Constant and time dummies not reported.

\*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

**TABLE 3** Debt and growth: Granger causality test

Impulse	Response		
	(1) Growth	(2) Public debt	(3) Private debt
Public debt	0.042		
Private debt	0.046		
Growth		0.740	0.726

Notes: The table displays the *p*-value from the panel VAR-Granger causality Wald test. Column (1) reports the IRF, growth being the response variable. Column (2) reports the IRF, public debt being the response variable. Column (3) reports the IRF, private debt being the response variable. The null hypothesis is that the impulse variable does not Granger-cause the response variable.

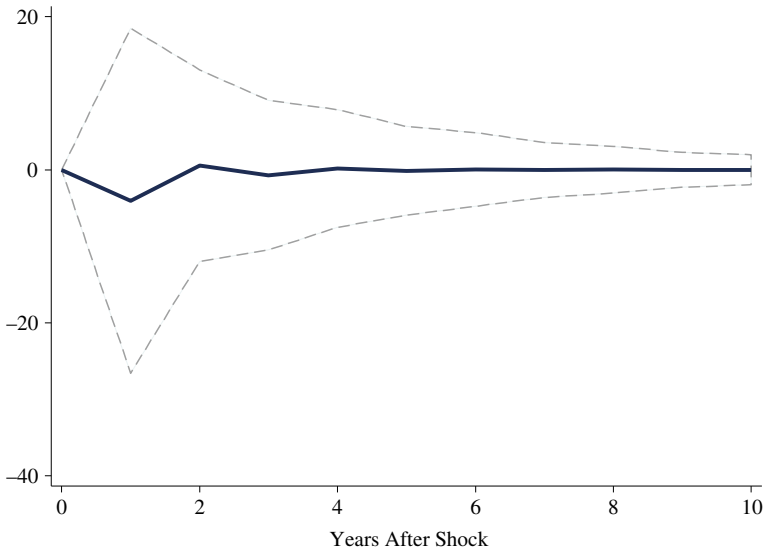


**FIGURE 1** Response of growth to shock in public debt

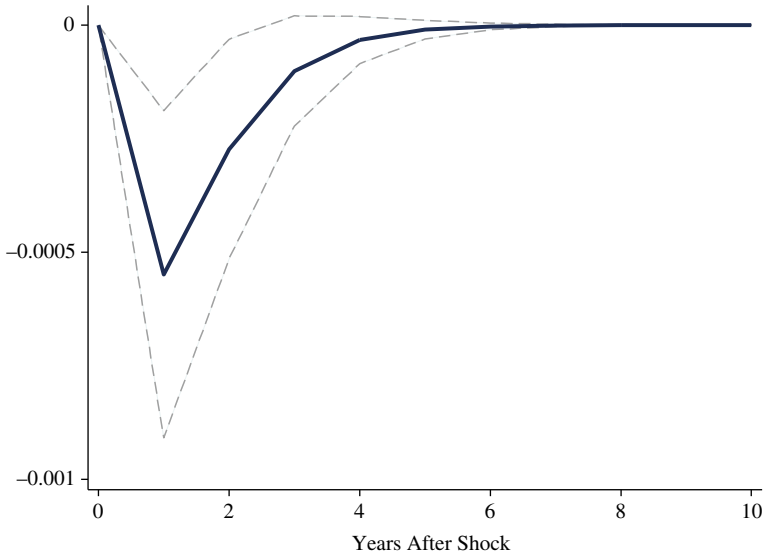
subsamples of developed and developing countries. Developed and developing countries are identified using the World Bank Country Income Classification.

As shown in Table 4 panel A, the coefficients associated with debt are always negative and statistically significant for developed countries. This is in line with the results for the overall sample reported in Table 2. However, our estimate for the sample of developing countries (panel B) tells a different story. Column (1) shows that public debt is harmful to growth, but the magnitude of the negative coefficient is much smaller compared to the developed country subsample reported in panel A. The effect of private debt is near zero and statistically insignificant (column (2)). Household debt appears to be expansionary for developing countries (column (3)). This is in sharp contrast to the developed country sample where household debt is clearly contractionary. This is perhaps indicative of the fact that household in developed countries is already overleveraged and therefore further credit expansion harms growth. In contrast, households in developing countries are relatively less leveraged and therefore credit expansion is expansionary. Unlike in the developed country sample, NFC and total debt do not seem to have a strong negative effect on growth in developing countries.





