

Do countries like households face limits on what they can borrow? Yes and no: when countries stop growing they must “payback” their debt at some point the present value of future trade surpluses must be positive (Sachs and Larraine Chapter 6 eq. 6.21). In two period models, all debts are settled in period 2, as if the country dies. In infinite horizon models this borrowing constraint appears as a transversality condition, a constraint the growth of debt that rules out bubbles and/or Ponzi schemes where new borrowing is used to service existing debt and no real investment. However, countries are not households in the sense that they do invest, grow and restructure, we hope forever. As long as nominal GDP increases, nominal debt can increase too: what economists, investors and the IMF care about is the debt to GDP ratio: as sustainable CA or fiscal deficit is one that keeps D/Y from increasing.

- (i) Unlike household heads, countries rarely die (and children can’t sign for their parent’s debt). A country’s income may grow “forever” if it is far from its steady-state potential. If growth is “endogenous” countries can grow forever: U.S. income per person for example has grown about 1.6% annually for 170 years, a 15-fold increase.
- (ii) A *second* important difference is that countries are sovereign entities—this limits the enforcement options of lenders and means countries must be willing to repay their debt. Creditors generally have no recourse (no collateral that can be seized in lieu of payment).¹
- (iii) *Any finally*, developing countries frequently borrow in a foreign currency (“original sin”) so the real exchange rate becomes a key determinate of their ability to pay exposing themselves and borrowers to currency risk, or currency mismatch. This sort of risks makes currency depreciation (monetary policy) a more problem antidote for coping with sudden stops.

This handout addresses the first and third aspects of sovereign borrowing. External debt is *sustainable* if it remains a constant fraction of GDP or exports. If debt does not rise as a share of exports or income, it should remain manageable unless there is a large interest rate shock. Debt ratios D/Y remain constant if debt grows as the same rate as GDP or exports. We use a fixed “steady state” growth rate to derive the trade and current account balance consistent with a stable debt to GDP ratio $d_y = D_t/Y_t$ or the debt to export ratio $d_x = D_t/X_t$. We assume GDP and dollar exports grow at rates g_y or exports, g_x , respectively. If export or GDP or export growth slows, all bets are off. This is how slow growth “causes” a debt crisis. But suppose debt grows at the same rate as GDP, g_y or exports, g_x it as grows along the following path,

$$D_t = (1 + g)D_{t-1} \quad (1)$$

with $g = g_y$ or $g = g_x$ as needed. Since the change in external debt equals the current account deficit,

$$D_t - D_{t-1} = r^* D_{t-1} - TB_t = -CA_t \quad \text{or,} \quad D_t = (1+r) D_{t-1} - TB_t \quad (2)$$

Using (1) we can replace D_{t-1} with $D_t/(1+g_y)$ and then divide by total GDP or Y_t so that (2) becomes,

$$tb_t^y = \left[\frac{(r^* - g_y)}{(1 + g_y)} \right] \bar{d}_t^y \quad (3)$$

where $d_t = D_t/Y_t$ and $tb_t = TB_t/Y_t$. If the real interest rate exceeds GDP growth, the rhs of (3) shows the real “burden” of debt service—the share of GDP that must be allocated to debt service to keep the debt ratio from rising. Adding debt service to this special trade balance yields the sustainable current account balance as a share of GDP (assuming we can also predict real (r^*) and nominal (i^*) world interest rates).

1/ See the footnote on page 3.

If the real rate of interest is lower than the growth rate, a country can run a trade deficit “forever” as the term in brackets is negative. The above analysis ignores the fact that debt is often denominated in foreign currency (“dollars”). Since exports are invoiced in dollars almost everywhere, a simple way to fix this problem is to focus on the debt to export ratio. To find the trade balance which stabilizes the debt to export ratio, divide (2) by exports and find the tb_x that causes debt to grow at the same rate as exports (g_x). Since exports are reported in current dollars, the nominal world interest rate i^* is most appropriate,

$$\bar{d}_t^x \left[\frac{(i^* - g_x)}{(1 + g_x)} \right] = tb_t^x \quad (4)$$

To use equations (3) or (4) to find a sustainable current account deficit, choose a target debt to export or GDP ratio, d^x or d^y and then plug the expected growth and interest rates to find the share of GDP or exports that will have to be dedicated to debt service to maintain a constant debt to GDP or export ratio.

