

## GROWTH-LINKED BONDS

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### Introduction

There is growing recognition of the need for more stable capital flows to help moderate the boom-bust patterns of capital flows that are so disruptive for the real economy and can cause such costly financial crises. Indeed, the major European debt crisis has, to a great extent, been preceded by very large capital flows, showing that this is not just a major concern for developing and emerging economies, but also for their developed counterparts. It is, in fact, surprising how little emphasis has been placed on the role that capital flows, mainly within Europe, have played in causing the Eurozone debt crisis. More generally, a major challenge for both developed and developing countries is to ensure that both national and international financial systems are more stable. It is therefore very important to develop instruments that can in concrete terms diminish this boom-bust pattern. Growth-linked bonds are an excellent example of such a market-based instrument.

### Context for growth-linked bonds

The global financial crisis focused attention on instruments that would allow countries to minimize the risks associated with increasing capital flows. The idea of a growth-linked instrument is not new. A first wave of interest in indexing debt to GDP (Gross Domestic Product) emerged in the 1980s and received fresh impetus after frequent debt and currency crises in many developing countries. The idea was supported by economists such as John Williamson (2005), Robert Shiller (1993; 2005), Eduardo Borenstein and Paolo Mauro (2004) at the

IMF, as well as at the US Council of Economic Advisers (CEA 2004). At the United Nations, one of the authors of this paper coauthored a study (Griffith-Jones and Sharma 2009).

It would be ideal for governments to issue growth-linked securities in a precautionary manner when their macro-economic fundamentals are strong and investors are keen to invest in their bonds. At such a moment any novelty premium of the new instrument would be relatively low. The problem is that in good times, governments have less incentive to issue such bonds, as they see downturns or crises as unlikely, especially during their mandate. GDP-indexed debt has to date only been issued to a limited extent and mainly by countries that were having difficulties in servicing their debts. However, the global financial crisis, as well as so many preceding ones, made the case for these bonds far stronger.

### *The advantages of GDP-indexed bonds*

GDP-indexed bonds offer two major benefits to borrowers: firstly, they stabilize government spending and limit the pro-cyclicality of fiscal pressures by requiring smaller interest payments at times of slower or negative growth, providing space for higher spending or lower taxes. On the other hand, when the economy is growing more, debt service goes up, encouraging governments to spend less or tax more in “good times”, thus discouraging overheating.

Secondly, by allowing debt-service ratios to fall in times of slow or negative growth, GDP-indexed bonds reduce the likelihood of defaults and debt crises which are so costly, both in terms of lost economic growth, investment and employment, as well as in financial terms (massive bail-outs, both domestically and internationally).

Investors would probably stand to benefit from the introduction of GDP-indexed bonds in two main ways. Firstly, the bonds would provide an opportunity for investors to take a position on countries’ future growth prospects, offering them equity-like exposure to a country or a number of countries and thus providing a diversification opportunity. If GDP-linked bonds were to become widespread across countries, investors could



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take a position on growth worldwide – the ultimate risk diversification.

The second main benefit for investors from GDP-indexed bonds would be a lower frequency of defaults and financial crises, which often result in costly renegotiation, and sometimes in outright large losses.

On an international scale, GDP-indexed bonds can be viewed as desirable vehicles for international risk-sharing and as a way of avoiding the disruptions arising from formal default. They can be said to have the characteristics of a public good in that they generate systemic benefits over and above those accruing to individual investors and countries. By reducing the likelihood of defaults, these instruments would benefit a broader range of investors than those directly affected, as well as the economies and multilateral institutions that may have to finance bail-out packages.

#### Variations on growth-linked securities

Robert Shiller (1993) proposed what will be referred to as a “Shiller security” as one of several new instruments intended to offer investors a broader range of investment possibilities. This security would represent a permanent fraction of the issuer country’s nominal GDP. It could pay, for example, one-trillionth of a nation’s nominal GDP, leading Shiller to propose the name “trill” for this security (Kamstra and Shiller 2009).

