7

Growth-Linked Securities

STEPHANY GRIFFITH-JONES AND DAGMAR HERTOVA

Though this chapter is focused on GDP-linked securities—and John Williamson's contribution to the discussion of this potentially valuable instrument—it must be placed in a broader context of countercyclical policies and mechanisms. John shared this concern with several of us (but, alas, not with most economists) about the need for more stable capital flows, increasingly broadened now to the need for more stable national and international financial systems. We can see two great strengths of John's contributions: first is the focus on broad analytical and theoretical issues—in this case the need to stabilize the boom and bust of capital flows to emerging economies; and second is the attention to detailed policy proposals that could help deal with the issues raised, including the design of GDP-linked securities to help stabilize capital flows.

While much thought has been given to flows to developing economies, we see now that such mechanisms would have been equally or even more relevant for lending to developed countries. Indeed, it is interesting when analyzing the euro area crisis to note how little emphasis there has been on the role that capital flows played in causing it. In addition, the US government would have benefited from issuing GDP-linked securities, as this would have lowered debt service in difficult times. But when John and one of us (Griffith-Jones) raised

Stephany Griffith-Jones is the financial markets director of the Initiative for Policy Dialogue at Columbia University in New York and associate fellow at the Overseas Development Institute. Dagmar Hertova is an economist at the Development Policy and Analysis Division of the Department of Economic and Social Affairs at the United Nations in New York. *The authors thank Jorge Carrera and Guillermo Mondino for providing estimates on Argentine GDP-linked warrants. Thanks go as well to Paolo Mauro for insightful comments on an early version of the paper presented at the organizational meeting for this volume in April 2012. The authors also thank Edward Griffith-Jones for excellent research assistance.*

this possibility with the US Treasury before the subprime crisis, we got a rather cold reception.

So how did John Williamson conceptualize the problem of curbing the cycle of booms and busts? This is most clearly shown in Williamson (2005):

> If one goes back in history, one finds that these (the Latin American and East Asian crises) are only the most recent of a succession of booms in lending to emerging markets that have given way to busts that impoverished both those who lent money and those who borrowed from them....
>
> In recent years, the flow of foreign capital has become the prime driver of the business cycle in a number of emerging markets, especially in Latin America. That the process is driven primarily by variations in the availability of foreign capital rather than by developments in the host countries seems strongly indicated by the large size of the variations in the overall flow.... It seems that, as José Antonio Ocampo (2003) has emphasized, the variations in capital flows are driven primarily by changes in risk evaluation. When foreign investors develop an appetite for risk (Ocampo points out that this should more properly be called an underestimation of risk), there is a boom in capital flows; the bust is marked by a flight to quality (risk aversion).
>
> External financing crises are far from being a novel feature of the international financial system: they have recurred at various times during the past two centuries.... The issue that is addressed in this study is whether it has to be this way or whether feasible policy actions could curb the sequence of boom and bust and thus permit both investors and emerging markets to tap the potential benefits of capital mobility without the costs of the crises that have so often ensued. (Williamson 2005, 2)

In the same book, John outlines the historical sequence:

> The Bretton Woods years were the only lengthy period since the birth of capitalism in Holland in the 17th century that lacked major banking or debt crises. The Bretton Woods years were also, not coincidentally, the period when financial repression was practically ubiquitous. The end of that period was heralded by Carlos Diaz-Alejandro, who presciently titled a 1984 paper on the debt crisis, *Goodbye Financial Repression, Hello Financial Crash.* (Williamson 2005, 4)

Finally, the policy implications John draws from these historical trends are clear and prescient:

> The process of financial liberalization needs to be approached with a great deal of caution and with a lot of care to install an effective system of prudential supervision that will deter bankers from acting in the interests of their cronies rather than their ostensible principals, depositors, and shareholders. (Williamson 2005, 5)

John then develops in his 2005 study a range of policy actions for debtors, creditors, and the international community to try to curb the boom-bust cycle of capital flows. He stresses that some of the actions that would seem most

likely to be effective would require the agreement of the general international community, including the source countries, to change the international rules of the game. The emphasis on source countries and on international action seems particularly important to us (one of us had been working on these issues for a long time, with very limited company from other economists). Griffith-Jones (1998, 171) described the "need for measures to be taken by source countries to discourage excessive surges of easily reversible capital inflows to emerging countries' capital flows from the source countries."

John's proposals to try to curb the boom-bust pattern of capital flows include a range of measures, such as forward-looking (or countercyclical) banking provisions and capital controls by emerging countries, which he stresses could be particularly effective. He also emphasizes measures such as GDP-linked securities and local currency bonds. Again, here John was well ahead of the curve. Very few economists before the global financial crisis starting in 2007 argued for countercyclical provisions. That short list included José Antonio Ocampo and Bank for International Settlements economists Claudio Borio and Phillip Turner (Griffith-Jones and Ocampo 2008). Now of course countercyclical regulation is very mainstream. Similarly, on capital controls, John was clear on their potential important net benefits as a tool to deal with volatile capital flows, provided countries followed good macroeconomic policies. Today this position is also much more accepted, with the International Monetary Fund (IMF), for example, quite clearly arguing that capital controls may be a valuable instrument if surges of capital are significant.

