



Piraeus Bank Greek Sovereign Bond Index

2014 can be characterised as a year of recovery with regards to stability and increased investor appetite for Greek government and corporate bonds. While the implementation of the Memorandum continues, the Greek Government proceeded in April and July with two new bond issues after four years of exclusion from international markets. The successful issues of Greek government bonds with the coupon below the psychological barrier of 5% is a significant development for the Greek economy and the attempt to exit the perennial crisis. In combination with the high bond coverage from foreign institutional investors, this is a crucial step towards restoring the confidence of international markets and Greek economic potential. Based on these developments, which signal the future direction of Greek government bonds and increased investor appetite, Piraeus Bank created the Greek Government Bond Index – following our Piraeus Bank Greek Corporate Bond Index, which reflects the overall changes and returns of Greek government bonds.

The evolution of the index and its comparison with the Bloomberg Eurozone Sovereign Bond Index is indicative of developments in the Greek economy, the intention of international investors to take on Greek risk and the higher returns relative to other countries. The index on September 30th had increased by 43.4% year-to-date compared to 10.3% for the respective Eurozone index. The covariance of the two indicators is remarkable, indicating that despite limited liquidity, the Greek bond market followed European trends. The higher Greek bond returns reflect the rapid decline in yields on Greek bonds, which is a consequence of the reduction of the Greek risk premium.

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Bloomberg Ticker:

Index: {PBGGGSBI Index<GO>}

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PIRAEUS BANK GREEK SOVEREIGN BOND INDEX



Source: Piraeus Bank Research

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Data and Characteristics

The basic selection criterion is that bonds are issued by the Greek Government. Moreover, bonds must be issued in a common currency, which, as far as the Piraeus Bank Greek Sovereign Bond Index is concerned, is the Euro. As part of the selection process, the bonds that have been excluded are International Bonds; bonds that are held by the European Central Bank and other Central Banks due to the SMP and ANFA, as well as bonds by public companies such as the Athens Urban Transportation Organisation (OASA) and the Hellenic Railways Organisation (OSE). The purpose of the index is to represent alternative sources of public funding through markets and to evaluate the returns of government bonds over time following the PSI and Buy-Back. The main source of information for the selection, calculation and construction of the Index is Bloomberg and the Ministry of Finance. In the following table, we present the final constituent list of the Piraeus Bank Greek Sovereign Bonds Index, along with the main characteristics of each bond: The amount issued, the amount outstanding, the currency, the coupon, the coupon type, the coupon frequency, the announcement date, maturity and the bond rating.

The first twenty bonds in the following table are those issued following the PSI and Debt Buy-Back, while the last two are the first long-term issues of the Greek government after four years, namely the April and July 2014 issues.

Piraeus Bank Greek Sovereign Bond Index Constituents									
Corporation	Amount Issued (€ mn.)	Amount Outstanding (€ mn.)	Currency	Coupon	Coupon Type	Coupon Frequency	Announcement Date	Maturity	Bond Rating (Standard & Poor's)
Hellenic Republic Government Bond	2.97	1.79	€	2.000	Fixed	Annual	24-02-12	24-02-23	B
Hellenic Republic Government Bond	2.97	1.77	€	2.000	Fixed	Annual	25-02-12	24-02-24	B
Hellenic Republic Government Bond	2.97	1.74	€	2.000	Fixed	Annual	26-02-12	24-02-25	B
Hellenic Republic Government Bond	2.97	1.50	€	2.000	Fixed	Annual	27-02-12	24-02-26	B
Hellenic Republic Government Bond	2.97	1.47	€	2.000	Fixed	Annual	28-02-12	24-02-27	B
Hellenic Republic Government Bond	3.17	1.53	€	2.000	Fixed	Annual	29-02-12	24-02-28	B
Hellenic Republic Government Bond	3.17	1.50	€	2.000	Fixed	Annual	01-03-12	24-02-29	B
Hellenic Republic Government Bond	3.17	1.44	€	2.000	Fixed	Annual	02-03-12	24-02-30	B
Hellenic Republic Government Bond	3.17	1.37	€	2.000	Fixed	Annual	03-03-12	24-02-31	B
Hellenic Republic Government Bond	3.17	1.37	€	2.000	Fixed	Annual	04-03-12	24-02-32	B
Hellenic Republic Government Bond	3.17	1.45	€	2.000	Fixed	Annual	05-03-12	24-02-33	B
Hellenic Republic Government Bond	3.17	1.41	€	2.000	Fixed	Annual	06-03-12	24-02-34	B
Hellenic Republic Government Bond	3.17	1.44	€	2.000	Fixed	Annual	07-03-12	24-02-35	B
Hellenic Republic Government Bond	3.17	1.51	€	2.000	Fixed	Annual	08-03-12	24-02-36	B
Hellenic Republic Government Bond	3.17	1.40	€	2.000	Fixed	Annual	09-03-12	24-02-37	B
Hellenic Republic Government Bond	3.17	1.38	€	2.000	Fixed	Annual	10-03-12	24-02-38	B
Hellenic Republic Government Bond	3.17	1.34	€	2.000	Fixed	Annual	11-03-12	24-02-39	B
Hellenic Republic Government Bond	3.17	1.37	€	2.000	Fixed	Annual	12-03-12	24-02-40	B
Hellenic Republic Government Bond	3.17	1.36	€	2.000	Fixed	Annual	13-03-12	24-02-41	B
Hellenic Republic Government Bond	3.17	1.43	€	2.000	Fixed	Annual	14-03-12	24-02-42	B
Hellenic Republic Government Bond	4.10	4.10	€	4.750	Fixed	Annual	10-04-14	17-04-19	B
Hellenic Republic Government Bond	2.10	2.10	€	3.375	Fixed	Annual	10-07-14	17-07-17	B