A second variant was suggested by Eduardo Borensztein and Paul Mauro (2004). A “Borensztein/Mauro security” would be very similar to a standard bond, but would pay an interest rate that would vary proportionately with the issuer country’s real growth rate. This bond would pay, for example, one percent of additional interest for each one percent of growth above expectations, and one percent less interest for each one percent of growth below expectations.

A third variant was suggested by Daniel Schydrowsky at a meeting at the United Nations in 2005 convened by one of the authors of this article, Stephany Griffith-Jones. This security would make payments just as the Borensztein/Mauro security, but the difference between this proposed payment and the payment that would occur under a conventional bond would be added or subtracted from the principal, and therefore from the country’s debt.

The different design and structure of growth-linked bonds have distinct practical implications for their servicing. Firstly, the Shiller security is the only security that indexes for inflation. Secondly, changes in real growth rate have varying effects on the payments of the different securities. An increase in the real growth rate has no effect on the payment of the Shiller security in the short run, but the value of the security increases in the long run, implying higher servicing payments. On the other hand, a higher growth rate implies higher servicing of the Borensztein/Mauro security in the short run, but the value of the principal would be unaffected. Under the Schydrowsky variant, interest payments would increase in the short run, but the country’s debt would be decreased in the long run. The Borensztein/Mauro security would be the most effective in providing fiscal stabilization benefits and in reducing the risk of debt default.

#### Possible problems

One potential problem is moral hazard. It has been argued that, by increasing debt repayments in case GDP growth is higher than normal, such bonds might reduce debtors’ incentives to grow. This concern is exaggerated, however, as it does not make political sense for governments to ever want to limit or underreport growth. Moreover, it would be difficult to substantially underreport growth for extended periods of time.

Revisions of GDP data, especially those resulting from modifications of the structure of national income estimates reflecting the changing structure of the economy, may, however, cause concerns. A rigorous analysis of historical GDP revisions published in the IMF International Financial Statistics Yearbooks of 1983 until 2006 for some 66 countries (conducted by John Williamson and Dagmar Hertova, in Williamson 2008) found that the vast majority of GDP revisions were small adjustments. However, the analysis showed 41 apparent non-routine adjustments to real GDP in 38 countries (out of 740 observations) between 1981 and 2000 (the years with adequate data).

The problem of such GDP revisions could be addressed by either specifying a consistent formula for measuring GDP in the contract of the bonds, by adding the excess GDP to the old formula, or by simply allowing payments to reflect the impact of any revisions (Williamson 2008).

Experience with growth-linked securities has highlighted the fear that their counter-cyclical element may be

limited by lags in publication of GDP data. In the case of both the Argentine and Greek warrants discussed below, payment in a given year is based on the growth reported in the previous year. The fear is that this lag in payment may imply a pro-cyclical effect rather than the intended counter-cyclical effect. Indeed, research suggests that were half of sovereign debt of Colombia and Malaysia to have been swapped for Borensztein/Mauro-type securities, such bonds would have had substantial countercyclical benefits for the issuing countries were growth rates measured semi-annually and payments lagged six months after the reporting period, but not if paid after one year (Hertova 2006).

