GDP WARRANT DESIGN FOR GREEK DEBT RESTRUCTURING

—LESSONS FROM THE ARGENTINE DEFAULT

Master of International Business Thesis

Submitted by Ye Cao

Advised by Laurent Jacque, Ph.D.

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http://fletcher.tufts.edu

THE FLETCHER SCHOOL

TUFTS UNIVERSITY

Abstract

This paper designs a GDP-linked warrant for Greek debt restructuring with an examination of the Argentine experience. It discusses the benefits of GDP warrants for sovereign issuers and investors. It also develops a Black model pricing exercise to calculate the expected net present value of such a warrant, modified after the Argentine warrant. The final inclusion of similar GDP warrants in Greece's PSI suggests that financial innovation, such as GDP warrants, is conducive to sovereign debt restructuring process and might mitigate output shocks. This shows a wider adoption of GDP warrants is possible, particularly can be favorable for indebted countries.

A loan to a foreign government is an act of faith.

— Herbert Feis, 1930

1. Introduction and European sovereign debt crisis

Since late 2009, the Eurozone has been engulfed in an unprecedented sovereign debt crisis. The burgeoning debt-to-GDP level in Greece, Portugal, Ireland, Spain and Italy alarmed investors of these countries' solvency issues. Despite rescue packages from the troika (ECB, IMF and EFSF), the Greek government had no choice but to default. Therein lies the question—how can sovereign borrowers raise money and restore investor confidence in the aftermath of a debt crisis? Apart from the fiscal austerity measures that might choke a country's growth prospects, is there an option to encourage investors to participate in the country's longer-term growth? With this goal in mind, this paper evaluates the role of GDP warrants in major debt restructurings. This product of financial innovation has been offered in Argentina's 2005 sovereign debt restructuring and enjoyed a favourable trading history due to Argentina's impressive economic performance in recent years[1]. Is the GDP warrant model transferrable to the debt-strapped European peripheral countries? How to design a macroeconomic derivative like the GDP warrant? This paper argues that there are distinctive benefits for issuing such a GDP warrant, although the market is nascent. Evidence shows that there are distinctive benefits for issuing GDP warrants, although the market is nascent. Pricing for such an instrument can be challenging because the underlying GDP

[1] Charles Newbury. February 2012. *Argentina Surge in GDP Warrants Signals Rosier Econ Prospects.* Deursche Borse. Available at: https://mninews.deutsche-boerse.com/index.php/argentina-surge-gdp-warrants-signals-rosier-econ-prospects?q=content/argentina-surge-gdp-warrants-signals-rosier-econ-prospects

growth is difficult to forecast and the illiquidity of GDP warrants market might not reflect market equilibrium. Compared to the Argentine GDP warrant, a GDP warrant in Greece's Private Sector Involvement (PSI) program is less attractive under current forecasts. The Greek government has deliberately limited the contingent liability that could arise from future payout. However, this practice may very well also be restraining Greece's ability to raise alternative sources of funding through GDP warrants.

2. What is GDP Warrant?

GDP Warrant is a subset of GDP-linked securities, mostly bonds, which promise to pay an interest coupon based on the issuing country's growth rate. The payment amount varies in accordance with a country's output. Therefore, intuitively, required interest payments would be higher when certain country has had a good economic performance and lower when the economy faced a downturn.

3. Benefits of GDP-linked securities

According to Griffith-Jones and Sharma, the benefits for issuing a GDP-linked security are three folds: gains for borrowing countries, gains for investors and benefits to the global financial system[2]. In emerging markets particularly, GDP-indexed bonds can dampen the pro-cyclicality of government spending and reduce debt service payment in times of slow growth. The two effects both serve

[2] Stephany Griffith-Jones and Krishnan Sharma, "GDP Indexed Bonds: Making it Happen," DESA Working Paper No. 21, April 2006, available at http://www.un.org/esa/ffd/BackgroundPaper.doc, accessed October 28, 2011

to decrease the likelihood of a future sovereign default – a favourable result for both the borrowers and creditors. For investors who hold this instrument, they acquire a rare opportunity to directly take a position on countries' future growth prospects. Further, capitalizing on countries with different growth rates, GDP-linked instruments provide diversification benefits for portfolio investments.[3] On a broader level, Griffith-Jones and Sharma argue that GDP-linked bonds are similar to a public-good, in the sense that these securities provide a risk-sharing mechanism and avoid disruptions to the global economy when formal default occurs.

In addition to the three advantages presented above, certain GDP-linked security could lower the required rate of return on government bonds, since the upside should be taken into consideration when valuing the package as a whole[4]. The fundamental nature of derivatives, mitigating and allocating risks, certainly suggests a potential interest within the investor community.

However, despite the benefits of the instrument, three major concerns limited its wide adoption. Only a handful of countries (such as Bulgaria, Costa Rica, Bosnia and Argentina) have issued them as part of their debt restructuring[5]. First, the moral hazard issue is of primary significance. Investors worry that GDP-linked securities could induce misreport of GDP data by the government. Issuing countries have the incentive to understate growth to avoid large payments.

[3] United Nations, "Report on the brainstorming meeting on 'GDP-Indexed Bonds: Making It Happen," 2005.
[4] Griffith-Jones and Sharma, "GDP Indexed Bonds," 2006.
[5] Ibid 2

Second, many critics argue that the market is not deep enough therefore there is insufficient liquidity in trading such instruments. Lastly, pricing on nascent and complex financial products can be problematic[6].

4. Background on Argentine GDP warrant

The inclusion of a GDP warrant in the Argentine debt-restructuring package came after a five-year dragging sovereign default, from 2001 to 2005. Argentina's GDP warrant is initially attached to an $81.8 billion bond exchange, the biggest sovereign default at the time (see Exhibit 1).

Features of Argentine GDP warrant are summarized below:

- Payments will be made in a given year if three conditions are met: 1) actual real GDP exceeds base case GDP; 2) real annual growth is greater than the growth implied by the base case GDP; and 3) total payments made on a GDP warrant do not exceed the payment cap, which is 0.48 per unit of currency.

- Payments are calculated as 5 per cent of the difference between the actual growth and the base case growth of GDP, multiplied by unit of currency coefficient.

- Trading of GDP warrant is denominated in pesos, but payments of interests are in currencies of corresponding underlying bonds.

[6] Borenzstein et al., "Sovereign Debt Structure for Crisis Prevention," 2004; summarized in Sturzenegger and Zettelmeyer, Defaults in the 1990s, 2006.

- Payments are made one year after the reference year and cannot be negative.

- Each new bond issued under the restructuring had a GDP-linked warrant attached that would be eligible to trade independently after November 29, 2005[7].

Thanks to the surge in commodity prices, Argentina embarked on a remarkable recovery path after 2003 (see Chart 2). Argentina is one of the world's top producers of soybeans, maize and wheat. However, inflation continued to hover around the double-digits, despite the unorthodox measures taken by the government. The Argentine local bureau of statistics, INDEC (Instituto Nacional de Estadística y Censos) is also publishing questionable low numbers to save costs on inflation-linked domestic government bonds[8]. However, the understated inflation numbers, pushing real GDP growth to an artificial level, in part helped the holders of GDP warrant. Both the commodity boom and a magnified GDP number on paper have driven the interest payment on Argentine GDP warrant to an unexpectedly high level[9]. The payout rate skyrocketed from 0.62% 2005 to 4.38% in 2010. Taking Argentina's economic performance and the successful trading history of Argentine GDP warrant into consideration, the possibility of a