Methodology and Creation of Index

The greatest challenge that had to be faced when creating the index was developing the methodology to be followed with regards to assigning the appropriate weight to each bond, how the weighting of each bond would change in the case of a new issuance and the rebalancing of the index in the case of coupon payments.

Weighting

The key assumption is that the index captures the total amount of outstanding bonds, which means that the investor buys the market. We assume that the Index measures the return on a portfolio which holds each bond in proportion to its market value. Based on this assumption, we conclude that it is the relative market value of a bond that must be taken into account, as the coupon reinvestment in every bond does not affect their relative market values. What indeed is affected by the coupon reinvestment is the total return of the bond and consequently of the index.

In the following table, we present the weighting of each bond as of September 2014:

Piraeus Bank Greek Sovereign Bond Index Weights		
	Maturity	Sep-14
Hellenic Republic Government Bond	24-02-23	5.0
Hellenic Republic Government Bond	24-02-24	5.0
Hellenic Republic Government Bond	24-02-25	4.9
Hellenic Republic Government Bond	24-02-26	4.2
Hellenic Republic Government Bond	24-02-27	4.1
Hellenic Republic Government Bond	24-02-28	4.3
Hellenic Republic Government Bond	24-02-29	4.2
Hellenic Republic Government Bond	24-02-30	4.0
Hellenic Republic Government Bond	24-02-31	3.8
Hellenic Republic Government Bond	24-02-32	3.8
Hellenic Republic Government Bond	24-02-33	4.1
Hellenic Republic Government Bond	24-02-34	3.9
Hellenic Republic Government Bond	24-02-35	4.0
Hellenic Republic Government Bond	24-02-36	4.2
Hellenic Republic Government Bond	24-02-37	3.9
Hellenic Republic Government Bond	24-02-38	3.9
Hellenic Republic Government Bond	24-02-39	3.7
Hellenic Republic Government Bond	24-02-40	3.8
Hellenic Republic Government Bond	24-02-41	3.8
Hellenic Republic Government Bond	24-02-42	4.0
Hellenic Republic Government Bond	17-04-19	11.4
Hellenic Republic Government Bond	17-07-17	5.9
		100.0

Source: Piraeus Bank Research

Rebalancing

The Piraeus Bank Greek Sovereign Bond Index is rebalanced regularly so as to incorporate any changes, such as a new issuance or coupon payments. The rebalancing takes place on a daily basis, as we believe that the daily rebalancing best reflects the dynamics of the current investment climate that a portfolio manager might have to face.

- A new bond issue is added to the index on the day of the issue.
- The daily total returns of the bond and of the Index following the addition of the new bond are calculated one day after the issue date.