**Recent experiences**

**Argentine GDP-linked securities**

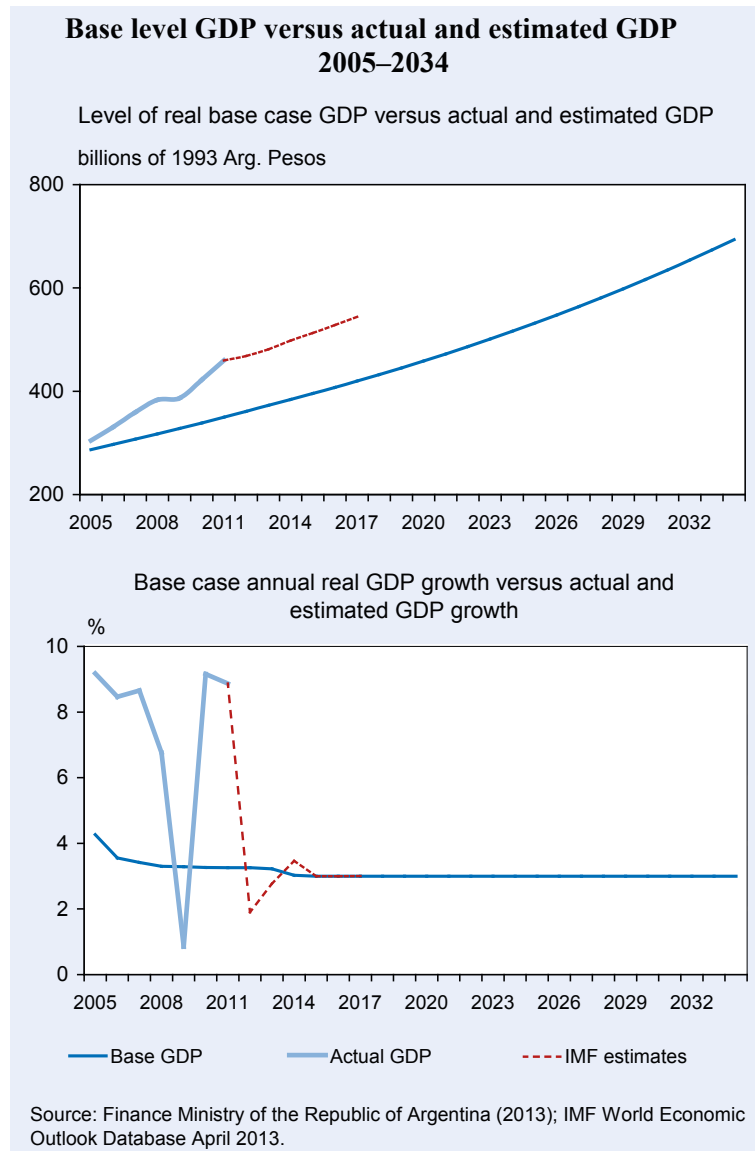
GDP-linked securities (warrants) worth 62 billion US dollars were included in the Argentine debt restructuring package in 2005 that aimed to exchange USD 82 billion in bonds on which the country had defaulted. More GDP-linked securities were issued as part of the 2010 restructuring for creditors who rejected the 2005 offering.

Initially, the GDP-linked warrants were viewed by Argentina’s creditors, as well as by the financial markets, as having very little value (Griffith-Jones and Sharma 2009), so they represented little gain for the country. However, thanks to the country’s booming growth in the following years, the warrants substantially outperformed expectations and their prices soared.

Payments are made to the holders of the Argentine GDP-linked warrants on December 15 of each year, starting in 2006, under the following conditions:<sup>3</sup>

<sup>3</sup> Republic of Argentina, Prospectus Supplement (to Prospectus dated December 27, 2004), January 10, 2005. [www.mecon.gov.ar/finanzas/sfinan/english/download/us\\_prospectus\\_and\\_prospectus\\_supplement.pdf](http://www.mecon.gov.ar/finanzas/sfinan/english/download/us_prospectus_and_prospectus_supplement.pdf) (accessed July 28, 2012).

**Figure 1**



- Real GDP exceeds base-case GDP.
- Real annual GDP growth exceeds base-case GDP growth. The threshold for real GDP growth starts at 4.26 percent for 2005, gradually falling to three percent for 2015 and onward.
- Total payments on the warrants do not exceed the payment cap, which has been set at 0.48 per unit of currency of the warrants. The warrants will expire no later than 2035, but if the payment cap has been reached prior to this date, the warrant will expire at that point.

When the above conditions are met, the government will make a payment as follows:

$$\text{Payment} = ((0.05 * \text{excess GDP}) * \text{unit of currency coefficient} * \text{notional value of GDP-linked securities}),$$

where *excess GDP* is the amount by which actual GDP exceeds the base-case GDP. Given a lag in publishing GDP data, the payment based on the GDP performance in a given year is paid at the end of the following year.