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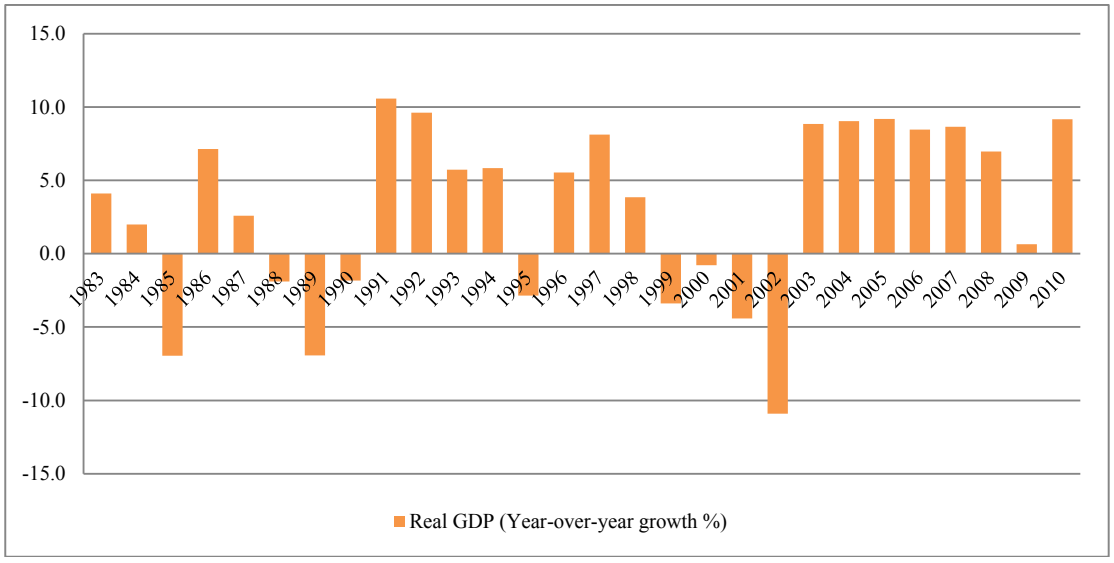
[7] Prospectus Supplement (to Prospectus Dated December 27, 2004), The Republic of Argentina Offers to Owners of Each Series of Bonds Listed in Annex A to This Prospectus Supplement, January 10, 2005, available at http://www.mecon.gov.ar/finanzas/download/us_prospectus_and_prospectus_supplement.pdf, accessed February 9, 2012.

[8] Martin Kanenguiser, "El costo de cinco años de intervención en el Indec,|| La Nación, January 13, 2012.

[9] Mark L. J. Wright. September 2011. Sovereign Debt Restructuring: Problems and Prospects. Working paper prepared for Advisory Group on Dispute Resolution and Sovereign Debt covened by the Netherlands Government and the Permanent Court of Arbitration at the Hague.

broader market being created for GDP-linked bonds of emerging economies is significantly enhanced (see Table 1).

Chart 1. Real GDP Growth in Argentina, 1983 through 2010



Source: International Monetary Fund (IMF), International Financial Statistics (IFS) database.[10]

Table 1. Argentine GDP Warrant Payout

Accrual Start Date	Rate (%)
12/15/10	4.38277
12/15/09	0.00000
12/15/08	3.16878
12/15/07	2.27980
12/15/06	1.31822
11/1/05	0.62449

Source: Bloomberg

To a lot of economists' surprise, the 3% growth target doesn't seem as overoptimistic as it was in 2005. Trailing large payouts, Argentine GDP warrant is

[10] International Capital Markets and Sovereign Debt: Crisis Avoidance and Resolution. Harvard Business School Case No. 707-018

trading strongly in the market, rising from merely 5 pesos to 19 pesos at its peak. Taking Argentina's economic performance and the successful trading history of Argentine GDP warrant into consideration (See Chart 1), the possibility of a market being created for GDP-linked bonds of emerging economies is significantly enhanced. Currently the GDP warrant market forward is still not very liquid, with an estimated market cap of $5 billion only[11], but the soar of Argentine warrant proves the market development has a notable potential.

Source: Bloomberg

5. Designing a GDP warrant for Greece

Against the backdrop of a developing GDP warrant market, the debt-strapped Greece seems like a perfect candidate to introduce a similar instrument in its debt-restructuring package. Like Argentina, Greece slumped into a deep debt crisis caused by a severe economic downturn coupled with uncontrolled government spending. In the 1990s and early 2000s, Greece enjoyed a higher-

[11] Ibid 2.

than-average growth rate in the European Union. Unfortunately, as the global economy cooled during the 2008/09 financial crisis, the Greek economy was hit particularly hard. Its two major industries—shipping and tourism—are highly vulnerable to negative business cycles shocks (see Exhibit 2). Greek government's fiscal health deteriorated quickly, exacerbated by a shocking discovery of fraudulent fiscal deficit report in past[12], therefore pushed its debt-to-GDP ratio to 174.9% in 2010 (see Exhibit 3). As Greece's debt burden skyrocketed, the investor community became increasingly worried about the country's ability to repay its sovereign debt. The concern was also exacerbated by the controversy regarding Greece's arrangement with Goldman Sachs of a currency swap, which allegedly took €10 billion off the government's balance sheet[13]. Although the Greek government secured a €45 loan from the EU and IMF in May 2010, it became apparent that a default was imminent. In October 2011, a second bailout plan was presented to Greece, under the condition of proven further austerity and a debt restructuring agreement[14]. Thus a months' long Greek debt negotiation started, with the expectation that private debt holders would receive new loans in exchange for their old holdings at a significant discount – a "haircut". At the same time, Greece had its worst economic decline

[12] "REPORT BY EUROSTAT ON THE REVISION OF THE GREEK GOVERNMENT DEFICIT AND DEBT FIGURES" (PDF). Eurostat. 22 November 2004.
[13] "Goldman bet against Entire European Nations". Washingtons Blog. 16 July 2011. http://georgewashington2.blogspot.com/2011/07/goldman-bet-against-its-european.html
[14] Newman, Rick (3 November 2011). "Lessons for Congress From the Chaos in Greece". US News. Available at: http://www.usnews.com/news/blogs/rick-newman/2011/11/03/lessons-for-congress-from-the-chaos-in-greece. Accessed 3 November 2011.

with -6.9% real GDP plunge, a 19.9% unemployment rate and frequent public protests against further austerity measures[15].

As a result, it is critical to design a comprehensive debt-restructuring package that provides compromise and acceptable solutions to all parties. The author contends that focusing solely on austerity is not the panacea for all debt crises. Greece has suffered from loss of competitiveness due to higher inflation rate and sustained wage increase. To make matters worse, Greece does not have the monetary toolkit to regain competitiveness in exports through currency devaluation, given its membership in the Eurozone. Harsher fiscal austerity will risk leaving Greek economy in dire strait for an extended period of time. Based on the benefits discussed in Section 3, this paper strives to introduce a GDP warrant instrument in Greece's debt restructuring package. The Greek GDP warrant is intended to act as a "sweetener" to minimize the haircut private sector investors (PSI) are facing and the future economic toll levied on Greek tax payer in the form of a higher interest burden. Therefore the GDP warrant for Greece is modeled on Argentine example, but also included adjustments to accommodate particular aspects of Greek economic fundamentals. Like the Argentine warrant, Greek GDP warrant is attached to the underlying bond for free and only has positive payments. Major improvements include an independent audit of real GDP numbers and the choice of overseas courts and governing laws for dispute settlement.

[15] "Eurostat Newsrelease 31/2012: Euro area unemployment rate at 10.7% in January 2012". Eurostat. 1 March 2012. Retrieved 5 March 2012.

The key architecture for a Greek GDP warrant is outlined as following: Detachment and Maturity. Each GDP Warrant will be originally issued as a single unit with the underlying bond (worth 40 (arbitrary) percent of old bond). Upon a short expiration period, the GDP warrant and the underlying bonds will automatically detach. Thereafter, the GDP warrant will trade independently from the underlying bonds. GDP Warrants shall have the same maturity corresponding to that of new bonds (estimated to be 30 years).

Payment Currency. The payment currency of the GDP Warrant will be the currency of the new security to which the GDP warrant are initially attached, which will be the Euro.

Reference Year. The reference year will be one year before the year of last published GDP number, commencing in 2012 and ending in 2042.

Base Case GDP. To facilitate investors to take a long-term view on Greek economy, we choose the average GDP growth rate from 2001 to 2011, using quarterly data, to construct the baseline for GDP number comparisons. The timeframe is selected based on relevance: Greece's entry into the Eurozone is a milestone event that has changed its economy fundamentally. The author calculated the average growth rate between 2001 and 2011 is 2.0% using public data and the 30-year average GDP growth rate is 1.6% (see Exhibit 4a and 4b). The growth rate of base case gross domestic product (Base Case GDP) is set at 2 per cent per annum, starting from 102 percent of 2011 Real GDP.

Real GDP. The real gross domestic product (Real GDP) is the gross domestic

product of Greece in constant euros for each calendar year as published by the statistical office of European Union (Eurostat). The The choice of Eurostat is intended to foster credibility of the statistics and enhance third party oversight on Greek's fiscal discipline. The lessons learned from debt restructuring for Argentina, who still does not have access to global capital market, is the importance to restore investors' confidence. A massive default already takes a heavy toll on creditors, but further manipulation of data could alienate investors immeasurably. A liquidity freeze for a sovereign government will only do more harm to the country in the long run.