In summary, John's contribution to the broad subject of curbing boom-bust cycles was important and prescient. He was often ahead of the curve and even swam against the tide. In rereading carefully his excellent 2005 text, we found only one disagreement, though this does benefit in part from hindsight. John writes:

> Some cyclical fluctuations seem to be an inherent feature of the financial markets of capitalist economies, but their relatively benign form in the industrial countries in the 60 years since World War II demonstrates that they do not have to be as destructive as they have been in the emerging markets. The action program that has been developed in this study is intended to facilitate a process of financial maturing similar to the one that has already occurred in the industrial countries. (Williamson 2005, 115)

Our disagreement is with the final sentence, because we now know that underregulated financial markets can be as, if not more, disruptive in developed countries as in developing countries, and that the latter should not aspire to "mature" to financial sectors similar to developed ones. On the contrary, developing countries need to rethink carefully how they can shape their financial sectors and regulation to serve the needs of their economies and avoid costly crises. The challenge is even deeper for the developed countries, having just endured major crises. The instrument we now discuss—GDP-linked securities—could be valuable for both developed and developing countries.

Overview of Growth-Linked Securities

The present global economic and financial crisis has focused attention on policies and instruments that would allow countries to manage and minimize the risks associated with increasing international financial integration. In light of this, there have been a variety of ideas and proposals put forth relating to innovative financial instruments. Some of these proposals have been put into practice, albeit to a limited degree and under special circumstances.

The idea of GDP-linked bonds falls into this category. The proposal for such an instrument is not new, and a first wave of interest in indexing debt to GDP emerged in the 1980s, propounded by economists such as John Williamson (2005). The practice has been encouraged by economists such as Robert Shiller (1993, 2005),[1] Eduardo Borensztein and Paolo Mauro (2004) at the IMF, and the US Council of Economic Advisers (CEA 2004). At the United Nations, one of us coauthored a study (Griffith-Jones and Sharma 2009) and organized a series of meetings to promote the idea. John Williamson was a key and valued supporter of this endeavor.

Though the idea of GDP-indexed debt has so far been implemented only to a limited extent—and unfortunately only by countries that were having difficulties in servicing their debts—it received new impetus after the wave of debt crises in a number of developing countries in the 1990s. In particular, GDP-indexed bonds have attracted discussion in recent years, since a variant of this instrument played a role in Argentina's debt restructuring (see below).

A key point is that it would be ideal for governments to issue growth-linked securities in a precautionary way when their macroeconomic fundamentals are strong and investors are keen to invest in their bonds. At such a moment any novelty premium 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. However, the global financial crisis, as well as all preceding ones, have made the case for these bonds far stronger.

The Benefits of GDP-Indexed Bonds

The introduction of GDP-indexed bonds could have a number of benefits for borrowing countries and investors, as well as broader benefits for the global economy and financial system. Those benefits are detailed in the following sections.

1. Shiller proposed the creation of "macro markets" for GDP-linked securities that were to be perpetual claims on a fraction of a country's GDP.

Gains for Borrowing Countries

GDP-indexed bonds provide two major benefits to borrowers: First, they stabilize government spending and limit the procyclicality of fiscal pressures by requiring smaller interest payments at times of slower growth, providing space for higher spending or lower taxes, and vice versa. This runs counter to the actual experience of borrowing countries often forced to undertake fiscal retrenchment during periods of slow growth. The bonds could also curb excessively expansionary fiscal policy in times of rapid growth.

Second, 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. Crises are extremely costly, both in terms of growth and production and in financial terms. The extent of this benefit is of course determined by the share of debt that is indexed to GDP.

Simulations show that the gains for borrowers can be substantial. If half of Mexico's total government debt had consisted of GDP-indexed bonds, it would have saved about 1.6 percent of GDP in interest payments during the 1994–95 financial crisis (Borensztein and Mauro 2004). These additional resources would have provided the government with space to avoid sharp spending cuts, and might even have provided some leeway for additional spending that could have mitigated some of the worst effects of the crisis. Countries experiencing volatile growth and high levels of indebtedness, and particularly those undergoing debt restructuring, find GDP-indexed bonds particularly attractive.

Gains for Investors

Investors would likely receive two main benefits from the introduction of GDP-indexed bonds. First, 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. Though this is made possible to some degree through stock markets, such opportunities are often not representative of the economy as a whole. In this respect, GDP-indexed bonds would also provide a diversification opportunity, for example by giving investors in countries or regions with low growth rates an opportunity to have a stake in countries with higher growth rates. Moreover, since growth rates across countries tend to be uncorrelated to some extent, a portfolio including GDP-indexed bonds for several economies would have the benefits of diversification, thus increasing the ratio of returns to risks. If GDP-linked bonds were to become widespread across countries, investors could 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 litigation and renegotiation and sometimes in outright large losses.