An important feature of the warrants is that the payment is not in itself based on GDP growth, but rather on the level of GDP. Since Argentina grew rapidly in the years following the debt exchange (Figure 1), the base GDP level was exceeded early, resulting in high payments on the warrants. High early growth also means that the level of GDP is more likely to stay above the base level, increasing the chance of future payments and their amount, thus raising the value of the warrant.

As a result, payments on the warrants have proved very costly for Argentina, rising from a total of USD 395 million in 2006 to USD 3.5 billion at the end of 2012 (Table 1). The government did not make any payment in 2010, as growth in the previous year was below the threshold. However, the missed payment in 2010 was effectively made up for in 2011.

It is clear that the GDP-linked securities are starting to be a burden for the Argentine government and economy. The payments represented 0.74 percent of Argentine GDP and 4.5 percent of exports in 2012, compared to just 0.19 percent and 0.85 percent in 2006, respectively. By 2012, the payments represented more than 30 percent of the total servicing of interest on public sector debt (Table 1). Overall, Argentina had paid out almost

USD 10 billion on the warrants as of end-2012. Given that the total cap on payments has been set at 48 percent of the value of the securities, Argentina has already paid around a third of its total GDP warrants payments within the first seven years.

In 2012, the economy grew by just 1.9 percent, which is below the 3.26 percent threshold, thus saving the country some USD four billion in payments on the warrants. Given current GDP projections, payments for the warrants in 2014 and 2015 would not happen. Growth would need to be above roughly three percent to trigger the payments (Figure 1).

### Greek GDP-linked securities

In February 2012, Greece issued GDP-linked securities as part of its large scale debt reduction and restructuring as well as new money package from the European Union and the IMF. In total, EUR 172 billion of Greek private debt was swapped in the deal, and participating holders received detachable GDP-linked securities.<sup>4</sup>

The securities will provide an annual payment on October 15 of every year starting in 2015 until 2042 under the following conditions (Morgan Stanley 2012):

- Nominal GDP equals or exceeds the reference nominal GDP.
- Real GDP growth is positive and in excess of specified targets. Based on the set levels of reference for GDP levels, the threshold for real GDP growth starts at

<sup>4</sup> Ministry of Finance of Greece. PSI Launch Press Release, February 21, 2012. [www.minfin.gr/portal/en/resource/contentObject/id/7ad6442f-1777-4d02-80fb-91191c606664](http://www.minfin.gr/portal/en/resource/contentObject/id/7ad6442f-1777-4d02-80fb-91191c606664) (accessed July 28, 2012).

**Table 1**

#### Total GDP-linked securities payments, Argentina

	2005	2006	2007	2008	2009	2010	2011	2012
Payment on GDP-linked warrants								
USD billions	..	0.395	0.812	0.996	1.416	0	2.481	3.536
As % of total servicing of interest on public sector debt	..	10.5	15.6	24.8	22.1	0	30	34.2
As % of GDP	..	0.19	0.31	0.31	0.46	0.00	0.56	0.74
As % of exports	..	0.85	1.45	1.42	2.54	0.00	2.96	4.50
GDP growth (%)	9.18	8.47	8.65	6.76	0.85	9.16	8.87	1.90
Fiscal balance (% of GDP)	-1.69	-0.97	-2.11	-0.85	-3.61	-1.36	-3.47	-4.31
Primary fiscal balance (% of GDP)	4.53	4.11	2.45	2.72	0.21	1.59	-0.47	-0.94

Source: Authors' calculations using data from Ministry of Finance of the Republic of Argentina, Instituto Nacional de Estadística y Censos (INDEC), Central Bank of Argentina and IMF *World Economic Outlook* (WEO) Database April 2013 Database.

2.9 percent for 2015, and falls to two percent from 2021.

- Each annual payment will not exceed one percent of the notional value of the bonds.