**FIGURE 2** Response of public debt to shock in growth

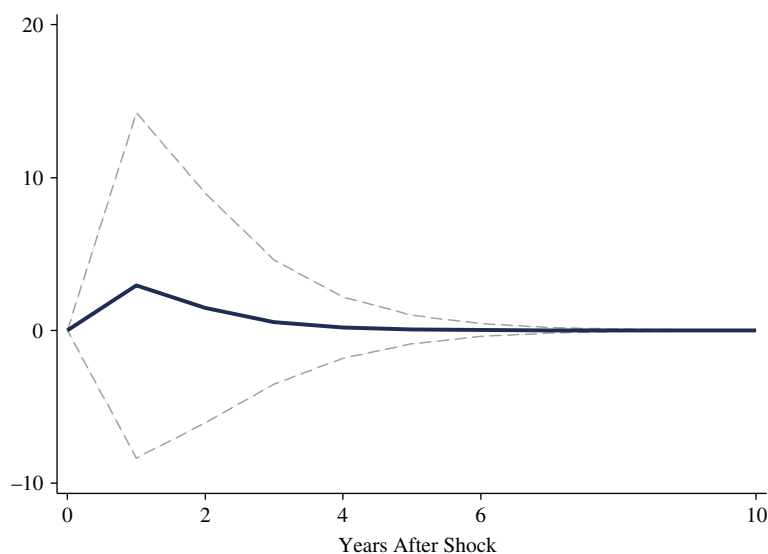


**FIGURE 3** Response of growth to shock in private debt

## 4.2 | Robustness tests

We perform a battery of robustness tests of our key results. These are as follows.

Neoclassical growth stipulates that the empirical growth model should include the lagged level of per capita GDP to account for “conditional convergence” (Barro & Sala-i-Martin, 2004). We include lagged level of per capita GDP into our specification, and our key results remain unchanged. These results are not included here to save space but are available upon request.



**FIGURE 4** Response of private debt to shock in growth

**TABLE 4** Debt and growth (Vague)

	(1) Public debt	(2) Private debt	(3) Household debt	(4) NFC debt	(5) Total debt
Panel A: Developed countries					
Debt <sub>t</sub>	-0.038** (0.014)	-0.014*** (0.004)	-0.038*** (0.010)	-0.016*** (0.006)	-0.011*** (0.003)
Country FE	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes
Observations	1,265	1,357	991	973	1,404
Countries	32	32	32	32	32
R <sup>2</sup>	.362	.334	.32	.355	.334
Panel B: Developing countries					
Debt <sub>t</sub>	-0.008*** (0.001)	0.000 (0.002)	0.024** (0.008)	-0.009 (0.009)	-0.002 (0.001)
Country FE	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes
Observations	497	466	196	196	553
Countries	16	14	10	10	16
R <sup>2</sup>	.333	.246	.378	.369	.243

*Notes:* The table reports fixed effect estimates. Column (1) reports public debt. Column (2) reports private debt. Column (3) reports household private debt. Column (4) reports private debt of nonfinancial corporations. Column (5) reports public and private debt. The figures in the parentheses are clustered standard errors with clustering at the country level. Constant and time dummies not reported.

\*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Our estimates use annual data which by definition is noisy. Therefore, we re-estimate our models in Tables 2 and 4 using 5-year averages. Our results survive, and they are displayed in Tables 5 and 6.

**TABLE 5** Debt and growth (Vague): 5-year averages

	(1) Public debt	(2) Private debt	(3) Household debt	(4) NFC debt
Debt <sub>t</sub>	−0.037*** (0.009)	−0.011** (0.005)	−0.045* (0.027)	−0.025** (0.012)
Country FE	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	351	359	198	225
Countries	48	46	42	42
R <sup>2</sup>	.256	.131	.024	.087

*Notes:* The table reports fixed effect estimates. Column (1) reports public debt. Column (2) reports private debt. Column (3) reports household private debt. Column (4) reports private debt of nonfinancial corporations. The figures in the parentheses are clustered standard errors with clustering at the country level. Constant and time dummies not reported.

