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What is the probability for Greece to default on its debt?



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ABSTRACT

This paper investigates the probability for Greece to default on its current debt. Several ‘bailout packages’ have been provided to Greece by the rest of the countries of the European Union. We also take a look at the IMF who built special frameworks that can be used by countries who find themselves in financial problems. A chapter was dedicated to the default of other countries around the world, in order to better understand what happens when a country defaults. Furthermore we have concluded that we have seen the situation of Greece coming and that was just a matter of time. The Austerity packages that were provided to Greece contained such harsh measures that they made Greece’s potential to fulfill their obligations even more unclear.

Keywords: Financial Crises, Information and Market Efficiency, International Financial Markets, Financial Forecasting and Simulation

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“Be strong and courageous. Do not be afraid; do not be discouraged, for the LORD your God will be with you wherever you go.” Book of Joshua (1:9)

Table of Acronyms

DSF	Debt Sustainability Framework
DSA	Debt Sustainability Analysis
EC	European Commission
EFMS	European Financial Stabilization Mechanism
EU	European Union
GDP	Gross Domestic Product
IMF	International Monetary Fund
LIC	Low Income Countries
VAT	Value Added Tax
S&P	Standard & Poor
ICRG	International Country Risk Guide

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1. Introduction

1.1 Thesis Topic

The deterioration of Greece's economic situation makes us realize once more that the growth of the public debt levels as well as the debt to GDP ratios has, in many parts of the world, turned out to be a serious problem. On a daily basis we are being confronted with information about the poor economic situation of Greece. There is much uncertainty and the most important question is whether Greece is able to meet its obligations and pay off its outstanding debts. This is important because Greece is a member state of the European Union, the countries within the EU work closely together, enabling them to influence each other's GDP to a certain extent. By following the developments of the crisis, we can conclude that the situation has gotten worse. On June 1, 2011, there was mentioned that the EU is busy putting together a rescue package for Greece¹. And on June 6, 2011 it was stated that Greece may not be able to repay its debt and that it will need to be refinanced².

This situation is of a very sensitive nature. If it is proven that Greece is unable to repay its debts this will not only affect Greece but it will also have an effect on the economic situation of the rest of the countries within the EU, which Greece forms a part since 1981. If the economic situation of Greece worsens then it means that the economies of all EU Member States will suffer due to the negative performance. Deterioration of the economic situation within the EU will also have an effect on the way the EU is regarded by the rest of the world. Thus we can conclude that there is a lot at stake.

If we consider the history of the EU member states, we can infer that there has always been a difference in economic strength between the various Member States. Statistics for the year 1995 show that Greece faced a budget deficit of 9.1% of GDP; the central government debt was of 109.3%³⁴. According to the guidelines of the European Commission, a Member State is not allowed to have a budget deficit that exceeds 3% of their GDP. Given these data, we can conclude that the Greek economy was weak since the early start. Indeed if we look at the evolution of Greece's budget deficit we can see that the Greece government never managed to reduce their budget deficit below the 3% that has been prescribed by the EC.

¹ De telegraaf.nl (1 juni 2011)

² Het Financieel Dagblad (6 juni 2011)

³ Relevance year 1995: When the ESA95 was approved, it became compulsory for member states to provide tables and graphs about their economic development. The legal requirement is valid from the end of the year 2002. The tables cover mostly the period since 1995.

⁴ Source : the data.worldbank.org (<http://data.worldbank.org/indicator/GC.BAL.CASH.GD.ZS?page=3>)

1.1.1 Countries that defaulted in the past

Before Greece, the European financial stabilization mechanism (EFSM) and the International Monetary Fund (IMF) had to provide two other members of the European Union - Portugal and Ireland - with extra funding, in order for them to service their debts. In the case of Portugal the bailout amounted into a total of € 78 billion Euros. With the aforementioned examples, we illustrate that it often happened that a member of the European Union encountered economic problems but that with the help of the other Member States, European Commission and the International Monetary Fund (IMF) after several years of planning and making the necessary savings they could improve their economic situation.

The cases that were mentioned above are clearly cases of countries who nearly defaulted on their debt. Both countries - Portugal and Ireland - are member states of the EU. In the following section the case of Argentina will be briefly discussed in order to provide a more in debt insight in to what happens when a country defaults. Throughout the end of 2001 and the beginning of 2002, Argentina made news around the world. A rapidly deteriorating economic situation weakened the indecisive government (Schamis, 2002).