If the above conditions are met, the government will make a payment as follows:

*Payment = (1.5 \* (real GDP growth rate – reference real GDP growth rate)) \* notional value of the GDP-linked securities.*

As in the case of Argentina, payment based on growth in a given year will be made the following year.

### ***Differences between Argentine and Greek GDP-linked securities***

Structural differences between the Greek and Argentine warrants imply differences in the payout. While the annual payment cap of one percent of the value of the Greek warrants limits that country's obligations (a very positive feature, given the country's huge debt overhang), it may not be so attractive to investors. On the other hand, the Argentine analysis has shown that while the GDP-linked warrants have been a very attractive investment, they have recently become a large burden for the government. In addition, the payments on Argentine warrants were made in the early stages of the warrants' maturity and any payment missed in any given year due to slow growth would be made up further out in the stream of payments. Any missed payment in the case of the Greek warrants, on the other hand, would be "lost" to the investors and creditors as it would be based on real growth in the preceding year, as well as "gained" for the country (Barclays Capital 2012). This difference has important implications for both creditors and debtors.

Given Greece's bleak economic situation and weak future prospects, will the Greek GDP-linked securities lead to significant payments? This remains to be seen. At the moment markets and investors are attaching little value to the Greek warrants and do not expect them to be as valuable as the Argentine warrants (Barclays Capital 2012; Whittall 2012). The Greek warrants seem to have been better designed from the debtor country's perspective. Unfortunately, growth prospects in the short term look weak for Greece, so large payments seem unlikely in the near future. On the other hand, because Greece has seen such a large decline in GDP, it may see a rebound of growth, which could generate

warrant payments that may not be desirable at a time of fragile and highly needed recovery.

### **Conclusions and policy suggestions**

As we have argued, it would be most desirable for countries to issue GDP-linked securities in normal times. Issuing GDP-linked warrants as part of a debt restructuring process, as Argentina and Greece have done, can be costly from the debtor perspective and may not attract much attention from investors and creditors at the time of the restructuring, who tend to undervalue the future benefits of those warrants.

If the advantages of issuing GDP-indexed bonds in normal times can be significant, as suggested above, why have financial markets not yet adopted them? A key point is that the system-wide benefits provided by these instruments are greater than those realized by individual investors. Hence, there are externalities that do not enter the considerations of individual financial institutions or even countries. Other factors that discourage beneficial financial innovation include the fact that the markets for new instruments may be illiquid. A concerted effort is therefore needed to achieve and ensure a critical mass so as to attain market liquidity. Related to this are coordination problems, whereby a large number of countries have to issue a new instrument in order for investors to be able to diversify risk.

There is consequently a clear case for involving multilateral institutions. Concretely, multilateral or regional development banks could play an active role as "market makers" for GDP-linked bonds. They could begin by developing a portfolio of loans, the repayments on which could be indexed to the growth rate of the debtor country. Once the institutions have a portfolio of such loans to different developing countries, they could securitize and sell them on the international capital markets. Such a portfolio of loans could be particularly attractive for private investors, as it would offer them the opportunity to take a position on the growth prospects of a number of economies simultaneously. As correlations among growth rates tend to be lower at the global level, the World Bank may be best placed to perform such securitization. However, regional development banks, such as the European Investment Bank, which lends to both developed and developing countries, could play a role. Alternatively, the multilateral development banks could buy GDP-linked bonds that developing countries would issue via private placements.

It is important that the design of these growth-linked securities would be simple, well thought through, and, ideally, standardized. Again, public international institutions could play an important role.

## References

Barclays Capital (2012), “Greek PSI 2: Valuation and Timeline”, *Interest Rates Research*, 24 February, [www.scribd.com/doc/84986988/Barclays-Capital-GREEK-PSI-2](http://www.scribd.com/doc/84986988/Barclays-Capital-GREEK-PSI-2) (accessed 22 June 2013).