\*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

**TABLE 6** Debt and growth (Vague): 5-year averages

	(1) Public debt	(2) Private debt	(3) Household debt	(4) NFC debt
Panel A: Developed countries				
Debt <sub>t</sub>	−0.062*** (0.016)	−0.014** (0.006)	−0.061* (0.036)	−0.028** (0.012)
Country FE	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	254	267	159	187
Countries	32	32	32	32
R <sup>2</sup>	.318	.055	.048	.092
Panel B: Developing countries				
Debt <sub>t</sub>	−0.015*** (0.003)	−0.002 (0.006)	0.105** (0.041)	0.010 (0.013)
Country FE	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	97	92	39	38
Countries	16	14	10	10
R <sup>2</sup>	.357	.066	.045	.026

*Notes:* The table reports fixed effect estimates. Column (1) reports public debt. Column (2) reports private debt. Column (3) reports household private debt. Column (4) reports private debt of nonfinancial corporations. Column (5) reports public and private debt. The figures in the parentheses are clustered standard errors with clustering at the country level. Constant and time dummies not reported.

\*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

**TABLE 7** Debt and growth (WB)

	(1) Public debt	(2) Private debt	(3) External debt
Debt <sub>t</sub>	-0.011** (0.005)	-0.007*** (0.002)	-0.004*** (0.001)
Country FE	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes
Observations	823	6,958	4,021
Countries	49	177	115
R <sup>2</sup>	.187	.022	.047

*Notes:* The table reports Fixed Effect estimates. Column (1) reports central government debt. Column (2) reports domestic credit to private sector provided by banks. Column (3) reports external debt stock. The figures in the parentheses are clustered standard errors with clustering at the country level. Constant and time dummies not reported.

\*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

**TABLE 8** Debt and growth (WB)

	Panel A: Developed countries		Panel B: Developing countries	
	(1) Public debt	(2) Private debt	(3) Public debt	(4) Private debt
Debt <sub>t</sub>	-0.019** (0.009)	-0.017** (0.007)	-0.003** (0.001)	0.002** (0.001)
Country FE	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	398	2,155	424	4,750
Countries	21	54	28	123
R <sup>2</sup>	.309	.126	.183	.023

*Notes:* The table reports Fixed Effect estimates. Columns (1) and (3) reports central government debt. Columns (2) and (4) reports domestic credit to private sector provided by banks. No results for external debt are reported as there are too few observations for the sample of developed countries. The figures in the parentheses are clustered standard errors with clustering at the country level. Constant and time dummies not reported.

\*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Our results could be driven by the idiosyncratic nature of the Vague (2014) data set that we use. To be confident that this is indeed not the case, we re-estimate models in Tables 2 and 4 using an alternative data set sourced from the World Bank. These results are reported in Tables 7 and 8. Note that these tables are somewhat different from Tables 2 and 4 because the debt variables are defined differently in the World Bank data set. The results however are qualitatively similar to Tables 2 and 4. In particular, Table 7 shows that public debt, private debt and external debt are harmful to growth for the overall sample of up to 177 countries. However, public debt is less harmful in developing countries than in developed countries (Table 8). As for private debt, the impact is negative for the developed countries but positive for the developing countries.

## 5 | CONCLUDING REMARKS

Our paper unbundles debt into several constituent subparts and analyses their effects on growth. Public debt appears to harm growth in both developed and developing countries, although not to the same degree. In contrast, private debt appears to have a negative impact on growth only in developed countries. Household debt facilitates growth in developing countries, and this is consistent with the relatively low leverage of households in these locations. Non-financial corporation debt harms growth in developed countries, whereas the effect is ambiguous and weak for developing countries. In our full sample of countries, we find that public debt, private debt, household debt and corporate debt are all harmful to growth. The results survive a battery of robustness tests.

The above findings generate new insights in the empirical literature on debt and growth. Drawing general policy conclusions from this exercise remains a challenge. Yet, two broader insights are important. First, non-linearity appears to be a crucial issue here with results differing across developed and developing countries. Therefore, local conditions should be a key pointer towards fiscal and monetary policy which drives the quantity of public and private debt. Second, the expansionary nature of household debt in developing countries should not be interpreted as a linear relationship. Therefore, it is worth noting that the speed of household credit expansion and initial conditions could very well be prime in determining the country specific effects. Needless to say that such nuances are not captured by our reduced form model.

## ACKNOWLEDGEMENTS

We gratefully acknowledge comments by the editor and two anonymous referees. We also acknowledge comments by and discussions with colleagues at the Sussex Global Debt Dynamics Workshop. All remaining errors are our own.