‘Due to the resignation of the president, Argentina had to deal with 3 different presidents in a very short period of time. A prolonged recession had eroded the country’s fiscal base, weakening its ability to service its large foreign debt. In the context of the currency board, the government could not intervene with stimulative policies⁵. As the recession dragged on, the country’s fiscal position got weaker still. Throughout 2001, this dynamic steadily pushed up Argentina’s debt repayment “risk index”, which translated into exorbitant interest-rate increases and even worse debt-repayment problems. After a cycle best captured by the notion of self-fulfilling prophecies, the dam broke in mid-December 2001 when, determined to continue making debt payments, the government tapped previously sacrosanct central-bank reserves and rolled over obligations with the private pension funds to do so. As if to prove this beyond any possibility of doubt, the government froze bank deposits—imposing another loss of wealth on millions of citizens—to prevent a massive flight to the dollar and with it the collapse of the banking system’ (Schamis, 2002).

In the case of Argentina, defaulting on its debt was not only due to the poor economic situation of the country, but mainly due to the poor management by the government.

⁵ An intervention was not possible due to the fact that the Peso was pegged to the US dollar

We analyzed cases of previous debt crisis cases, in order to give a more incisive idea on what could happen when a country defaults on its debt. Hereby it is important to bear in mind that even though debt crises initiate in different manners, usually they end up following similar patterns, which in certain cases makes it possible for us to make comparison between the different debt crises. At the end of this thesis, we want to conclude the probability that Greece will default on its outstanding debt. We also want to examine the consequences for Greece and for the European Union, in case Greece is unable to fulfill its obligations.

1.2 Research question and sub questions

With Greece being at the border of defaulting on its debt, there is much uncertainty about the country's future. Considering this the research question is:

What is the probability for Greece to default on its debt?

Literally defaulting means: failure to perform a task or fulfill an obligation, especially failure to meet a financial obligation. Thus the probability that Greece will not be able to pay its debt. 'The current crisis was triggered by the loss of market confidence after the public deficit figures were revised up sharply from 3.7 per cent of GDP to 6 per cent in September, and then up again after a general election in October to 12.7 per cent. Greece owes foreign banks €220 billion, equal to 115 per cent of its GDP' (The times, 2010)⁶.

In order to make the thesis more structured and to ultimately reach a proper conclusion, three sub- questions will be used.

Question 1: What is debt sustainability?

Question 2: What do we understand under Sovereign Default?

Question 3: Can we make predictions about the Greece debt, using the debt sustainability and the developments in the Greek Financial Market?

⁶ The Business times. Q&A: The Greek Crisis. 17 february 2010
<http://business.timesonline.co.uk/tol/business/economics/article7030186.ece>

1.3 Thesis Format and Methodology

The paper is structured as follows. In chapter two, the debt sustainability framework will be discussed through a literature review and exploration of the theory about this framework.

In chapter 3, the theory about sovereign defaults will be explained, and also examples of previous sovereign defaults will be discussed. Next, in chapter 4 the dataset of Greece will be introduced in order to analyze several key macroeconomic variables that are central to this research. Chapter 5 will then finally, be the conclusion for the paper and present a summary.

1.3.1 Methodology

The research method that will be implemented during this thesis is combination of theoretical research and practical research. In order to answer our research question: What is the probability that Greece will default on its debt, we will be using the debt sustainability framework for countries and we will be also using a combination of variables and ratios in order to determine the default risk. In general, default risk is considered to be the risk of contractual failure to pay and this is the definition that will be used during this thesis. The default risk can be seen as a combination of the economic, financial and political risk of a country. Determining the economic, financial and political risk that Greece is currently facing, will give a perspective on the effect of these risks on Greece's ability to pay. 'The economic and financial risk refers to a country's ability to pay its debt. Political risk refers to the political decisions made within a country that might result in an unanticipated loss for investors' (Erb et al, 1996). This is also referred to as the willingness of a country to pay its debt and to maintain a hospitable climate for outside investors (Investopedia, 2011).

According to Hernandez-Trillo (1994), the elements that are found useful in explaining the probability of default are: *the degree of openness* (-0.07564), *international reserves* (-0.05848)⁷⁸. Also external conditions have contributed substantially to the financial crisis that major borrowers face today; in particular, unluckiness and the persistence of shocks are shown to be important when explaining the probability of default⁹. According to the research that was conducted by Kalotychou & Staikouras (2005), *debt levels* (2.66), *trade resources* (-2.61), *internal economics environment* (2.59) and *international factors* (2.11)¹⁰ do play an

⁷ In order to determine the significance level of the variables a probit analysis was used. The numbers in parenthesis are the significance levels of each variable

⁸ Both variables were tested using a significant level of 5%.