Payment Conditions. Greece will make a payment on GDP warrant in respect of any given reference year only if the following three conditions are met:

1) For the reference year, Real GDP exceeds Base Case GDP;

2) For the reference year, annual growth in Real GDP exceeds 2 per cent;

3) Total payments made on a GDP Warrant do not exceed the payment cap for that GDP Warrant.

Payment Amount. Similar to the Argentine GDP warrant, calculated as 5 per cent of the difference between the actual growth and the base case growth of GDP, multiplied by unit of debt. Warrant payout amount = 0.05 X (Real GDP growth rate – Base Case GDP growth rate) X (1/size of debt). The size of being restructured debt is currently set at €200 billion. The actual total payment amount will depend on the participation percentage of Greek debt holders.

Payment Cap. The payment cap limits the upside for GDP warrants. The original intent is to give investors an equity-like exposure to the country's growth, thus this paper does not advocate the adoption of an annual payment cap. Payment cap = ∞

Call Option. The ability for the government to buyback warrants also puts a ceiling on the upside for these warrants. The call option was embedded in the GDP-linked bond Bosnia issued but was not included in the Argentine GDP warrant. With the call option, issuing governments have the right to buyback outstanding warrants when it feels it is too expensive to keep paying. This paper does not include a call option in the GDP warrant's design both for attracting more investor demand and for simplicity.

Governing Law. The governing laws of each GDP warrant and of the underlying new bonds shall be the same. In order to establish credibility and restore creditor confidence, this paper suggests that the governing law be laws of international financial centers – English Law or New York Law – instead of the Greek national law. Judges in those jurisdictions generally are more sophisticated in dealing with investment disputes.

6. Valuation model

After setting the parameters for the GDP warrant, examining how much the new instrument should be priced at is essential. The valuation metrics center on different base case and potential realized growths assumptions. Below is an

example of potential scenarios of 30-year-average growth rates vis-à-vis expected baseline growth assumptions.

	Base Case Growth Rate		
Realized Growth Rate	(0%, 0%)	(0%, 1%)	(0%, 2%)
	(2%, 0%)	(2%, 1%)	(2%, 2%)
	(3%, 0%)	(3%, 1%)	(3%, 2%)

The uncertainty of coupon payments and term structure of GDP warrants resemble many characteristics of an interest rate cap. An interest cap is a derivative that offers coupon payment at the end of each period in which the interest rate exceeds the specified strike rate. An interest cap agreement can be viewed as a series of short maturity European call option or caplet[16]. The traditional bootstrapping model does not capture the volatility of coupon payments, therefore this paper employs the Black model to value Greek GDP warrants.

The Black model is similar to the Black-Scholes formula, which is used for stock option valuation. The Black model also assumes that the underlying follows a lognormal distribution with constant volatility σ. Thus the price for a caplet, equivalent to a European call option, with maturity T on a bond option contract with strike price K is priced as

[16] Gupta, Anurag and Subrahmanyam, Marti G., Pricing and Hedging Interest Rate Options: Evidence from Cap-Floor Markets (April 2002). EFMA 2002 London Meetings. Available at SSRN: http://ssrn.com/abstract=314878 or http://dx.doi.org/10.2139/ssrn.314878

$$c = e^{-rT}[FN(d_1) - KN(d_2)]$$

The corresponding put price is

$$p = e^{-rT}[KN(-d_2) - FN(-d_1)]$$

where

$$d_1 = \frac{\ln(F/K) + (\sigma^2/2)T}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln(F/K) - (\sigma^2/2)T}{\sigma\sqrt{T}} = d_1 - \sigma\sqrt{T},$$

In the GDP warrant's context, each GDP-linked coupon payment is dependent upon the reference year's real growth rate in excess of the 2% target. The creditors will receive payments at the end of each period when the real differential exceeds the threshold, same as the strike price in interest rate caps.

Major assumptions are listed below:

1) Yearly real GDP growth is drawn from a lognormal distribution with a mean growth rate that matches the IMF forecast of Greece's 30-year growth rate 2.5%-1.5%[17].
2) The 30-year historical average of standard deviation of the real GDP data is approximately 3%.
3) The risk free rate for new Greek bonds is 12%, which is indicative of recent yield of 30-year Greek bonds.

[17] Greece: Preliminary Debt Sustainability Analysis. February 15, 2012. International Monetary Fund. Available at: http://av.r.ftdata.co.uk/files/2012/02/Greece-DSA.pdf

4) The forward price, which is the referenced real GDP, to be 100. The strike price is 2% growth above the referenced real GDP, which is 100*1.02=102.
5) The value of the GDP warrant is the cumulative value of the series of caplets.

Calculations show that on average, GDP warrants are valued at 2% of the notional value of the entire debt exchange package. Each caplet is worth 0.26% of the underlying notional amount (see Exhibit 6a and Exhibit 6b).

7. Comparison to GDP warrant issued in Feb 2012 Greek debt exchange

On February 21, European finance ministers agreed on the €130 second bailout package after further fiscal and political reform commitments from Greece. The second credit package presented to the private sector involvement (PSI) consists of three components. The first is a new bond issued by Greece with a face value of 31.5% of the original value. The second part is a 24-month treasury bill issued by the European Financial Stabilization Facility (EFSF), with a face value of 15% of the original value of debt exchanged. Lastly, a detachable GDP-linked security, with a notional amount equal to the face amount of the new bonds, is included in the debt exchange[18].

The introduction of GDP warrant in the debt exchange confirms this paper's argument on the benefits and efficacy of developing such a macroeconomic

[18] Invitation Memorandum (dated 24 February 2012), Invitation by the Hellenic Republic to the holders of each series of securities listed in Annex I to this Invitation Memorandum, February 24, 2012, available at https://www.bondcompro.com/greeceexchange/genDocuments.asp, accessed February 29, 2012

instrument. Greece's GDP-linked security in the PSI specifies a payment amount of up to 1% per year starting from 2015, as long as Greece's nominal GDP exceeds the reference threshold and the country has positive real growth above pre-stated targets (see Exhibit 7)[19]. Compared to the GDP warrant designed in the sections above, the actual GDP-linked security in the PSI has a few distinctions[20].

1) Additional coupon payment of the warrant starts from 2015 for the next 28 years, instead of paying for 30 years.

2) The threshold is set to be nominal GDP numbers instead of real GDP at constant price level. This is probably due to concerns for a deflationary path in the recent years.

3) Maximum annual coupon payment is capped at 1% of notional value of the underlying new bond, which worth 31.5% of the old debt. There is no cap on cumulative payments. The original intent was to give investors an equity-like exposure to the country's growth, but Argentina's high growth resulted in a warrant price tag of about $6.9 billion from 2005-2010. Greece's annual payment cap is insofar a result of concerns about servicing capacity in the event of a growth surprise. Coupon payment is calculated as payment = 1.5*(real GDP growth rate- Reference GDP

[19] Greece gdp linked warrant « valueandopportunity [cited 4/25/2012 2012]. Available from http://valueandopportunity.com/tag/greece-gdp-linked-warrant/ (accessed 4/20/2012).
[20] Greek debt swap terms released | FDL news desk [cited 4/25/2012 2012]. Available from http://news.firedoglake.com/2012/02/27/greek-debt-swap-terms-released/ (accessed 4/25/2012).

Growth Rate). Effectively, Greek warrant's coupon payment is capped if real GDP growth rate is more than 0.67% in excess of the benchmark.

4) The nominal Value will amortise after year 2022 to zero in year 2043.

5) The Greek government retains the right to buyback GDP warrants after 2020.

6) Major improvements include an independent audit of real GDP numbers and the choice of overseas courts and governing laws for dispute settlement. The original Greek bonds were governed by national law, which raises questions regarding judicial independence and the possible impediment of creditor activism.

The Institute of International Finance (IIF), which represented the private sector creditors in the negotiation, proposed the GDP warrant instrument after the first PSI agreement in July 2011 had failed. Under the pressure from IMF to contribute more, the IIF envisioned an instrument to have possible payout if Greece were to do well, therefore a way for private sector creditors to consent to the new agreement. The GDP warrant was a good tool to satisfy PSI's needs. Greek government had concerns about servicing capacity in the event of a growth surprise. Nevertheless parties included the GDP warrant through a tough negotiation. The end product that is included in the package therefore is the outcome of the bargain[21].