Broader Benefits to the Global Economy and Financial System

On a larger 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. For example, by reducing the likelihood of a default by the borrowing country, these instruments would benefit not just their holders but also the broader categories of investors, including those who hold plain vanilla bonds. Similarly, the benefits of a lesser likelihood of financial crises extend to those countries that may be affected by contagion as well as to economies and multilateral institutions that may have to finance bailout packages. As elaborated below, these externalities provide an additional compelling explanation of why it is not sufficient to expect markets to develop these instruments on their own, which indeed they have not. Rather, there exists a justification for the international community, using public international institutions and especially the multilateral and regional development banks, to coordinate efforts to achieve such an end.

John Williamson's Important Contributions to Growth-Linked Securities

Besides John Williamson's pioneering role in advocating the use of GDP-linked bonds as a valuable instrument, he has made several more specific contributions, especially in his 2008 paper entitled *Is There a Role for Growth-Linked Securities?* (Williamson 2008).

Analysis of Variants of Growth-Linked Securities

John has strongly emphasized that the distinct implications of the different structures of growth-linked securities have yet to be recognized. Here we present the main variants of growth-linked securities and John's analysis of the difference between them (without going into as much detail as he did).

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 kind of security (Kamstra and Shiller 2009).

A second variant was suggested by Borensztein and 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. Take, for example, a country that, based on past experience, is expected to grow at an annual rate of 3 percent and can issue conventional bonds with fixed annual interest payments of 10 percent. A

Borensztein-Mauro security would pay 1 percent of additional interest for each 1 percent of growth above expectations, and 1 percent less interest for each 1 percent of growth below expectations. If the economy grows at 5 percent, then the payment would increase to 12 percent; and with growth of 2 percent the security would pay 9 percent.

A third variant was suggested by Daniel Schydlowsky at a meeting at the United Nations in 2005 convened by one of us, and where John Williamson was a speaker.[2] 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, rather than being transferred between the debtor and creditor. Using the example above, when the economy grows at 5 percent, the extra 2 percent in payment would be subtracted from the country's debt. In this case, the debtor country would still benefit from the countercyclical element of the growth-linked security, but its debt would be decreased if it were to grow above the threshold and vice versa.

Having described the proposed variants, Williamson (2008) turns to analyzing the effects of varying economic performance on the debt-servicing of these securities. It is clear that there are substantive and economically significant differences between the three variants. First, the Shiller security is the only one that indexes for inflation, although it would be relatively easy to adjust the other two variants to do so.

Second, 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 Schiller security in the short run. In the long run, thanks to capital appreciation, the value of the security increases and implies 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 Schydlowsky variant, interest payments would increase in the short run but the country's debt would be decreased in the long run. It is evident that the Borensztein-Mauro security would be the most effective in providing fiscal stabilization benefits and in reducing the risk of debt default.

Potential Role of Muslim Investors

John Williamson argues that growth-linked bonds could be very attractive for Muslim investors "because they do not imply the payment of a fixed rate of interest irrespective of the ability to pay of the debtor, [and] one can hope that sharia law will take a benign view of such instruments" (Williamson 2008, 10). According to John, four criteria are described by Islamic law for financial instruments to be deemed "Islamic." First, financial assets should avoid *riba*,

2. GDP-Indexed Bonds: Making It Happen, New York, October 31, 2005.

meaning interest payments. Since growth-linked securities offer the opportunity to avoid conventional interest payments, while earning a competitive rate of return through payments that vary with the borrower's ability to pay, they are consistent with this principle.

Second, financial assets should avoid *gharar*, which can be understood as unnecessary uncertainty. Growth-linked securities reduce uncertainty for borrowers, but may increase uncertainty for lenders. John argues that as long as lenders are able to diversify away their uncertainty, growth-linked securities can be deemed Islamic in this sense.

Third, Islamic finance must not promote sinful activities prohibited by Islam, such as drinking or gambling. Since by investing in growth-linked securities Islamic creditors would invest in positive growth prospects of non-Islamic countries, the prohibited activities would be a part of the faster growth. In this sense, it would be difficult to envisage growth-linked bonds, much like most sovereign bonds, as being Islamic, unless an acceptable maximum level of sinful activities were specified.

Lastly, Islamic finance covers real activities, not financial speculation; for example, bonds that are backed by collateral are acceptable. Growth-linked securities are not likely to satisfy this condition, as they are not designed, like most sovereign borrowing, to be backed by real collateral.

Overall, growth-linked securities clearly satisfy the first condition of Islamic finance. Compliance with the other three conditions is not as clear; however, other forms of sovereign borrowing face the same problems. Therefore, John argues that Islamic investors should not be reluctant to hold growth-linked securities, which are closer to Islamic philosophy than normal sovereign bonds.