The above discussion of debt to GDP ratios ignores secular changes in the real exchange rate. Because LDCs tend to borrow in foreign currencies and because their real exchange rates tend to appreciate over time (the Balassa-Samuelson effect) real exchange rate changes should not be ignored. Conversely, during financial crises currency depreciation can increase the debt service burden. Starting with the real exchange rate $q_t = e_t P_t^*/P_t$, where e is the nominal exchange rate and P^* and P are foreign and domestic prices respectively, equation (1) becomes,

$$q_t d_t = (1 + g_y) q_{t-1} d_{t-1} \quad (5)$$

where again lower case $d = [(q^*D)/Y]$ that is the debt GDP ratio in local currency and adjusted for changes in domestic and foreign prices P and P^* , where $q = eP^*/P$. Since $q_t/q_{t-1} = (1 + \Delta q_t)$ then (1) can also be written as,

$$D_t = \left[\frac{(1 + g_y)}{(1 + \Delta q_t)} \right] D_{t-1} \quad (6)$$

showing the evolution of debt in local currency terms $\Delta D_t = D_t - D_{t-1} = -CA_t$, we follow the same procedure as before substituting for r^*D_{t-1} in the current account equation. After a little manipulation we have an expression similar to (3) above, except that it includes the evolution of the real exchange rate.

$$tb_t = \left[\frac{(\Delta q_t + r^*(1 + \Delta q_t) - g_y)}{(1 + g_y)} \right] \bar{d}_t \quad (7)$$

where again we set our target debt to GDP level d_t and solve for the requisite trade balance % of GDP, tb_t , that maintains our desired debt to GDP level, allowing for expected changes in the RER and real GDP. Note that if the real exchange rate is constant ($\Delta q_t = 0$) equation (6) reduces to equation (3) above. A sustained real exchange rate appreciation ($\Delta q_t < 0$) allows a country to run a larger current account deficit and still maintain the same debt to GDP level. Of course a depreciation of the real exchange rate raises the trade surplus necessary to maintain a stable debt to GDP level.² A “[sustainable fiscal deficit](#)” keeps public debt as a constant fraction of GDP, replacing the trade balance is replaced by the primary surplus.

² For derivation of a very similar condition see Frenkel and Razin (1996) *Fiscal Policy and Growth in the World Economy* [chapter 17 page 517 equation 17.6](#). Gillis et. al 5th ed. (1996) derive an expression similar to (4) on page 414, equation 15-2.

The RER (q) can even be a factor if the government borrows in dollars. Developing countries can default or request debt relief (as did highly indebted poor countries with HIPC program) or countries use rapid growth of nominal GDP reduce high debt to GDP ratios over time.

Sustainable Debt Questions

SD-1 Suppose target debt export ratio is 2 and export growth has been averaging 11% annually in nominal terms and its average nominal interest rate on external debt is 8% and the target debt to export rate is 2. Using equation (4) compute the trade balance % of exports that will maintain debt at twice the level of exports. Suppose exports are 25% of GDP, what is the sustainable current account deficit as a % of GDP for this country can run consistent with a constant debt to export ratio? A popular rule of thumb is a 3% of GDP current account deficit is fine, but over 5-6% is dangerous (Mexico's current account deficit climbed to 8% in 1994). Does the sustainable CA deficit for this country meet this rule of thumb? How would you argue that this deficit is "safe" or would you? Suppose export growth slowed to 5%-- what would happen to the sustainable current account deficit?

SD-2 Suppose a country has a target debt to GDP ratio of 50% and it has been growing at 4% per year and borrowing at a real (world inflation adjusted) interest rate of 3%. Finally, because the productivity of its tradables sector is growing rapidly, its exchange rate is appreciating at 2% per year ($\Delta q_t = -.02$). Use eq. (6) to compute the trade balance as a % of GDP that maintains its target debt to GDP ratio (50%)? What happens if its growth prospects change and the real exchange rate q_t is expected to depreciate at 2% per annum? Intuitively, why does an appreciation of the RER increase the sustainable current account deficit as % of GDP?

SD-3. What if low growth causes high debt to GDP levels and not vice versa? (one might argue this is what happened to Africa in the 1980s and to the GIPSI's after 2007). How have countries historically escaped very high debt to GDP ratios without formally defaulting (as Argentina did in 2002) see the IMF, WEO, 2013, [Chapter 3](#) The Good, the Bad, and the Ugly: 100 Years of Dealing with Public Debt Overhangs? Hint: The U.S. and Japan and most countries inflate their way out of debt. This is where [Rogoff](#), Krugman, 2009 (Chapter 10) and the IMF agree.