[21] Interviews with Charles Dallara and Mikis Hadjimichael, Directors at the Institute of International Finance

Valuation from various houses have place the new Greek GDP warrants at 0.5% to 1% of the total package[22]. Due to the peculiar features of this GDP warrant, investors so far have attached little value to these warrants compared to the Argentine warrants. The reasons are twofold – one, the payment cap made the warrants less appealing; and low growth prospects due to Greece's unsustainable debt burden (even after PSI) and loss of competitiveness. The labor cost for Greece rose by almost 50% in the last two decades, and cannot be reversed easily. The callback option also limits the upside for investor returns after 2020. It is important to note that the warrant is not paying anything until 2015 and the forecast for Greece's real GDP is quite pessimistic. Without the monetary toolkit to devalue its currency, Greece's recovery and growth path lies in the results of public sector reform and privatization. The GDP warrant is far out-of-the-money; the valuation metrics will be truly tested when the warrant becomes in-the-money[23].

8. Conclusion

Resolving sovereign debt crisis usually requires creditors to take a significant loss of their holding's notional value. The examination of Greek and Argentine GDP warrants shows that financial innovation can provide a beneficial channel for both issuing countries and investors. Specific designs of the instrument are

[22] FT alphaville » the worlds inside a greek GDP warrant [cited 4/25/2012 2012]. Available from http://ftalphaville.ft.com/blog/2012/02/24/895031/the-worlds-inside-a-greek-gdp-warrant/ (accessed 3/20/2012).
[23] Investors eye GDP warrants dubiously | capital city | IFRe [cited 4/25/2012 2012]. Available from http://www.ifre.com/investors-eye-gdp-warrants-dubiously/21001925.article (accessed 4/25/2012).

tailored to countries' needs; therefore investment decisions should be made on a case-by-case basis. Evidences suggest that GDP warrants contributed to a higher participation rate in PSI, currently standing at 96.6%[24]. Although GDP warrants' value varies based on different fundamentals of countries, issuance of such an instrument offers a unconventional way for countries' capital-raising efforts. By providing an equity-like exposure, GDP warrants have some peculiar advantages over traditional sovereign bonds. Investors can benefit from a holistic economic variable while issuing countries mitigate output shocks in volatile times post-restructuring. Pricing for such an instrument requires further studies because the underlying GDP growth is difficult to forecast and the market liquidity is limited. Valuation of GDP warrants will be tested in the market, with theoretical framework such as the Black -76 model or Monte Carlo simulation[25]. It is expected that the novelty premium on GDP warrants will decline reasonably fast[26], therefore the prospect for adopting such an instrument for heavily indebted countries, such as Portugal, Ireland and Spain, is rather positive.

[24] Ibid. 21

[25] Miyajima, Ken. March 01, 2006. How to Evaluate GDP-Linked Warrants: Price and Repayment Capacity. International Monetary Fund.

[26] 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. International Monetary Fund.

Exhibit 1 Argentina's 2005 Bond Restructuring Package; Selected Instruments[1]

Name	Amount Outstanding (US$ mm)	PV[2] (US$)	New Value[3] (US$)	Haircut	Name	Amount Outstanding (US$ mm)	PV[2] (US$)	New Value[3] (US$)	Haircut
Bonte 02	1,513.4	108.1	37.9	64.9%	Hidro	18.2	96.3	34.1	64.6%
Bonte 03	732.9	120.5	38.0	68.5%	Bonex 92	150.0	13.3	4.7	64.3%
Bonte 03F	143.1	114.0	38.5	66.2%	Radar 1	349.5	112.3	38.6	65.6%
Bonte 04	508.7	129.8	37.9	70.8%	Radar 2	351.7	115.9	38.0	67.2%
Bonte 05	759.5	142.0	38.1	73.2%	Radar 3	361.9	117.5	38.5	67.2%
Bonte 06	225.2	144.9	38.1	73.7%	Radar 4	232.0	115.5	38.6	66.6%
Bonte 27	3.4	150.0	38.6	74.3%	Celtic 2	279.1	112.9	38.6	65.8%
FRAN	383.5	311.4	39.5	87.3%	Span 02	130.1	117.7	38.0	67.7%
FRN 04	225.9	120.0	38.3	68.1%	Letras T90	448.5	103.8	37.5	63.9%
Global 03	1,794.4	118.8	37.7	68.3%	Letras T10a	119.7	103.9	37.5	63.9%
Global 05	821.6	139.1	37.8	72.8%	Letras T10b	116.8	103.8	37.5	63.9%
Global 06	1,185.4	143.8	38.4	73.3%	Letras T10c	25.0	103.9	37.5	63.9%
Global 08	5,024.7	147.8	37.7	74.5%	Letras T10d	30.8	103.8	37.5	63.9%
Global 09	1,197.0	155.9	38.5	75.3%	RML	561.8	108.4	38.3	64.7%
Global 10	775.0	156.7	38.9	75.2%	Pagare III	4.0	107.6	38.6	64.1%
Global 12	465.3	174.5	39.3	77.5%	Pagare IV	11.3	110.3	38.7	64.9%
Global 15	718.2	166.7	37.7	77.4%	Pagare V	1.4	112.4	38.1	66.1%
Global 17	1,903.7	169.3	39.3	76.8%	Pagare VI	20.7	126.8	37.8	70.2%
Global 18	104.6	216.8	39.9	81.6%	Pagare A	197.8	111.9	37.9	66.1%
Global 19	146.8	178.8	39.2	78.1%	Pagare B	130.0	107.6	38.0	64.7%
Global 20	121.7	178.0	39.3	77.9%	Pagare C	75.0	106.1	38.1	64.1%
Global 27	809.5	147.4	38.6	73.8%	Pagare 200x	15.0	144.7	38.9	73.1%
Global 29	125.0	138.0	38.6	72.0%	Global F	181.6	100.5	27.8	72.3%
Global 30	166.0	154.0	39.3	74.5%	FRB	1,637.2	59.5	21.2	64.4%
Global 31	13.2	178.7	39.3	78.0%	Discount	800.5	99.6	62.0	37.8%
Global31M	8,595.2	214.5	39.9	81.4%	RA $02	20.3	40.8	13.7	66.4%
PRE 4	259.9	26.4	6.4	75.9%	RA $07	5.8	48.1	13.8	71.4%
PRE 6	73.5	107.4	41.7	61.2%	RA $08	248.6	44.3	13.5	69.5%
PRO2	332.6	73.3	25.2	65.6%	PRE 3	9.9	9.1	2.1	76.9%
PRO4	452.3	126.9	46.7	63.2%	PRO1	39.2	20.7	9.2	55.5%
PRO6	527.6	91.5	31.7	65.4%	PRO3	1.0	33.6	14.1	58.0%
PRO8	14.7	101.2	41.7	58.8%	PRO5	96.9	32.8	11.1	66.1%
PRO10	51.5	103.6	37.7	63.6%	PRO9	30.3	36.7	13.2	63.9%
Total weighted average haircut									**72.9%**

Source: Compiled from Sturzenegger and Zettelmeyer 2005.

[1] Excludes a number of U.S. and Argentina issues.

[2] Represents present value per bond, including past-due interest and principal.

[3] This is actually a weighted average of five different options: 35-year bond in US$ with step-up coupon and no face value reduction; 35-year bond in AR$ with step-up coupon and no face-value reduction; 30-year bond in US$ with step-up coupon and face-value reduction of 66.3%; 30-year bond in AR$ with step-up coupon and face-value reduction of 66.3%; 42-year capitalizing bond in AR$ with face-value reduction of 30.1%.

Exhibit 2. Key Macro-Economic Indicators of Greece

Note: Highlighted numbers are estimates.