Why Moral Hazard Is Not Important

John Williamson believes that the fears of moral hazard risks are "vastly overdone" (Williamson 2008, 9). It does not make sense for governments to suppress growth just so that their debt servicing bill will be lower, as the benefits would be very small compared to the costs of curbing growth. Underreporting of growth may be of more concern. Again, this is not likely for political and technical reasons. First, politicians like to report that the economy has been growing during their time in office. It would not be beneficial for them to underreport growth. Second, from the technical perspective, substantially underreporting growth for extended periods of time would be very difficult. Finally, any misreporting by governments would come to the attention of markets and most probably be punished. Markets would allow for such behavior in pricing of new issues of securities, and it would become more costly for the country to borrow in the way of growth-linked securities in the future.

GDP Revisions

Even though John does not think moral hazard risks are important, he does believe governments may be reluctant to pay more on growth-linked securities when GDP data are statistically revised. He describes three possible sources of revisions of GDP data that may cause concern (Williamson 2008).

First, there are routine adjustments to GDP data, usually prompted by additional information becoming available following the publication of data. A second source of revisions comes from manipulation of data by the issuer. However, as discussed above, it would be very difficult to continuously misreport growth.

Third, there are GDP revisions resulting from modifications of the structure of national income estimates reflecting the changing structure of the economy. To analyze the scope of this problem, John Williamson, with the help of one of us (Dagmar Hertova), conducted rigorous analysis of historical GDP revisions published in the IMF's *International Financial Statistics* yearbooks of 1983 until 2006 for some 66 countries (Williamson 2008). The vast majority of GDP revisions were found to be small adjustments to nominal GDP and the GDP deflator that normally occur following the initial publication of statistics. In total, over 80 percent of all revisions were within 1 percent of the values reported in the previous year, and almost 90 percent were within 3 percent.

The authors examined nonroutine adjustments to real GDP—those larger than 3 percent—in more detail. In total, between 1981 and 2000 (the years with adequate data) there were 41 apparent GDP revisions in 38 countries (out of 740 observations). These revisions averaged 6.7 percent.

Williamson (2008) has proposed several approaches to designing securities that would resolve the problem of GDP revisions. One approach would incorporate into the contract of the securities the exact formula for measuring GDP, which would then always be used when calculating the payment. However, in the case of long-term securities, such a measure could become outdated and would not account for changes in the structure of the economy. Another approach, applicable for the Borensztein-Mauro security but not the Shiller one, would be to simply add to the old GDP formula the increase in real GDP that results from the latest updated formula. Lastly, payments could simply reflect the impact of any and all revisions. If a revision is made to the way national accounts data are calculated, and subsequently GDP is reported higher, then the payment increases based on the revision. Under a Borensztein-Mauro bond, payment would be higher for the year of the revision and then return to normal. In order not to jeopardize the countercyclical element of the security in such a year, the excess GDP could be capitalized, that is, added to the value of the debt. The securities would still provide the countercyclical element but incorporate GDP revisions.

Would These Securities Really Be Countercyclical?

Experience with growth-linked securities, however limited, has highlighted the fear that their countercyclical 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 procyclical effect rather than the intended countercyclical effect. Williamson (2008) has acknowledged that there may be cases when lags could wipe out the countercyclical benefits of these instruments, but it is important to look at what happens generally.

Since the Borensztein-Mauro security is the one that offers the most countercyclical benefits in principle, it is also more susceptible to the problem at hand. Hertova (2006) analyzed the timing of payments and its effects on Colombia and Malaysia had half of their sovereign debt been swapped for Borensztein-Mauro-type securities. The study compared the interest payments under different timing scenarios. In one scenario, growth rates are measured annually, with payments lagging one year. In a second scenario, growth rates are measured semiannually with a six-month lag from the end of the reporting period to payment.

The results suggest that the second scenario, with only a six-month lag in payments, would have had substantial countercyclical benefits for the issuing countries. In contrast, with a lag in payments of one year, there would be very little, if any, countercyclical benefit. For example, the savings resulting from Colombia's 1999 recession would only have been realized at the end of 2000 when growth had already picked up again. In contrast, if the payments had been based on semiannual growth with a lag of six months, then savings would have been realized in 1999, expanding the country's fiscal space when needed. Malaysia would have also benefited from growth-linked securities, if to a lesser extent, with payments based on semiannual growth during the 1997 Asian crisis.

Lessons Learned

Argentine GDP-Linked Securities

GDP-linked securities were included in the Argentine debt restructuring package in 2005 that aimed to exchange $82 billion in bonds on which the country had defaulted four years earlier. With a creditor participation rate in the debt swap of 76 percent, the notional value of the GDP-linked securities, which were initially attached to every restructured bond, was $62 billion. At the end of November 2005, 180 days after the issue date, the warrants became detachable and started trading separately. The securities were issued in different currencies: Argentine pesos (under Argentine law), dollars (one under the New York law and one under Argentine law), euros (under English law), and yen (under Japanese law). More GDP-linked securities were issued as