SD-4 Suppose the debt GDP ratio is one and we want to keep it at one. Discuss some values for GDP and export growth that (a) lead to sustainable CA deficits or be justify our 6% danger point rule of thumb.

$$tb_t^y = \left[\frac{(r^* - g_y)}{(1 + g_y)} \right] \bar{d}_t^y \quad (3)$$

$$\bar{d}_t^x \left[\frac{(i^* - g_x)}{(1 + g_x)} \right] = tb_t^x \quad (4)$$

Footnote from first page: 1/ Hence the limit on what countries can borrow may be much below what they can afford to pay. Sovereign credit ratings reflect both countries ability and willingness to pay (hence center right governments may be able to borrow more). During housing crises, some U.S. borrowers who could pay defaulted, "strategically" deciding to "walk away" when the value of the home (collateral) was less than the loan balance (but not in Spain). With countries strategic default is always an option and except for assets held abroad (e.g. Venezuela's PDVSA owns CITGO in the U.S.) An exception is the Libertad, an Argentine Navy sailing ship [seized in Accra by NML Capital in 2012](#).

References:

Abbas, SM Ali, Mr B Akitoby, Mr J R. Andritzky, Mr H Berger, Mr T Komatsuzaki, and J Tyson (2013) [*Dealing with high debt in an era of low growth*](#). No. 13-17. International Monetary Fund, “Its mostly fiscal” [slides](#) type the title into GS to get many pdf versions...

Claessens, S. (1990). [The debt Laffer curve: some estimates](#). *World Development*, 18(12), 1671-1677.

Corsetti, Giancarlo (2012) Austerity too much of a good thing?: [aVoxEU.org ecollection of](#) views by leading economists. Centre for Economic Policy Research, 2012.

Frenkel, Jacob A., Assaf Razin, and Chi-Wa Yuen (1996) Fiscal policies and growth in the world economy. MIT press, [3rd Edition Chapter 17](#)

Krugman, P., 1988, Financing versus forgiving a debt overhang, *Journal of Development Economics* 29.
Krugman, Paul. (1989) [Reducing developing country debt](#), *Revista de Análisis Económico–Economic Analysis Review* 4.2: 3-18.

Sachs, J. (1989) “The debt overhang of developing countries” in Calvo, G. A., Fidlay, R. P., Kouri & De Macedo, J. B. (Eds.), *Debt stabilization and development: Essays in memory of Carlos Diaz-Alejandro* (pp.80-102). Oxford and Cambridge, MA: Blackwell.

Reinhart, Carmen M., and Kenneth S. Rogoff. ["Growth in a Time of Debt."](#) *American Economic Review* 100, no. 2 (2010): 573-78.

http://www.jstor.org/stable/pdf/29729978.pdf?casa_token=b9XFWIJFF6MAAAAA:dJCr5hYzcH2rQNoqJp4NF123Ze9hAQYnjvxjH64JtNWGFMZ0c15tdDILRflmMhzX6iSwD3sBcrpVoP37WCg6SmT0C8tsrK99SKEPIfmTTV7dDH99Zcho

Fiscal Sustainability in theory and practice <http://www.scribd.com/doc/16060559/Fiscal-Sustainability-in-Theory-and-Practice-A-Handbook>

https://www.youtube.com/results?search_query=public+debt+sustainability+1

<https://www.youtube.com/watch?v=xPjJ5fOoCuM>



Debt - Sustainable Or Not? - Real Economy Crash Course

326 views



euronews Business
Published on Sep 18, 2015

Our today's Crash Course is about debt - when it is sustainable, when it becomes unsustainable, and when it is able to destroy a country's economy.



Courses ▾ Programs ▾ Schools & Partners About ▾

Search

Sign In [Register](#)

Home > All Subjects > Economics & Finance > Debt Sustainability Analysis



Debt Sustainability Analysis

What are the tools to assess debt sustainability? How can countries effectively manage their sovereign debt? To answer these questions, this course combines theory with hands-on exercises.



Self-Paced
Starts on April 30, 2018

[Enroll Now](#)

I would like to receive email from The International Monetary Fund and learn about other offerings related to Debt Sustainability Analysis.

About this course

What causes a country's debt to become unsustainable? How do we assess debt sustainability of public and external debt? How can countries manage their debt portfolio?

This online course aims to provide a comprehensive overview of debt sustainability analysis (DSA) and a medium-term debt management strategy framework adopted by the IMF and the World Bank.