	2008	2009	2010	2011
Real GDP (% change)	-0.2	-3.3	-3.5	-6.9
Nominal GDP (US$ bil.)	340.9	321.9	301	299.1
Nominal GDP Per Capita (US$)	30188	28420	26502	26257
Consumer Price Index (% change)	4.2	1.2	4.7	3.3
Policy Interest Rate (%)	2.5	1	1	1
Fiscal Balance (% of GDP)	-9.8	-15.4	-10.5	-9.6
Population (mil.)	11.29	11.33	11.36	11.39
Unemployment Rate (%)	7.6	9.4	12.5	17.6
Current Account Balance (% of GDP)	-14.9	-11.2	-10.6	-9.3
BOP Exports of Goods US$bn	29	21.3	22.6	25.4
Exchange Rate (LCU/US$, end of period)	0.72	0.69	0.75	0.77

Source: IHS Global Insight

Exhibit 3. Greek Debt Economics

	2007	2008	2009	2010	2011
Foreign Exchange Earnings (US$ bil.)	68.7	81	60.4	61.5	63.6
Portfolio Investment, Net (US$ bil.)	23.9	25	39	-26.9	17.9
Portfolio Investment, Net (% of GDP)	7.7	7.2	12	-8.8	5.8
Foreign Direct Investment, Net (US$ bil.)	-3.3	2.5	0.3	-0.5	-0.2
Foreign Direct Investment, Net (% of GDP)	-1.1	0.7	0.1	-0.2	-0.1
Foreign Exchange Reserves, Excl. Gold (US$ bil.)	0.6	0.3	1.6	1.3	1.3
Import Cover (Months)	0.1	0	0.2	0.2	0.2
Total External Debt (US$ bil.)	447.1	475.6	480.7	533.7	556.6
Total External Debt (% of GDP)	143.9	137.3	147.7	174.9	181.3
Total External Debt (% of forex earnings)	650.3	587.5	795.5	867.9	875.3
Short Term External Debt (US$ bil.)	75.2	98.8	107.9	141.1	147.1
Short Term External Debt (% of total external debt)	16.8	20.8	22.4	26.4	26.4
Short Term External Debt (% of international reserves)	1191 3.3	2875 0.2	6940. 5	1077 3.4	1131 6.9
Total External Debt Service (US$ bil.)	49.7	52.8	50.4	64.3	93
Interest Payment Arrears (US$ bil.)	0	0	0	0	0
External Liquidity Gap (% of forex earnings)	207.6	209.3	252.7	325.2	362.3

Source: IHS Global Insight

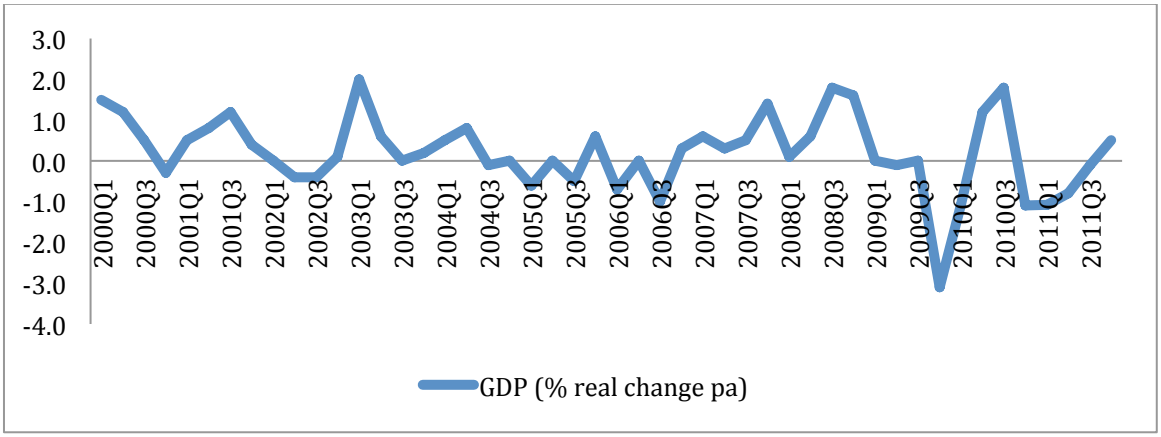
Exhibit 4a. Greece's Real GDP Growth (%)

Date	Real GDP Growth Rate (%)
3/31/11	-5.5
12/31/10	-7.4
9/30/10	-4.1
6/30/10	-3.1
3/31/10	-2.8
12/31/09	-2.1
9/30/09	-3.5
6/30/09	-2.7
3/31/09	-1.1
12/31/08	0.1
9/30/08	1
6/30/08	1.5
3/31/08	1.6
12/31/07	3.6
9/30/07	3.9
6/30/07	4.2
3/31/07	5.4
12/31/06	4.4
9/30/06	5.5
6/30/06	5.9
3/31/06	4.8
12/31/05	2.9
9/30/05	2.8
6/30/05	1.5
3/31/05	1.8
12/31/04	4.5
9/30/04	4.6
6/30/04	4.7
3/31/04	3.6
12/31/03	6.1
9/30/03	5.4
6/30/03	5.9
3/31/03	6.5
12/31/02	2.7
9/30/02	3.9
6/30/02	4.4
3/31/02	2.7
12/31/01	6.2
9/30/01	4.8
6/30/01	2.4
3/31/01	3.2
12/31/00	4.7

9/30/00	3
6/30/00	5
3/31/00	5.4

Source: Bloomberg

Exhibit 4b. Greece's Real GDP Growth (%)



Source: EIU Country Data

Exhibit 5. Description of Argentine GDP Warrants

The text below is an excerpt from Prospectus Supplement (to Prospectus Dated December 27, 2004), The Republic of Argentina Offers to Owners of Each Series of Bonds Listed in Annex A to This Prospectus Supplement, January 10, 2005.

The GDP-linked Securities

Securities Offered	GDP-linked Securities that expire no later than December 15, 2035. Each GDP-linked Security will be originally issued as a single unit with the underlying Par, Discount or Quasi-par. During the period of 180 days following the first day of the Settlement Date, each GDP-linked Security will remain attached to and trade as a single unit with the underlying Par, Discount or Quasi-par. Upon expiration of this 180-day period, the GDP-linked Securities and the underlying Pars, Discounts or Quasi-pars will automatically detach and will no longer constitute a single unit. Thereafter, the GDP-linked Securities will trade independently from the underlying Pars, Discounts or Quasi-pars.
Notional Amount	Each GDP-linked Security will have a notional amount equal to the corresponding Eligible Amount of Eligible Securities tendered and accepted. If the Eligible Securities tendered and accepted are not in the same currency as the GDP-linked Securities you are entitled to receive, the corresponding notional amount of the GDP-linked Securities will be determined using exchange rates in effect on December 31, 2003. There are no principal payments in respect of the GDP-linked Securities. Holders will not receive any payments during the life or upon the expiration of their GDP-linked Securities other than as described below.
Payments	Any payments on the GDP-linked Securities are contingent upon the performance of Argentina's GDP (as described below) and subject to the conditions described below. Payments made on the GDP-linked Securities will be based on the notional amount of GDP-linked Securities.
Payment Currency	The payment currency of the GDP-linked Securities will be the currency of the New Security to which the GDP-linked Securities are initially attached, which may be U.S. dollars, euro or pesos.
Calculation Date	The calculation date for the GDP-linked Securities will be on November 1 of each year following the relevant reference year (as defined below), commencing on November 1, 2006.
Payment Date	Subject to the conditions specified below, Argentina will make payments on the GDP-linked Securities on December 15 of each year following the relevant reference year. The first payment, if any, will occur on December 15, 2006.
Reference Year	The reference year for the GDP-linked Securities will be a calendar year, commencing in 2005 and ending in 2034.

Base Case GDP ..... The base case gross domestic product ("Base Case GDP") for each reference year is set forth in the following chart:

Reference Year	Base Case GDP (1993 pesos in millions)	Reference Year	Base Case GDP (1993 pesos in millions)
2005	287,012.52	2020	458,555.87
2006	297,211.54	2021	472,312.54
2007	307,369.47	2022	486,481.92
2008	317,520.47	2023	501,076.38
2009	327,968.83	2024	516,108.67
2010	338,675.94	2025	531,591.93
2011	349,720.39	2026	547,539.69
2012	361,124.97	2027	563,965.88
2013	372,753.73	2028	580,884.85
2014	384,033.32	2029	598,311.40
2015	395,554.32	2030	616,260.74
2016	407,420.95	2031	634,748.56
2017	419,643.58	2032	653,791.02
2018	432,232.88	2033	673,404.75
2019	445,199.87	2034	693,606.89

The Base Case GDP will be adjusted in accordance with any changes to the year of base prices (currently 1993).

Actual Real GDP ..... The actual real gross domestic product ("Actual Real GDP") is the gross domestic product of Argentina in constant pesos for each calendar year as published by the *Instituto Nacional de Estadística y Censos* ("INDEC").