part of the 2010 restructuring, when $12.9 billion of debt was swapped in a settlement with 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. Some commentators have argued that the existence of the warrants helped make the overall package (which was favorable to Argentina) somewhat more acceptable to creditors, and therefore could have had intangible benefits. Nevertheless most observers and participants in the deal agree that the market gave little value to the warrants when they were issued. However, thanks to the country's booming growth in the following years, and the corresponding higher payments made on the warrants (as well as the expected higher payments in future), the warrants substantially outperformed expectations and their prices soared. At the time of the exchange, the price of the securities suggested by major investment banks was about $2 per $100 of notional value. At the time they became detached, the dollar-denominated securities were trading at $4.25 (Costa, Chamon, and Ricci 2008). In the following years, the market price of the Argentine GDP-linked securities skyrocketed, with the dollar-denominated warrant reaching a peak of $15.82 in June 2007. As of July 4, 2012, the dollar-denominated warrant was trading at $14.65.[3]

It is likely that markets charged a premium for the Argentine warrants due to the apparent poor prospects of the Argentine economy at the time, the novelty of the instrument, the complexity of its pricing, and concerns about data accuracy. However, this premium declined substantially, especially in the first three months of trading (Costa, Chamon, and Ricci 2008). More importantly, from the Argentine perspective, payments on the warrants have started to become rather high (see below).

Payments have been made to the holders of the Argentine GDP-linked securities on December 15 of each year starting in 2006 under the following conditions:[4]

- Real GDP exceeds base-case GDP.
- Real annual GDP growth exceeds base-case GDP growth. Based on the set levels of base-case real GDP levels, the threshold for real GDP growth starts at 4.26 percent for 2005, falling to 3.55 percent for 2006, and then gradually falling to 3 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

3. Using the Bloomberg exchange rate as of July 4, 2012. See Ken Parks, "Argentina Bonds Retreat, Peso Steady on Low Volume; Merval +0.5%," *Wall Street Journal*, July 4, 2012.

4. 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 (accessed on July 28, 2012).

will expire no later than December 15, 2035. If the payment cap has been reached prior to this date, the warrant will be deemed to have expired then.

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

Payment = ((0.05 x excess GDP) x unit of currency coefficient) x notional value of GDP-linked securities,

where *excess GDP* is the amount by which actual GDP exceeds the base-case GDP, expressed in billions of nominal pesos, and the *unit of currency coefficient* represents the proportion of a GDP-linked security with a notional amount of one unit of currency in the total amount of eligible securities available at the time of exchange (i.e., $81.8 billion).

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. The warrants will not provide any principal payments.

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 7.1), the base GDP level has been 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 value and 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 $395 million in 2006 to almost $2.5 billion in 2011 and an estimated $3.8 billion at the end of 2012 (table 7.1). The government did not make any payment in 2010, as growth in the previous year was below the threshold of 3.29 percent. However, the missed payment in 2010 was effectively made up for in 2011. Furthermore, with the level of GDP rising at a much faster pace than the expected base GDP due to exceptional growh in 2010–11, projected payments for 2012 have shot up.

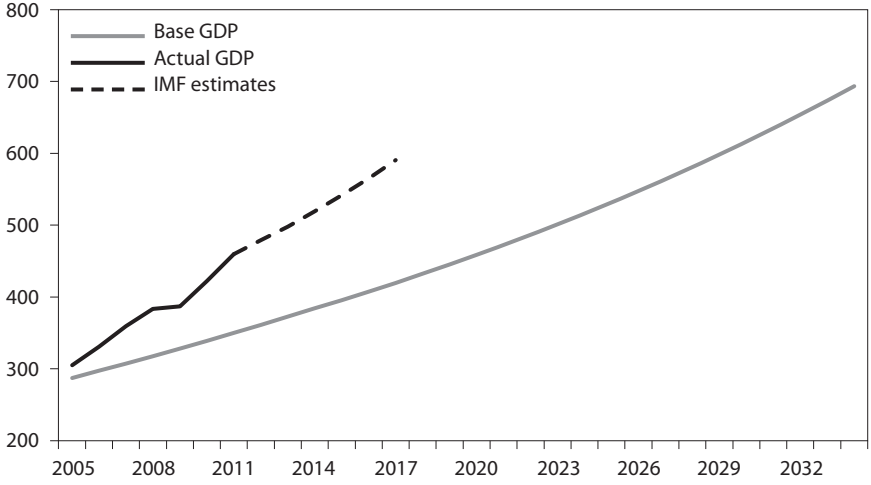
It is clear that the GDP-linked securities are starting to be a burden for the Argentine government and economy. The payments represented over 0.5 percent of Argentine GDP and over 2.5 percent of exports in 2011, compared with just 0.18 percent and 0.72 percent in 2006, respectively. The payments are projected to rise quite significantly in 2012. Up to 2011, payments on the warrants were between 10 and 30 percent of the total servicing of interest on public sector debt. In 2012, however, this ratio is estimated to rise to 34 percent, a very high level indeed (table 7.1).