## ORCID

Andreas Antoniadou  <http://orcid.org/0000-0002-6240-7389>

## REFERENCES

- Abbas, S. M. A., & Christensen, J. E. (2010). The role of domestic debt markets in economic growth: An empirical investigation for low-income countries and emerging markets. *IMF Staff Papers*, 57(1), 209–255. <https://doi.org/10.1057/imfsp.2009.24>
- Barro, R., & Sala-i-Martin, X. (2004). *Economic growth*. Cambridge, MA: MIT Press.
- Baum, A., Checherita-Westphal, C., & Rother, P. (2013). Debt and growth: New evidence for the euro area. *Journal of International Money and Finance*, 32(February), 809–821. <https://doi.org/10.1016/j.jimonfin.2012.07.004>
- Beck, T., Büyükkarabacak, B., Rioja, F. K., & Valev, N. T. (2012). Who gets the credit? And does it matter? Household vs. firm lending across countries. *The B.E. Journal of Macroeconomics*, 12(1). <https://doi.org/10.1515/1935-1690.2262>
- Bezemer, D., Grydaki, M., & Zhang, L. (2014). *Is financial development bad for growth?* SOM Research Reports; Vol. 14016-GEM. Groningen, the Netherlands: University of Groningen, SOM research School.
- Caner, M., Grennes, T., & Koehler-Geib, F. (2010). *Finding the tipping point – When sovereign debt turns bad* (Policy Research Working Paper Series 5391). The World Bank. Retrieved from World Bank website: <http://documents.worldbank.org/curated/en/509771468337915456/Finding-the-tipping-point-when-sovereign-debt-turns-bad>



- Cecchetti, S., Mohanty, M., & Zampolli, F. (2011). *The real effects of debt*. Retrieved from <http://www.bis.org/publ/work352.htm>
- Checherita-Westphal, C., & Rother, P. (2012). The impact of high government debt on economic growth and its channels: An empirical investigation for the euro area. *European Economic Review*, 56(7), 1392–1405. <https://doi.org/10.1016/j.euroecorev.2012.06.007>
- Crouch, C. (2009). Privatised Keynesianism: An unacknowledged policy regime. *The British Journal of Politics & International Relations*, 11(3), 382–399. <https://doi.org/10.1111/j.1467-856X.2009.00377.x>
- DeLong, J. B., & Summers, L. H. (2012). *Fiscal policy in a depressed economy* (Brookings Papers on Economic Activity). <https://www.brookings.edu/bpea-articles/fiscal-policy-in-a-depressed-economy/>
- Dobbs, R., Lund, S., Woetzel, J., & Mutafchieva, M. (2015). *Debt and (not much) deleveraging*. McKinsey Global Institute. <https://www.mckinsey.com/global-themes/employment-and-growth/debt-and-not-much-deleveraging>
- Eberhardt, M., & Presbitero, A. F. (2015). Public debt and growth: Heterogeneity and non-linearity. *Journal of International Economics*, 97(1), 45–58. <https://doi.org/10.1016/j.jinteco.2015.04.005>
- Égert, B. (2015). Public debt, economic growth and nonlinear effects: Myth or reality? *Journal of Macroeconomics*, 43, 226–238.
- Elmendorf, D. W., & Mankiw, N. G. (1999). Chapter 25 Government debt. In J. B. Taylor & M. Woodford (Eds.), *Handbook of macroeconomics*, 1, Part C (pp. 1615–1669). Amsterdam: Elsevier. [https://doi.org/10.1016/S1574-0048\(99\)10038-7](https://doi.org/10.1016/S1574-0048(99)10038-7)
- Fincke, B., & Greiner, A. (2015). Public debt and economic growth in emerging market economies. *South African Journal of Economics*, 83(3), 357–370. <https://doi.org/10.1111/saje.12079>
- Garcia-Escribano, M., & Han, F. (2015). *Credit expansion in emerging markets: Propeller of growth?* (IMF Working Paper No. 15/212). Retrieved from IMF website: <https://www.imf.org/external/pubs/ft/wp/2015/wp15212.pdf>
- Greiner, A. (2013). Sustainable public debt and economic growth under wage rigidity. *Metroeconomica*, 64(2), 272–292. <https://doi.org/10.1111/meca.12006>
- Harvey, D. (2011). *The enigma of capital: And the crises of capitalism*. London, UK: Profile Books.
- Keen, S. (2009). The global financial crisis, credit crunches and deleveraging. *Journal of Australian Political Economy*, 64, 22–36.
- Keen, S. (2017). *Can we avoid another financial crisis?* Cambridge, UK: Polity.
- King, M. (2016). *The end of alchemy: Money, banking, and the future of the global economy*. New York, NY: W. W. Norton & Company.
- Kourtellis, A., Stengos, T., & Tan, C. M. (2013). The effect of public debt on growth in multiple regimes. *Journal of Macroeconomics, Dynamics, Economic Growth & International Trade*, 38(Pt A), 35–43.
- Levin, A., Lin, C.-F., & Chu, J. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics*, 108(1), 1–24. [https://doi.org/10.1016/S0304-4076\(01\)00098-7](https://doi.org/10.1016/S0304-4076(01)00098-7)
- Lof, M., & Malinen, T. (2014). Does sovereign debt weaken economic growth? A panel VAR analysis. *Economics Letters*, 122(3), 403–407. <https://doi.org/10.1016/j.econlet.2013.12.037>
- Mian, A., & Sufi, A. (2014). *House of debt*. Chicago, IL: University of Chicago Press.
- Minsky, H. (1957). Monetary systems and accelerator models. *American Economic Review*, 67, 859–883.
- Panizza, U., & Presbitero, A. F. (2013). *Public debt and economic growth in advanced economies: A survey* (Mo.Fi.R. Working Paper 78). Money and Finance Research group (Mo.Fi.R.) – Univ. Politecnica Marche – Department of Economic and Social Sciences. <https://econpapers.repec.org/paper/ancwmo/fir/78.htm>
- Pesaran, H. (2003). *A simple panel unit root test in the presence of cross section dependence* (Cambridge Working Papers in Economics 0346). Faculty of Economics (DAE), University of Cambridge.
- Presbitero, A. F. (2012). Total public debt and growth in developing countries. *The European Journal of Development Research*, 24(4), 606–626. <https://doi.org/10.1057/ejdr.2011.62>
- Puente-Ajovín, M., & Sanso-Navarro, M. (2015). Granger causality between debt and growth: Evidence from OECD countries. *International Review of Economics & Finance*, 35, 66–77. <https://doi.org/10.1016/j.iref.2014.09.007>
- Reinhart, C. M., & Rogoff, K. S. (2010). *Growth in a time of debt* (Working Paper 15639). National Bureau of Economic Research. Retrieved from NBER website: <http://www.nber.org/papers/w15639>
- Reinhart, C., Reinhart, V., & Rogoff, K. (2015). Dealing with debt. *Journal of International Economics*, 96, 43–55. <https://doi.org/10.1016/j.jinteco.2014.11.001>

