

Appendix Table 1

Recent Literature on Public, Private, and External Debt and Growth

| Study | Sample, frequency, country, coverage | Methodology/Comments | Main conclusions |
|--|---|---|---|
| Arkand, Berges, and Panizza (2012) examine whether there is a threshold above which financial development no longer has a positive effect on economic growth. | Cross-section over 1976-2005 comprised of 44 advanced and emerging market economies. | The empirical exercise in the paper involves testing for nonlinear “threshold effects” over which credit to the private sector begins to have a negative impact on growth (5-year averages), after controlling for many of the standard determinants. | A principal result is that finance starts having a negative effect on output growth when credit to the private sector reaches 104 to 110 percent of GDP. The strongest adverse effects are for credit over 160 percent of GDP. |
| Balassoni, Francese and Page (2011) The link between public debt and growth is examined. The analysis distinguishes between the effects of domestic and external debt. | General government debt for Italy over 1861-2010. Various subperiods are examined. | Endogenous growth model is fitted to the data. Alternative estimation strategies to deal with endogeneity and heteroskedasticity. | There is a strong negative correlation for Italy over the entire sample but the relationship is somewhat weaker since 1985. The stronger negative effect of debt on growth prior to 1914 is importantly connected to the larger role played by external debt. |
| Cechetti, Mohanti and Zampolli (2011) It is an attempt to define empirically debt thresholds beyond which growth suffers. It studies government debt, corporate debt, and household debt separately. | 18 OECD countries (of which none are emerging markets) 1980-2010 | Correlations and standard panel growth regressions are used to examine the debt-growth link. Working with 5-year growth averages as a function of predetermined regressors to control for feedback from debt to growth. | The estimated thresholds for government and household debt are at 85 percent of GDP, although it is less precisely estimated for the latter. Corporate thresholds are somewhat higher and close to 90 percent. |
| Checherita and Rother (2010) Studies effect of gross government debt on per-capita GDP growth for 12 euro area countries. | The 12 countries are: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain. Sample period: 1970-2010 (though most of the regressions cover the period 1970-2008). | Panel with fixed effects with robust estimation. Main estimation strategy is an equation with per-capita GDP growth as dependent variable. Among the control variables: government debt (level and squared), saving/investment rate, population, fiscal indicators, etc. Controls for possible endogeneity of debt variable via instrumental variables (lagged debt, average debt in euro area) | There is a nonlinear relationship between debt and growth. Most specifications provide evidence of “turning point” at around 90-100% of debt/GDP. Confidence intervals suggest that the negative growth effect of high debt may start already from levels of around 70-80% of GDP. They also study different channels by which debt may have an impact on growth. |

Appendix Table 1. The Recent Literature on Public, Private, and External Debt and Growth (continued)

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| <p>Kumar and Woo (2010)</p> <p>Evidence on the impact of <i>initial</i> gross public debt on <i>subsequent long-run</i> growth of real per capita GDP. It thus, lends itself to examining the debt overhang hypothesis.</p> | <p>Panel of 38 advanced and emerging market economies with populations over 5 million over 1970-2007.</p> | <p>The approach follows the large literature on endogenous growth models, as such it controls for a variety of the standard determinants of growth. Robustness checks allow for different estimation strategies, subsamples, and varying degrees of parsimoniousness in the regressors. Nonlinearities are examined.</p> | <p>The results suggest an inverse relationship between initial debt and subsequent growth, controlling for other determinants of growth: on average, a 10 percentage point increase in the initial debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of around 0.2 percentage points per year, with the impact being smaller (around 0.15) in advanced economies. There is some evidence of nonlinearity, with only high (above 90 percent of GDP) levels of debt having a significant negative effect on growth.</p> |
| <p>Panizza and Presbitero (2012)</p> | <p>Same sample as Cechetti et al. (2011). 18 OECD countries (of which none are emerging markets) 1980-2010</p> | <p>Similar to Cechetti et al (2011) and Kumar and Woo (2010). Their key instrument to deal with potential endogeneity of debt is the share (in total debt) of foreign currency debt. As the authors discuss, however, this instrument, is nearly zero and has zero variance in France, Germany, Japan, the Netherlands, and the United States (as these five countries do not have public debt denominated in foreign currency.)</p> | <p>Cast doubts that for the Cechetti et al sample there is evidence that high public debt levels hurt future growth in advanced economies. It is suggested that things are different in developing countries, where a significant fraction of debt is external and the debt overhang argument has more bite.</p> |
| <p>Patillo, Poirson and Ricci (2011)</p> <p>The focus is on the impact of gross external debt (public plus private) on growth</p> | <p>93 developing countries representing all regions over 1969-1998.</p> | <p>Examines both external debt/GDP as well as external debt/exports. 3-year and 10-year growth averages are used. Robust GMM estimation addresses potential endogeneity. A distinction is made between the average impact of debt and growth and the marginal impact (that is, raising debt further from already high levels.</p> | <p>The estimates support a hump-shaped nonlinear relationship between external debt and growth. The average impact of debt on growth becomes negative at the 35-40 debt/GDP threshold. For external debt/exports the threshold is 160-170 percent.</p> |

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| <p>Reinhart and Reinhart (2010)</p> <p>A study of the growth performance in the decade following severe crises associated with private debt overhangs.</p> | <p>The 21-year window around 15 post WWII severe financial crises. Five of these in advanced economies and the remainder in middle-high income emerging markets.</p> | <p>The differences in pre- and post-crises frequency distributions are compared for the level of GDP, growth, unemployment, inflation, private debt, and real estate prices. Advanced and emerging economy episodes are examined both jointly and individually.</p> | <p>Study concludes that private deleveraging is a protracted process that starts 2-3 years after the crisis and lasts about seven years during which GDP growth is lower by about one percent per annum. The magnitude of the deleveraging is comparable to the debt build up prior to the crisis.</p> |
| <p>Reinhart, Rogoff and Savastano (2003)</p> <p>Thresholds for external debt are influenced by a country's repayment and inflation history.</p> | | | |
| <p>Reinhart and Rogoff (2010a)</p> <p>The contemporaneous link between gross public debt, growth and inflation is examined. External debt (public plus private) for emerging markets is also studied.</p> | <p>44 countries-20 advanced and 24 emerging. The sample, subject to data availability span as much as 1790-2009 (depending on the country) and covers 3,700 observations. Post- WWII subsample is also analyzed.</p> | <p>Years (observations) are sorted into 4 buckets, those with debt/GDP 0-30 percent; 30-60; 60-90; and above 90 percent. Basic descriptive statistics are reported for each of the four buckets for advanced and emerging economies separately and for full and post WWII samples.</p> | <p>Evidence of nonlinearities is presented. There is no systematic link between public debt and growth for debt/GDP below 90 percent but the contemporaneous relationship is negative for higher levels of debt. External debt for emerging markets has a lower threshold of 60 percent.</p> |