As mentioned above, the government made no payments on the GDP-linked securities at the end of 2010. However, looking at the fiscal balances, it seems that the temporary relief would have benefited Argentina more in the previous year. By 2010, growth had already picked up again and the fiscal balance had improved compared to 2009. This suggests that in this instance, the countercyclical element of the warrants may have been lost.

Figure 7.1 Argentine base-case GDP level and GDP growth versus actual GDP level and GDP growth, 2005–34

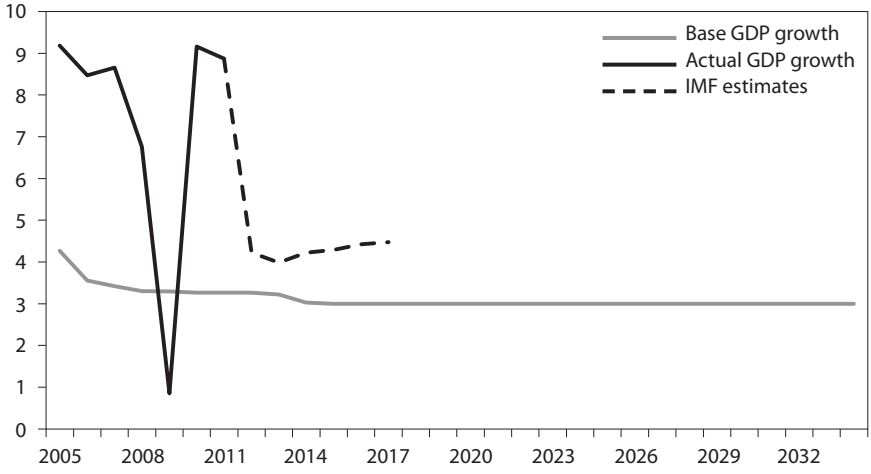
a. Level of real base-case GDP versus actual and estimated GDP

billions of 1993 Argentine pesos



b. Base-case annual real GDP growth versus actual and estimated GDP growth

percent



IMF = International Monetary Fund

Sources: Ministry of Finance of the Republic of Argentina, www.mecon.gov.ar (accessed on July 18, 2012); IMF, *World Economic Outlook* database, April 2012, www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx (accessed on July 27, 2012).

Table 7.1 Argentina: Servicing of GDP-linked securities, 2005–12

Indicator	2005	2006	2007	2008	2009	2010	2011[a]	2012[a]
Payments on GDP-linked warrants								
Billions of dollars	—	0.395	0.812	0.996	1.416	0	2.481	3.787[b]
As share of total servicing of interest on public sector debt (percent)	—	10.5	15.6	24.8	22.1	0	30.0	34.2
As percent of GDP	—	0.18	0.31	0.30	0.46	0	0.55	0.80
As percent of exports	—	0.72	1.22	1.21	2.12	0	2.52	n.a.
GDP growth (percent)	9.18	8.47	8.65	6.76	0.85	9.16	8.87	4.22
Fiscal balance (percent of GDP)	–1.56	–0.89	–2.08	–0.81	–3.62	–1.58	–3.29	–3.07
Primary fiscal balance (percent of GDP)	4.65	4.18	2.47	2.76	0.21	1.68	–0.36	–0.19

n.a. = not available; — = not applicable

a. Economic indicators data for 2011 and 2012 are estimates from IMF, *World Economic Outlook* database, April 2012.
b. Unofficial estimate from Central Bank of Argentina. Original estimated payments in 2012 expressed in Argentine pesos were converted to dollars using exchange rate as of July 11, 2012, as reported by the Central Bank of Argentina.

Sources: Authors' calculations using data from the Ministry of Finance of the Republic of Argentina, www.mecon.gov.ar (accessed on July 18, 2012); Central Bank of Argentina, www.bcra.gov.ar/index_i.htm (accessed on July 18, 2012); Argentine National Statistics Institute (INDEC), www.indec.mecon.ar (accessed on July 18, 2012), and IMF, *World Economic Outlook* database, April 2012 (fiscal balances), www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx (accessed on July 27, 2012).

Table 7.2 Argentina: Annual and accumulated payments on GDP-linked securities (per 100 units, unless otherwise specified)

	Annual payment				
Currency	**December 15, 2006**	**December 15, 2007**	**December 15, 2008**	**December 15, 2009**	**December 15, 2011**
US dollars (New York law)	0.62	1.32	2.28	3.17	4.38
US dollars (Argentine law)	0.62	1.32	2.28	3.17	4.38
Euros (English law)	0.66	1.26	1.99	2.84	4.19
Argentine pesos (Argentine law)	0.65	1.38	2.45	3.72	5.98
Yen (Japanese law)	0.68	1.46	2.42	2.66	3.39

	Accumulated payment
US dollars (New York law)	11.77
US dollars (Argentine law)	11.77
Euros (English law)	10.94
Argentine pesos (Argentine law)	14.18
Yen (Japanese law)	10.60

	Accumulated payment (percent of total cap)
US dollars (New York law)	24.53
US dollars (Argentine law)	24.53
Euros (English law)	22.79
Argentine pesos (Argentine law)	29.55
Yen (Japanese law)	22.09

Source: Ministry of Finance of the Republic of Argentina, www.mecon.gov.ar (accessed on July 28, 2012).