Length:	6 weeks
Effort:	6 to 8 hours per week
Price:	FREE Add a Verified Certificate for \$25 USD

<https://www.edx.org/course/debt-sustainability-analysis-imfx-dsax-4>

<http://www.imf.org/en/Publications/WEO/Issues/2016/12/31/Coping-with-High-Debt-and-Sluggish-Growth>

WORLD ECONOMIC OUTLOOK

World Economic Outlook
Database

 OCTOBER 2012


Data Tools

IMF Data

[русский](#) [中文](#) [español](#) [العربية](#) [日本語](#) [fran](#)

WORLD ECONOMIC OUTLOOK

Coping with High Debt and Sluggish Growth

October 2012

The October 2012 World Economic Outlook (WEO) assesses the prospects for the global recovery in light of such risks as the ongoing euro area crisis and the 'fiscal cliff' facing U.S. policymakers. Reducing the risks to the medium-term outlook implies reducing public debt in the major advanced economies, and Chapter 3 explores 100



Download
Full Text

[Dealing with Debt in an era of low Growth](#)

<https://ftalphaville.ft.com/2012/10/09/1199151/its-austerity-multiplier-failure/>

[Fiscal Policies and Growth in the World Economy - 3rd Edition Chapter 17](#)

Jacob A. Frenkel, Assaf Razin

[Austerity too much of a good thing> VOXEU book](#)

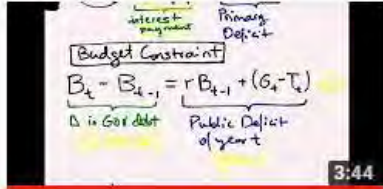
[Has Austerity gone too far?](#)

There are actually 4 in this series, but you only need the first or 2nd (if any)

https://www.youtube.com/results?search_query=public+debt+sustainability+1

https://www.youtube.com/results?search_query=public+debt+sustainability+1

Not the last video below asks what if China owns our debt? This is the issue Krugman address in his 2013 presentation: a loss of confidence benefits the U.S. (not China) because the dollar depreciates against the renembi , which is what happened and may happen even more..



Public Debt Sustainability

Understand Economics @Berkeley • 2.4K views • 4 years ago

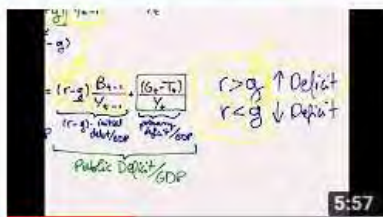
In this video you will learn the basics about how the government can sustain (or even repay) its **debt**.



Book Launch: Restoring Public Debt Sustainability

WoodrowWilsonCenter • 98 views • 3 years ago

Restoring **Public Debt Sustainability**, the Role of Independent Fiscal Institutions (Oxford University Press) represents the first



Public Debt Sustainability 3

Understand Economics @Berkeley • 976 views • 4 years ago

Now we see what happens when we develop the constraint for the **debt** to GDP ratio, the measure of **debt** that is mostly used in



Debt Sustainability Analysis | IMFx on edX | About Video

edX • 7.7K views • 3 years ago

Debt Sustainability Analysis What are the tools to assess **debt sustainability**? How can countries effectively manage their sovereign

CC



Debt - Sustainable Or Not? - Real Economy Crash Course

euronews Business • 317 views • 2 years ago

Our today's Crash Course is about **debt** - when it is **sustainable**, when it becomes unsustainable, and when it is able to destroy a



Foreign Held Public Debt and Fiscal Sustainability: Is "China" Owning the "US"?

Modern Money Theory, Videos from L&C Students • 983 views • 2 years ago

In this video you will learn: - why foreign ownership of US **debt** is not more of a concern than domestic ownership in terms of ability to



GOVERNMENT



Why A Hedge Fund Seized An Argentine Navy Ship In Ghana

October 22, 2012 · 10:13 AM ET

JACOB GOLDSTEIN



Inflation is Now the Lesser Evil

Dec 2, 2008 **KENNETH ROGOFF** It is time for the world's major central banks to acknowledge that a short burst of moderate inflation would be extremely helpful in unwinding today's epic debt morass. It may not be fair, but fear of inflation, when viewed in the context of a possible global depression, is like worrying about getting the measles when one is in danger of getting the plague.

<https://www.project-syndicate.org/commentary/inflation-is-now-the-lesser-evil?barrier=accessreg>