Actual Real GDP is currently calculated by INDEC using the year 1993 as the year of base prices. If in any year, the year of base prices for calculating Actual Real GDP is changed by INDEC, the Base Case GDP will be adjusted accordingly. For example, if Actual Real GDP for 2006 with 1993 prices is X, and with 2000 prices is Y, then the Base Case GDP = Base Case GDP as per chart above multiplied by a fraction, the numerator of which is Y and the denominator of which is X.

Actual Nominal GDP ..... The actual nominal gross domestic product ("Actual Nominal GDP") is the gross domestic product of Argentina in current pesos for each calendar year as published by the *Instituto Nacional de Estadística y Censos* ("INDEC").

Payment Conditions ..... Argentina will make a payment on GDP-linked Securities in respect of any given reference year only if the following three conditions are met:

- for the reference year, Actual Real GDP exceeds Base Case GDP;
- for the reference year, annual growth in Actual Real GDP exceeds the growth rate in Base Case GDP for such year (for your reference, the Base Case GDP for 2004 is Ps.275,276.01 million, measured in 1993 pesos); and

- total payments made on a GDP-linked Security do not exceed the payment cap for that GDP-linked Security.

Annual growth of "Actual Real GDP" for any reference year will be calculated by dividing Actual Real GDP for that reference year by the Actual Real GDP for the year preceding that reference year, minus one. For purposes of this calculation, the Actual Real GDP for the relevant reference year and the preceding year will each be measured using the same year of base prices, with Actual Real GDP for the year preceding the reference year adjusted, if necessary, to reflect any changes in the year of base prices implemented during such reference year (for an example of how this adjustment is effected see "— Actual Real GDP" above).

Excess GDP ..... The excess gross domestic product for any reference year ("Excess GDP") is the amount, if any, by which Actual Real GDP (converted to nominal pesos, as described below) exceeds the Base Case GDP (converted to nominal pesos, as described below). Excess GDP will be expressed in billions.

For purposes of determining Excess GDP for any reference year, each of the Actual Real GDP and Base Case GDP for that reference year will be converted into nominal pesos by multiplying it by a fraction, the numerator of which is the GDP Deflator (as defined below) for that reference year and the denominator of which is the GDP Deflator for the year of base prices used to calculate Actual Real GDP and Base Case GDP for that reference year. As noted above, 1993 is currently the year of base prices, and the GDP Deflator for that year is one.

GDP Deflator ..... The GDP deflator for any given year ("GDP Deflator") is the quotient that results from dividing the Actual Nominal GDP for such year, by the Actual Real GDP for the same year, in each case as published by INDEC.

Payment Amount ..... On each payment date, holders of GDP-linked Securities will be entitled to receive payments in an amount equal to the Available Excess GDP (as defined below) for the corresponding reference year, multiplied by the aggregate notional amount of GDP-linked securities they hold. "Available Excess GDP" is an amount per unit of currency of notional amount of GDP-linked Securities, determined in accordance with the following formula:

$$\text{Available Excess GDP} = (0.05 \times \text{Excess GDP}) \times \text{unit of currency coefficient}$$

where:

- "Excess GDP" is expressed in billions of nominal pesos, and
- the "unit of currency coefficient" is as set forth in the following table:

Currency	Unit of Currency Coefficient
U.S. dollars	$1/81.8 = 0.012225$
Euro	$1/81.8 \times (1/.7945) = 0.015387$
Pesos	$1/81.8 \times (1/2.91750) = 0.004190$

	The unit of currency coefficient represents the proportion that one GDP-linked security with a notional amount of one unit of currency bears to the aggregate Eligible Amount of all Eligible Securities outstanding as of the date of this prospectus supplement (approximately U.S.$81.8 billion), calculated using exchange rates in effect on December 31, 2003.
	For purposes of effecting payments on GDP-linked Securities, Available Excess GDP will be converted to the relevant payment currency using the average free market exchange rate of pesos to the applicable payment currency during the 15 calendar days preceding December 31 of the relevant reference year.
	All calculations for payments on the GDP-linked Securities will be performed by the Ministry of Economy and Production of Argentina.
	Annex F to this prospectus supplement contains sample calculations related to payments on GDP-linked Securities.
Payment Cap	The total amount to be paid during the life of the GDP-linked Securities, per unit of GDP-linked Security, will not exceed 0.48, measured per unit of currency. We refer to this amount as the "payment cap for GDP-linked Securities." For example, if you receive GDP-linked Securities in a notional amount equal to U.S.$1 million, the payment cap for your GDP-linked Securities would equal U.S.$480,000.
	If the payment cap for a GDP-linked Security is reached in a payment year prior to the scheduled expiration of the GDP-linked Securities, the GDP-linked Securities will be deemed to have expired in such year.
	If, for any given year the aggregate payment due under a GDP-linked Security is greater than the amount remaining under the payment cap for that Security, then the remaining amount available under the payment cap for that GDP-linked Security will be distributed to the holder of that security.
Governing Law	The governing law of each GDP-linked Security will be the same as the governing law of the New Security to which the GDP-linked Security is initially attached.

Source: Prospectus Supplement (to Prospectus Dated December 27, 2004), The Republic of Argentina Offers to Owners of Each Series of Bonds Listed in Annex A to This Prospectus Supplement, January 10, 2005, available at http://www.mecon.gov.ar/finanzas/download/us_prospectus_and_prospectus_supplement.pdf, accessed February 9, 2012.

Exhibit 6a. Valuation of Each Caplet As European Short Term Bond Option (Black-76 Model)

Available at: http://lombok.demon.co.uk/financialTap/options/bond/shortterm

Input					
	Call		100		
Option type		**Forward price**	100	**Time to maturity in yr**	1 1
			102		12
Volatility in %	17	**Strike**	102	**Interest rate in %**	12

Output	
Price:	5.222055

Exhibit 6b. Valuation of GDP Warrant As An Interest Rate Cap

Exit Yield	12%
Price of Each Caplet	5.222055

Years	1	2	3	4	5	30
Caplets	5.2221	5.2221	5.2221	5.2221	5.2221	5.2221
Discount Factor	0.8929	0.7972	0.7118	0.6355	0.5674	0.0334
Discounted Caplet Value	4.6625	4.1630	3.7170	3.3187	2.9631	0.1743
PV	**42.0646**					
***0.05**	2.01	Percentage points of notional amount				

Exhibit 7. Description of Greek GDP-linked Security

The text below is an excerpt from Invitation Memorandum (dated 24 February 2012), Invitation by the Hellenic Republic to the holders of each series of securities listed in Annex I to this Invitation Memorandum, February 24, 2012, available at https://www.bondcompro.com/greeceexchange/genDocuments.asp

GDP-linked Securities

The GDP-linked Securities will be (a) authorised and issued by the Republic pursuant to: (i) Law 2187/1994 (Government Gazette A 16/1994) of the Republic, as amended and in force, (ii) Law 2362/1995 (Government Gazette A 247/1995) of the Republic as amended and in force, (iii) Law 4050/2012 (Government Gazette A 36/2012) of the Republic, and (iv) a ministerial decision which will approve the terms and conditions of the GDP-linked Securities and the Trust Deed, and (b) constituted by the Trust Deed.

There are material differences between the Designated Securities and the GDP-linked Securities. Bondholders should consider carefully all such differences before any decision is made with respect to the Invitation and are urged to read the terms and conditions of the GDP-linked Securities in their entirety. The GDP-linked Securities contain the following features, including, without limitation:

(a) the GDP-linked Securities will be issued in dematerialised and uncertificated form registered within the System for Monitoring Transactions in Book-Entry Securities of Law 2198/1994, a system which is subject to Greek law and managed by the Bank of Greece;

(b) certain actions in relation to the GDP-linked Securities such as enforcement and modification can only be taken with the consent or direction of the holders of the requisite majority of the GDP-linked Securities. Subject to the Trust Deed, the Trustee shall (subject in each case to being indemnified and/or secured and/or prefunded to its satisfaction by the relevant holders), if so requested in writing by the holders of the requisite majority of GDP-linked Securities, take such proceedings against the Republic to enforce the payment of any amounts due under the GDP-linked Securities if the Republic fails to make such payment before the day falling 30 days after the due date for such payment; and

(c) the GDP-linked Securities contain a purchase option which provides that the Republic may at its option on any one or more occasions elect to re-purchase any or all of the GDP-linked Securities on the terms set out therein as to price and where the Republic re-purchases some but not all of the GDP-linked Securities this will be effected on a pro-rata basis; and

(d) all payments on the GDP-linked Securities will be made by the Republic without withholding or deduction for, or on account of, any present or future taxes, levies or duties of whatever nature imposed, levied, collected or assessed by or on behalf of the Republic or any political subdivision or taxing authority thereof (Greek Withholding Taxes), unless such withholding or deduction is required by law. In such event, the

Republic will pay such additional amounts as may be necessary in order that the net payment made in respect of the GDP-linked Securities after such withholding or deduction for or on account of Greek Withholding Taxes is not less than the amount that would have been receivable in respect of the GDP-linked Securities in the absence of such withholding or deduction, subject to certain exceptions as set out in the terms and conditions of the GDP-linked Securities.