Borenstein, E. and P. Mauro (2004), “The Case for GDP-indexed Bonds”, *Economic Policy* 19 (38), 166–216.

CEA (Council of Economic Advisers) (2004), *GDP-Indexed Bonds: A Primer*, Council of Economic Advisers, Washington D.C.

Central Bank of Argentina (2013), [http://www.bcra.gov.ar/index\\_i.htm](http://www.bcra.gov.ar/index_i.htm) (accessed 22 June 2013).

Finance Ministry of the Republic of Argentina (2013), <http://www.mecon.gov.ar/peconomica/basehome/infoeco.html> (accessed 22 June 2013).

Griffith-Jones, S., and K. Sharma (2009), “GDP-Indexed Bonds: Making it Happen”, in S. Ketkar and D. Ratha, eds., *Innovative Financing for Development*, World Bank, Washington D.C.

Hertova, D. (2006), Fiscal Implications of GDP-linked Bonds, August.

IMF (2013), World Economic Outlook Database April 2013, <http://www.imf.org/external/pubs/ft/weo/2013/01/weodata/index.aspx> (accessed 22 June 2013).

JP Morgan (2012), “Argentina Economic Outlook: Deep Inside of a Parallel Universe...”, Emerging Markets Research, June, <http://quantfinanceclub.com/wp-content/uploads/2012/06/Argentina-research-June-2012.pdf> (accessed 28 July 2012).

Instituto Nacional de Estadística y Censos (INDEC) (2013), <http://www.indec.gov.ar/> (accessed 22 June 2013).

Kamstra, M., and R. J. Shiller (2009), “The Case For Trills: Giving The People and Their Pension Funds a Stake in the Wealth of the Nation”, *Cowles Foundation Discussion Paper* no. 1717, Yale University, New Haven, CT.

Ministry of Finance of the Republic of Argentina (2005, 2006, 2008, 2009, 2011, 2012), Argentina anuncia el calculo del excedente disponible de pbi en relación con los pagos por las unidades ligadas al pbi emitidas en el canje de deuda de junio de 2005, [http://www.mecon.gov.ar/finanzas/sfinan/?page\\_id=47](http://www.mecon.gov.ar/finanzas/sfinan/?page_id=47) (accessed 22 June 2013).

Morgan Stanley (2012), Greece: Trading After the PSI, 8 March, [http://linkback.morganstanley.com/web/sendlink/webapp/BMServlet?file=bonq7288-3ob9-g000-85a7-001a64f36000&store=0&d=UwBSZXNlYXJjaAA0MTIzNDA%3D&user=nd54zuh9cp-268&\\_\\_gda\\_\\_=1457382936\\_5fb99d9fa43eb48efd58fc760ec9e45c](http://linkback.morganstanley.com/web/sendlink/webapp/BMServlet?file=bonq7288-3ob9-g000-85a7-001a64f36000&store=0&d=UwBSZXNlYXJjaAA0MTIzNDA%3D&user=nd54zuh9cp-268&__gda__=1457382936_5fb99d9fa43eb48efd58fc760ec9e45c), (accessed 22 June 2013).

Shiller, R. J. (1993), *Macro Markets: Creating Institutions for Managing Society's Largest Economic Risks*, Clarendon Press, Oxford.

Shiller, R. J. (2005), “In Favor of Growth-Linked Bonds”, *The Indian Express*, 10 March.

Williamson, J. (2005), *Curbing the Boom-Bust Cycle: Stabilizing Capital Flows to Emerging Markets*, Peterson Institute for International Economics, Washington D.C.

Williamson, J. (2008), “Is There a Role for Growth-linked Securities?”, *Mimeo*, 15 April.

Whittall, C. (2012), “Investors Eye GDP Warrants Dubiously”, *International Financing Review* no. 1922, 26 February to 2 March, [www.ifre.com/investors-eye-gdp-warrants-dubiously/21001925.article](http://www.ifre.com/investors-eye-gdp-warrants-dubiously/21001925.article) (accessed 22 June 2013).