- Roxburgh, C., Lund, S., Wimmer, T., Amar, E., Atkins, C., Kwek, J. H., . . . Manyika, J. (2010). *Debt and deleveraging: The global credit bubble and its economic consequences*. McKinsey Global Institute. <https://www.mckinsey.com/global-themes/employment-and-growth/debt-and-deleveraging-the-global-credit-bubble-update>
- Turner, A. (2016). *Between debt and the devil: Money, credit, and fixing global finance*. Princeton, NJ: Princeton University Press. <https://doi.org/10.1515/9781400873326>
- Vague, R. (2014). *The next economic disaster: Why it's coming and how to avoid it*. Philadelphia, PA: University of Pennsylvania Press. <https://doi.org/10.9783/9780812291100>
- Westerland, J. (2007). Testing for error correction in panel data. *Oxford Bulletin of Economics and Statistics*, 69(6), 709–748. <https://doi.org/10.1111/j.1468-0084.2007.00477.x>
- Woo, J., & Kumar, M. S. (2015). Public debt and growth. *Economica*, 82(328), 705–739. <https://doi.org/10.1111/ecca.12138>

**How to cite this article:** Intartaglia M, Antoniadis A, Bhattacharyya S. Unbundled debt and economic growth in developed and developing economies: An empirical analysis. *World Econ*. 2018;00:1–14. <https://doi.org/10.1111/twec.12626>

## APPENDIX

**TABLE A1** List of countries

Developed countries (32)	Developing countries (16)
Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, UAE, UK, USA	Argentina, Brazil, China, Colombia, India, Indonesia, Kazakhstan, Malaysia, Mexico, Philippines, Romania, Russian Federation, South Africa, Thailand, Turkey, Ukraine

*Notes:* The table reports the largest sample of countries included in our study. The income classification is based on the World Bank Atlas method.