Overall, Argentina had paid out about $6 billion on the warrants as of end-2011. 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 quarter of its total GDP warrants payments within the first six years (table 7.2). If Argentina were to continue to pay the warrants (and grow) at the same speed as in the last six years, the GDP warrants could expire before their set maturity of 30 years.

Given current GDP projections, payment for the warrants in 2013 and 2014 may not happen, as the economy is expected to slow substantially in 2012 and 2013. Growth would need to be above 3.26 percent in 2012 and 3.22 percent in 2013 to trigger payment on the warrants. But since the payment is based on the level of excess GDP above the base level (which is now substantial), growth that is just slightly above the threshold (at, say, 3.3 percent) would result in substantial payment on the warrants, whereas growth of, say, 3.1 percent would imply no payment at all. Thus, the Argentine government could be tempted to underreport growth in order to avoid a payment.

However, this risk is paradoxically practically eliminated by the fact that, if anything, Argentina has been criticized for allegedly overreporting growth and underreporting inflation. If the government were to do this (a bad practice for any number of other reasons), it would increase the likelihood of servicing on the warrants, an undesirable result from the Argentine perspective and a very fortunate one for investors and creditors. Some private estimates of GDP suggest that Argentina's official statistics have overreported GDP growth by 1.9 percentage points on average since 2008 (JP Morgan 2012), and by as much as 3 percentage points in 2011 alone (Barclays Capital 2012b). At the same time, some sources allege inflation has been underreported since 2006 on average by 14.5 percentage points compared to private measures (JP Morgan 2012).

Greek GDP-Linked Securities

In February 2012, Greece issued GDP-linked securities as part of what is considered the biggest sovereign debt restructuring in history. The deal, which was agreed to as part of Greece's €130 billion bailout from the European Union and the IMF, along with Greece's massive austerity measures, erased about €100 billion from the country's staggering debt. Greece's sovereign debt still stands at 160 percent of its GDP, the highest in Europe. In the deal, private sector bond holders agreed to a loss of 53.5 percent of nominal value and over 70 percent of the net present value of the Greek bonds they are holding.

In total, €172 billion of Greek private debt has been swapped in the deal, with a participation rate of 85.8 percent for bonds issued under Greek law (€152 billion) and 69 percent for foreign-law bonds and bonds issued by state enterprises (€20 billion). Overall, the participation rate would reach 95.7 percent, following the use of collective action clauses.[5]

Participating holders received detachable GDP-linked securities, with a notional amount equal to the face amount of new bonds.[6] 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 GDP levels, the threshold for real GDP growth starts at 2.9 percent for 2015, and then gradually falls to 2 percent for 2021 and onward (Morgan Stanley 2012).
- Each annual payment will not exceed 1 percent of the notional value of the bonds.

5. Ministry of Finance of Greece, PSI Press Release, March 9, 2012, www.minfin.gr/portal/en/resource/contentObject/id/baba4f3e-da88-491c-9c61-ce1fd030edf6 (accessed on July 28, 2012).

6. 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 (accessed on July 28, 2012).

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

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

As in the case of Argentina, payment based on growth in a given year will not be made until the following year and the securities will not pay out a principal.

Differences between Argentine and Greek GDP-Linked Securities

Structural differences between the Greek and Argentine warrants imply differences in the payout. First, the Greek securities have an annual payment cap whereas the Argentine warrants have a total payment cap. While the payment cap of 1 percent of the value of the Greek warrants limits that country's obligations (a very positive circumstance, given the country's huge debt overhang), it may not be so attractive to investors. On the other hand, the Argentine analysis in this chapter 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. In contrast, any missed payment in the case of the Greek warrants would be "lost" to the investors and creditors (Barclays Capital 2012a). This difference has important implications for both creditors and debtors. It would seem to offer some protection for Greece, which is in any case still overburdened by an excessive debt overhang. However, the annual payments cap is rather high.

Second, the Argentine warrant payments are related to nominal GDP performance and thus indexed to inflation (as under the Schiller security).[7] In contrast, the payment on the Greek securities is a function of real growth.

Given Greece's bleak economic situation and future prospects, will the Greek GDP-linked securities lead to significant payments? It remains to be seen. But it seems that at the moment markets and investors are attaching very little value to the Greek warrants and do not expect them to be as valuable as the Argentine warrants (Barclays Capital 2012a, Whittall 2012). For example, Morgan Stanley (2012) projects a fair value for the Greek warrant at around 1 cent, and even under a positive scenario the value remains below 2 cents. The cap on annual payments of the Greek warrants also restricts the possibility of large payouts for the investors.