Calculation of the Daily Total Returns of the Index

Daily total returns of the index measure the total returns of the bonds of the index, including the accrued interest and coupon payments. The one-day return from time point t-1 to time point t-2 is calculated as follows:

$$dr_t = \frac{\sum_i AO_{i,t-1} * (P_{i,t} + AI_{i,t}) / 100}{\sum_i AO_{i,t-1} * (P_{i,t-1} + AI_{i,t-1}) / 100} - 1$$

Where P: Bond market Price
 AI: Accrued Interest
 AO: Amount Outstanding

In the case of a coupon payment on that particular day, the formula is:

$$dr_t = \frac{\sum_i AO_{i,t-1} * (P_{i,t} + AI_{i,t}) / 100 + \sum_i C_{i,t}}{\sum_i AO_{i,t-1} * (P_{i,t-1} + AI_{i,t-1}) / 100} - 1$$

Where

P: Bond market Price

AI: Accrued Interest

AO: Amount Outstanding

C: Coupon

As a result, the total return of the index between t-k and t is:

$$r_{t-k,t} = \frac{Index_t}{Index_{t-k}} - 1$$

Calculating the Yield of the Index

The average index yield is measured as the weighted average yield of each bond in relation to the amount outstanding.

Building The Index

On its inception date (09/03/2012) the index was set at 100. Consequently the value of the Index is calculated as follows:

$$Index_t = Index_{t-k} * (1 + dr_{t-k+1}) * \dots * (1 + dr_{t-1}) * (1 + dr_t)$$

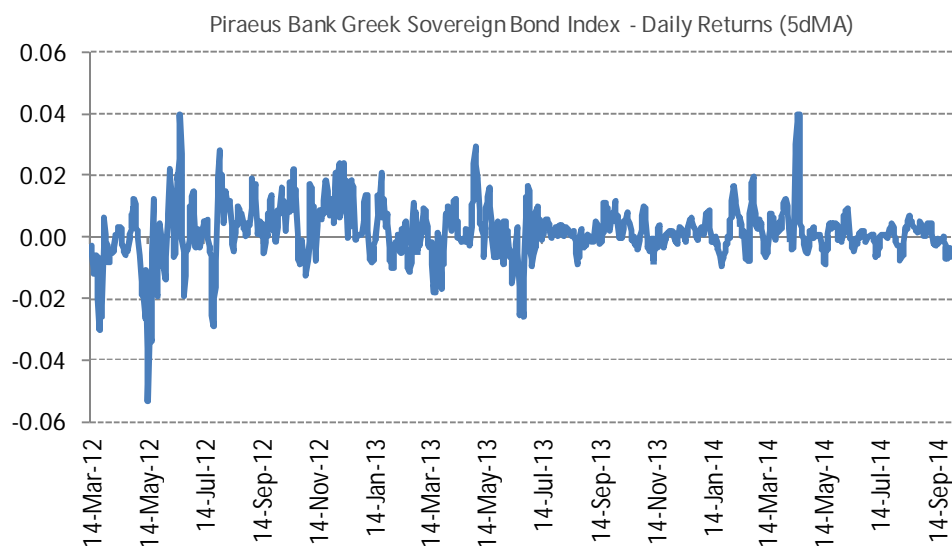
The Piraeus Bank Greek Sovereign Bond Index and International Markets

The Greek Sovereign Bond Index that derives from our analysis with a starting price of 100 on March 9, 2012 is illustrated in the following chart:



Source: Piraeus Bank Research

In the following line chart, we report the daily total returns of the Index on a five day moving average.



Source: Piraeus Bank Research

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While in the following table, the weighted average yield for end 2013 and the latest observation is:

Weighted Average Yield	
31 December 2013	8.21
30 September 2014	6.63

Source: Piraeus Bank Research

The evolution of the weighted average yield is represented in the following line chart:



Source: Piraeus Bank Research

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Relationship between the Piraeus Bank Greek Sovereign Bond Index and its Yield



Source: Piraeus Bank Research

PIRAEUS BANK GREEK SOVEREIGN BOND INDEX

What is of particular interest is the comparison of the Bloomberg Eurozone Sovereign Bond Index to the Piraeus Bank Greek Sovereign Bond Index for the same time periods. Our main finding is that Greek government bonds offer a higher return, while, however, following the global market trends.



Source: Piraeus Bank Research

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