Original Notional Amount

Each GDP-linked Security is issued in an initial notional amount of €100.00 (the Original Notional Amount) and a GDP- linked Security shall mean a GDP-linked Security with a notional amount equal to the Notional Amount. Euro and € shall mean the single currency unit of each participating member state of the European Union that adopts or has adopted the Euro as its lawful currency in accordance with the legislation of the European Union in relation to the Economic and Monetary Union.

GDP Index Percentage means, for any Reference Year, the product (rounded to the nearest five decimal places with 0.000005 being rounded upwards) of (a) Real GDP Growth Rate for such Reference Year less the Reference Real GDP Growth Rate for such Reference Year and (b) 1.5, provided that:

(i) the GDP Index Percentage for any Reference Year shall not exceed 1.00%;
(ii) (ii) if the GDP Index Percentage for such Reference Year would have exceeded 1.00%, but for (i) immediately above, any difference between the GDP Index Percentage for such Reference Year and 1.00% shall not be taken into account for any purpose for any subsequent Reference Year;
(iii) (iii) if Real GDP Growth Rate for such Reference Year is negative, the GDP Index Percentage shall be zero; and
(iv) (iv) if Real GDP Growth Rate for the Reference Year is lower than the Reference Real GDP Growth Rate for such
(v) Reference Year, the GDP Index Percentage shall be zero.

Nominal GDP means, for any Reference Year, the GDP of the Republic at current prices (expressed in euro) of the Reference Year as published by EUROSTAT in accordance with the Statistics Regulations for such Reference Year, provided that any subsequent revision after the Calculation Date preceding the Payment Date of such Reference Year of the data published by EUROSTAT shall not result in, or entitle a Holder to claim, any increase in the Payment Amount.

Notional Amount means, in respect of any Payment Date falling in or prior to 2022, 100% of the Original Notional Amount and for each year following 2022, the fraction of the Original Notional Amount set out in the table below opposite that year:

Payment Date	**Fraction of the Original Notional Amount**

15 October 2023	315/315
15 October 2024	300/315
15 October 2025	285/315
15 October 2026	270/315
15 October 2027	255/315
15 October 2028	240/315
15 October 2029	224/315
15 October 2030	208/315
15 October 2031	192/315
15 October 2032	176/315
15 October 2033	160/315
15 October 2034	144/315
15 October 2035	128/315
15 October 2036	112/315
15 October 2037	96/315
15 October 2038	80/315
15 October 2039	64/315
15 October 2040	48/315
15 October 2041	32/315
15 October 2042	16/315

Any reduction in the Notional Amount shall occur on the day immediately preceding each Payment Date.

Payment Amount means, for any Payment Date, an amount (rounded down to the nearest €0.01 for each GDP-linked Security) equal to the product of (i) the GDP Index Percentage for the Reference Year corresponding to such Payment Date, multiplied by (ii) the Notional Amount, provided that the Payment Amount for any Reference Year will be zero if the Nominal GDP did not exceed the Reference Nominal GDP for that Reference Year. Any subsequent revision after the Calculation Date preceding the relevant Payment Date of (i) the data used to calculate the Payment Amount and/or (ii) the data published by EUROSTAT, shall not result in, or

entitle a Holder to claim, any change in the Payment Amount. The Payment Amount shall be determined by the Ministry of Finance on the Calculation Date preceding the relevant Payment Date, who shall notify the Republic and the Trustee of such Payment Amount once determined, and the Republic shall notify the Holder thereof in accordance with Condition 10, in each case as soon as reasonably practicable and in any event before the relevant Payment Date. All calculations made by the Ministry of Finance hereunder shall be binding on all parties including the Trustee and all Holders absent bad faith, wilful misconduct or manifest error on the part of the Ministry of Finance.

Payment Date means, for any Reference Year, 15 October of the calendar year following such Reference Year. The first Payment Date is 15 October 2015 for the Reference Year 2014. The last Payment Date is the Expiration Date for the Reference Year 2041.

Real GDP Growth Rate means, for any Reference Year, the percentage change of (i) GDP of the Reference Year compared with (ii) the GDP of the year immediately preceding the Reference Year, with each expressed in prices of the year immediately preceding the Reference Year, as published by EUROSTAT in accordance with the Statistics Regulations, provided that, from and including Reference Year 2021, if the Real GDP Growth Rate for the calendar year preceding the Reference Year is negative, the Real GDP Growth Rate for the Reference Year shall be deemed to be the sum of the Real GDP Growth Rates for both such years, provided further that any subsequent revision after the Calculation Date preceding the Payment Date of such Reference Year of the data published by EUROSTAT shall not result in, or entitle a Holder to claim, any change in the Payment Amount.

Reference Nominal GDP means for each Reference Year in the table below, the amount (expressed in euro) set out in the table below opposite that year, provided that any subsequent revision after the issuance of this GDP-linked Security to any data used to derive the amounts set out in the table below, shall not result in, or entitle a Holder to claim, any change in the Payment Amount.

Reference Year	**Reference Nominal GDP (EUR in billions)**
2014	210.1014
2015	217.9036
2016	226.3532
2017	235.7155
2018	245.4696
2019	255.8822

2020 - 2041	266.4703

Reference Real GDP Growth Rate means, in respect of any Reference Year, the rate of growth set out in the table below opposite that year, provided that any subsequent revision after the issuance of this GDP-linked Security to any data used to derive the amounts set out in the table below shall not result in, or entitle a Holder to claim, any change in the Payment Amount.

Reference Year	**Reference Real GDP Growth Rate**
2014	2.345000%
2015	2.896049%
2016	2.845389%
2017	2.796674%
2018	2.596544%
2019	2.496864%
2020	2.247354%
2021 - 2042	2.000000%

Reference Year means any calendar year from and including 2014 to and including 2041.

3. **PAYMENTS**

3.1 **Payment Amounts**

a) Subject to the conditions set forth in Condition 3.1(d) below, on each Payment Date the Republic shall pay in relation to each GDP-linked Security an amount equal to the Payment Amount, if any, for such Payment Date.
b) Payments of any amounts payable to the Holders under the GDP-linked Securities will be made to the Holders in the manner provided in, and in accordance with, the Regulations or otherwise as specified in the Trust Deed, provided always that in any event final discharge of the obligation to make payments due to the Holders will only occur on the receipt of such payments by the Holders or by the Trustee on behalf of the Holders.
c) Payments in respect of the GDP-linked Securities are subject in all cases to any fiscal or other laws and regulations applicable in the place of payment,

but without prejudice to the denomination of the GDP-linked Securities or the provisions of Condition 3.1(b) or 4..

d) If any date for payment in respect of any GDP-linked Security is not a Business Day, the Holder shall not be entitled to payment until the next following Business Day nor to any interest or other sum in respect of such postponed payment.
e) No commissions or expenses shall be charged to the Holders in respect of any payments made in accordance with this Condition.

3.2 **Agents**

The initial Paying Agent for the GDP-linked Securities shall be the Bank of Greece. The Republic reserves the right at any time to vary or terminate the appointment of any Paying Agent and to appoint additional or other Paying Agents provided that:

(a) there will at all times be a Paying Agent having a specified office in a European city which, so long as the GDP- linked Securities are admitted to trading on a regulated market within the European Economic Area and the rules of such regulated market require, shall be such European city as the rules of such regulated market may require or permit; and

(b) the Republic undertakes that it will ensure that it maintains a Paying Agent in a Member State of the European Union that is not obliged to withhold or deduct tax pursuant to European Council Directive 2003/48/EC or any law implementing or complying with, or introduced in order to conform to, such Directive.