However, we should remember that investors also initially attached very little value to the Argentine warrants, yet their prices then shot up. The Greek

7. Joseph Cotterill, "The Worlds Inside a Greek GDP Warrant," *Financial Times* blog, February 24, 2012.

warrants seem to have been better designed from the country's perspective, and unfortunately, growth prospects in the short term look pretty grim 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. Having a reference GDP may offer some protection, but further study is required on this.

Conclusion and Next Steps

As has been argued in this chapter and in John Williamson's 2008 paper, it would be most desirable for countries to issue GDP-linked securities in normal times, as this has clear benefits for all parties and for the international financial system. 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 not attract much attention from investors and creditors, 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? To put it a bit provocatively, if markets can create so many "socially useless" or even harmful financial innovations, why can they not create innovations that could be beneficial?

A key point is that the systemwide 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. Other factors that dissuade beneficial financial innovation from taking place include the fact that the markets for new instruments may be illiquid. There is therefore a need for a concerted effort to achieve and ensure a critical mass so as to attain market liquidity. Related to this are coordination problems, whereby a large number of borrowers have to issue a new instrument in order for investors to be able to diversify risk.

Given the existence of positive externalities in issuing these kinds of instruments, as well as coordination problems, there is 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. Given the low correlation among these countries' growth rates, the return-risk ratio would be higher. As correlations tend to be lower at the global level, the World Bank may be best placed to do such securitization. However, the European Investment Bank could offer

a portfolio of developed and developing countries' GDP-linked securities. Other regional development banks could also play a role, including the Islamic Development Bank.

Alternatively, the multilateral development banks could buy GDP-linked bonds that developing countries would issue via private placements. The active involvement of those banks in this type of lending would serve to extend the benefits of adjusting debt service to changes in economic growth to countries that do not have access to international bond markets. The Agence Française de Développement has started making such loans to low-income countries with a very simple formula that gives debtor countries the option to take a total debt service holiday in years when their projected exports are below 95 percent of their previous average exports.

This brings us to a final point: it is important that the design of these growth-linked securities be simple, well thought through, and, ideally, standardized. Again, here, public financial international institutions or the United Nations could play an important role.

References

Barclays Capital. 2012a. Greek PSI 2: Valuation and Timeline. *Interest Rates Research* (February 24). Available at www.scribd.com/doc/84986988/Barclays-Capital-GREEK-PSI-2 (accessed on July 30, 2012).

Barclays Capital. 2012b. Argentina: Pro-growth GDP Print Supports GDP Warrants. *Emerging Markets* (March 27).

Borensztein, Eduardo, and Paolo Mauro. 2004. The Case for GDP-indexed Bonds. *Economic Policy* 19, no. 38: 166–216.

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

Costa, Alejo, Marcos Chamon, and Luca Antonio Ricci. 2008. *Is There a Novelty Premium on New Financial Instruments? The Argentine Experience with GDP-Indexed Warrants.* IMF Working Paper 08/109. Washington: International Monetary Fund.

Griffith-Jones, Stephany. 1998. *Global Capital Flows: Should They Be Regulated?* Basingstoke, UK: Palgrave Macmillan.

Griffith-Jones, Stephany, and José Antonio Ocampo. 2008. Building on the Counter-Cyclical Consensus: A Policy Agenda. Paper prepared for the High-level Roundtable on "Towards Basel III? Regulating the Banking Sector after the Crisis," Brussels, October 12. Available at www.stephanygj.net/papers/Counter-Cyclical-Regulation.pdf (accessed on July 28, 2012).

Griffith-Jones, Stephany, and Krishnan Sharma. 2009. GDP-Indexed Bonds: Making it Happen. In *Innovative Financing for Development*, ed. Suhas Ketkar and Dilip Ratha. Washington: World Bank.

Hertova, Dagmar. 2006. Fiscal Implications of GDP-Linked Bonds. Photocopy (August).

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

Kamstra, Mark, and Robert 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. New Haven, CT: Yale University.

Morgan Stanley. 2012. *Greece: Trading After the PSI* (March 8). Available at 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 on July 28, 2012).

Ocampo, José Antonio. 2003. Capital Account and Countercyclical Prudential Regulations in Developing Countries. In *From Capital Surge to Drought: Seeking Stability for Emerging Economies*, ed. Ricardo Ffrench-Davis and Stephany Griffith-Jones. Basingstoke, UK: Palgrave Macmillan.

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

Shiller, Robert J. 2005. In Favor of Growth-Linked Bonds. *Indian Express*, March 10.

Williamson, John. 2005. *Curbing the Boom-Bust Cycle: Stabilizing Capital Flows to Emerging Markets.* Policy Analyses in International Economics 75. Washington: Institute for International Economics.

Williamson, John. 2008. Is There a Role for Growth-Linked Securities? Peterson Institute for International Economics, Washington. Photocopy (April 15).

Whittall, Christopher. 2012. Investors Eye GDP Warrants Dubiously. *International Financing Review,* no. 1922 (February 26 to March 2). Available at www.ifre.com/investors-eye-gdp-warrants-dubiously/21001925.article (accessed on July 28, 2012).