Notice of any termination or appointment and of any changes in specified offices will be given to the Holders promptly by the Republic in accordance with Condition 10 and to the Trustee.

4. **TAXATION**

4.1 All payments on the GDP-linked Securities will be made by the Republic without withholding or deduction for, or on account of, any present or future taxes, levies or duties of whatever nature imposed, levied, collected or assessed by or on behalf of the Republic or any political subdivision or taxing authority thereof (**Greek Withholding Taxes**), unless such withholding or deduction is required by law. In such event, the Republic will pay such additional amounts (**Additional Amounts**) as may be necessary in order that the net payment made in respect of the GDP-linked Securities after such withholding or deduction for or on account of Greek Withholding Taxes is not less than the amount that would have been receivable in respect of the GDP-linked Securities in the absence of such withholding or deduction; *provided that* the foregoing obligation to pay Additional Amounts shall not apply to….

5. **STATUS OF THE GDP-LINKED SECURITIES**

The GDP-linked Securities constitute direct, general, unconditional, unsubordinated and unsecured obligations of the Republic. The GDP-linked Securities rank, and will rank, *pari passu* among themselves and with all unsecured and unsubordinated obligations for borrowed money of the Republic. The due and punctual payment of the GDP-linked Securities and the performance of the obligations of the Republic with respect thereto are backed by the full faith and credit of the Republic.

6. **PURCHASE OF SECURITIES**

6.1 **Purchase Option**

At any time after 1 January 2020, upon not less than 30 nor more than 60 days' notice to the Holders in accordance with Condition 10 and to the Trustee (a **Purchase Option Notice**), the Republic may, at its option, on any one or more occasions elect to purchase any or all of the GDP-linked Securities from the Holders at the Call Price. In the event that the Republic delivers a Purchase Option Notice, each Holder shall be required to sell to the Republic on the date specified in such Purchase Option Notice such amount of the GDP-linked Securities as is specified in such Purchase Option Notice, in each case at the Call Price, *provided that* the number of GDP-linked Securities to be purchased by the Republic specified in such Purchase Option Notice shall be an integral multiple of 1,000 (other than the final purchase which shall be in respect of all GDP-linked Securities then Outstanding). In the event that any Purchase Option Notice specifies that the Republic shall purchase some only but not all of the GDP-linked Securities then Outstanding, each GDP-linked Security will be purchased by the Republic, and the Holders shall be required to sell, on a *pro rata* basis.

The Call Price shall be paid to the relevant Holders in accordance with Conditions 3.1(b) to (e) (inclusive). For the purposes of these Terms and Conditions:

Call Price means, in respect of any date on which the Republic makes a purchase of GDP-linked Securities from the Holders pursuant to this Condition 6.1, and for each 1,000 GDP-linked Securities so purchased, the arithmetic mean of the Market Price for the 30 Trading Days preceding the date on which the relevant Purchase Option Notice is given.

Market Price means, for any day, the amount required to purchase 1,000 GDP-linked Securities at the price equal to the arithmetic mean of the last bid and asked prices:

(i) quoted or otherwise provided by Bank of Greece's Electronic Secondary Securities Market (or any successor service) (**HDAT**); or

(ii) to the extent that no price is quoted or otherwise provided as set out in (i) immediately above on any day, as determined by the Ministry of Finance (acting in good faith in a commercially reasonable manner), based on the arithmetic mean of the quotations for the GDP-linked Securities from at least three and not more than five primary reference banks in Europe of the arithmetic mean of the bid and asked

prices for the GDP-linked Securities. If the Ministry of Finance obtains five quotations, the Ministry of Finance shall determine the arithmetic mean after eliminating the highest (or, in the event of equality, one of the highest) and lowest (or, in the event of equality, one of the lowest) quotations.

All calculations made by the Ministry of Finance hereunder shall be binding on all parties including the Trustee and all Holders of this GDP-linked Security absent bad faith, wilful misconduct or manifest error on the part of the Ministry of Finance.

The Ministry of Finance shall provide in the Purchase Option Notice, for each relevant day, the name of the pricing source and the relevant price quotation and/or, as the case may be, the reference banks which have provided such quotations and details of the relevant quotations and in all the cases the calculations made.

Trading Day means any day (other than a Saturday or a Sunday) on which (i) HDAT (or any successor service) is open for trading, to the extent there is no market, exchange and/or trading disruption, and/or early closure, in each case which the Ministry of Finance (acting in good faith in a commercially reasonable manner) determines is material for the purposes of determining the Market Price; or (ii) to the extent that HDAT is permanently closed and no successor service is available, commercial banks are generally open for business and carrying out transactions in the place of business of each of the reference banks selected for the purposes of calculating the Market Price.

6.2 **Other Purchases of Securities**

The Republic may at any time purchase or otherwise acquire GDP-linked Securities at any price in the open market or otherwise.

6.3 **Cancellation**

Any GDP-linked Security purchased or otherwise acquired by the Republic may be held, reissued, resold or, at the option of the Republic, cancelled, *provided that* any such GDP-linked Securities purchased or otherwise acquired by the Republic shall, unless previously reissued or resold, be cancelled on or before 31 December in the year of purchase and thereafter may not be reissued or resold.

7. **PRESCRIPTION**

Claims for payments under the GDP-linked Securities shall become void unless made within the period of five years from the Relevant Date.

8. **ENFORCEMENT**

Subject to the Trust Deed, the Trustee shall (subject in each case to being indemnified and/or secured and/or prefunded to its satisfaction by the relevant Holders), if so requested in writing by Holders for the time being of at least 25 per cent in aggregate Notional Amount of the Outstanding GDP-linked Securities, take such proceedings against the Republic as it may think fit to enforce the payment of

any amounts due hereunder on any Payment Date (as this GDP-linked Security may be amended or modified pursuant to Condition 9) if the Republic fails to make such payment before the day falling 30 days after the due date for such payment.

No Holder shall be entitled to proceed directly against the Republic by instituting any proceeding, judicial or otherwise, with respect to the GDP-linked Securities or the Trust Deed, or for the appointment of a receiver or a trustee, or for any other remedy hereunder, unless the Trustee, having become bound so to proceed under the Trust Deed, fails to do so within a reasonable period and the failure shall be continuing.

9. **MEETINGS AND MODIFICATIONS**

10. **NOTICES**

11. **FURTHER ISSUES**

The Republic shall be at liberty from time to time without the consent of the Holders to create and issue further Securities having terms and conditions the same as the GDP-linked Securities or the same in all respects save for the amount and date of the first payment thereon and so that the same shall be consolidated and form a single series with and increase the outstanding aggregate Notional Amount of the GDP-linked Securities.

12. **INDEMNIFICATION OF TRUSTEE**

The Trust Deed contains provisions for the indemnification of the Trustee and for its relief from responsibility, including provisions relieving it from any obligation to take proceedings to enforce repayment unless indemnified and/or secured and/or prefunded to its satisfaction. The Trust Deed also contains provisions pursuant to which the Trustee is entitled *inter alia*, (i) to enter into business transactions with the Republic or any person or body corporate associated with the Republic and to act as trustee for the holders of any other securities issued by or relating to the Republic or any person or body corporate associated with the Republic, (ii) to exercise and enforce its rights, comply with its obligations and perform its duties under or in relation to any such transactions or, as the case may be, any such trusteeship without regard to the interests of, or consequences for, the Holders, and (iii) to retain and not be liable to account for any profit made or any other amount or benefit received thereby or in connection therewith.

13. **GOVERNING LAW**

13.1 The GDP-linked Securities, the Trust Deed and any non-contractual obligations arising out of or in connection with the GDP-linked Securities and/or the Trust Deed shall be governed by and construed in accordance with the laws of England and Wales.

13.2 The Republic irrevocably and unconditionally agrees for the exclusive benefit of the Trustee and the Holders that the courts of England are to have exclusive jurisdiction to settle any disputes which may arise out of the GDP-linked Securities and/or the Trust Deed, and that any suit, action or proceeding arising out of the GDP-linked Securities and/or the Trust Deed (including any suit, action or proceeding arising out of any non-contractual obligations arising out of the GDP-linked Securities and/or the Trust Deed) (together referred to as **Proceedings**) may be brought in the courts of England.

13.3 The Republic irrevocably appoints The Economic and Commercial Counsellor at the Greek Embassy, 1A Holland Park, London W11 3TR, United Kingdom to receive service of process in relation to any Proceeding in England.

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