⁹ Even though scholars found that 'unluckiness' is an important factor when explaining default, this term will not be further discussed in this paper.

¹⁰ Significant level 5%. Other variables significant at a 1%

important role in determining default. In particular, *net international reserves (5.18)* account for much of the volatility in debt repayment. The method that will be used in order to determine the probability that Greece will default is by using the different variables and ratios (see table 1) that have been previously mentioned¹¹. In order to calculate the default probability we will be observing the development of the economic, financial and political risk of Greece. Also Greece's credit rating will be briefly discussed, the higher this rating the safer the investment made in that country is.

2. Debt sustainability framework

2.1 Introduction

In this chapter, the debt sustainability framework for countries will be explained. The term "debt sustainability" refers to *the ability of a debtor country to service its debt on a continuing basis and not go in to default*. Assessing sustainability in the first instance means forming a view of how outstanding stocks of liabilities are likely to evolve over time. 'This requires projecting the flows of revenues and expenditures including those for servicing debt as well as exchange rate changes (given the currency denomination of the debt). Projections of the debt dynamics thus depend, in turn, on macroeconomic and financial market developments which are intrinsically uncertain and highly variable. Here, a key factor is the market willingness to provide financing, which determines the costs of rolling over debt. Such projections also frequently incorporate judgments, based on historical and cross-country experience, of what adjustment is politically and socially feasible. They also depend importantly on the exchange rate regime both because the existing regime affects the variability of exchange rates and because a change in regime is always possible. However in this case, the exchange rate does not play an important role, due to the fact that Greece uses a currency in conjunction with the rest of the countries of the European Union. Another complication is that the sustainability of a country's external debt depends on the balance sheets and revenue-expenditure balances of several different sectors of the government, the banking system, and the corporate and household sectors which are also linked with one another by actual and contingent liabilities. These factors should be incorporated into assessments of sustainability in so far as this is feasible, given the availability of information' (IMF: Assessing Sustainability, 2002)¹². After a debt crisis, sustainability may be restored through a rescheduling of the debt. There is a

¹¹ See table 1. In the Appendix for a description of how we determine and calculate the variables

¹² IMF: Assessing Sustainability (Approved by Timothy Geithner) May 28, 2002

framework that makes it easy for a country to see what steps can be taken to achieve a desired economic development and not to default. This framework can be applied by both high-income countries and low income countries. By distinguishing between the market access of countries -thus to what extent a country has the ability to access international capital markets- a more specified framework can be built that can suit the economic situation of most countries. The information needed to calculate the sustainability of a country and to provide the needed advice is collected by analyzing the external debt of that country. In the second part of this chapter the theoretical side of the debt sustainability framework will be discussed and an outline will be given as to how to apply the framework in practice.

Table 1. List of variables

Literature	Variable	Name	Formula	Description
Hernandez Trillo (1994)	DOP	The degree of openness	$X+M$ GDP	A country's degree of economic openness is the extent to which its economy is integrated with the rest of the world*.
	IR	International reserves		These are assets of the central bank held in different reserve currencies.
Kalotychou & Staikouras (2005)	<u>Debt Ratio</u>			
	D/GDP	Debt over GDP	Table 3	Total external debt relative to GDP**
	<u>Trade Resources</u>			
	XPG	Export growth		Annual percentage change in exports
	<u>Domestic Economy</u>			
	IN	Inflation	Figure 3	Annual percentage change in the consumer price index
	XR	Real exchange rate overvaluation		Deviation of the real exchange rate from the long-run trend
	GDPG	Growth rate of GDP	Table 3	
	<u>External Developments</u>			
	GDP/cap	GDP per Capita	Appendix Fig.	

* In practice, the degree of a country's openness to trade is measured by the ratio between aggregate exports plus imports and gross domestic product

** Total External Debt includes public and publicly guaranteed, private non-guaranteed and long and short-term debt and loans from the IMF and the World Bank (Kalotychou and Staikouras, 2005)

The highlighted variables have been considered used in the calculations

2.2 Literature review

‘In response to the currency crises that afflicted several emerging market economies in the 1990s, the IMF launched a major effort to improve its ability to analyze whether, and to what extent, countries are vulnerable to such crises. Emerging market economies, which often heavily rely on external borrowing and other capital inflows for their economic growth, are especially vulnerable to reversals in investor sentiment. The IMF has therefore paid special attention to this group of countries in its vulnerability assessment work. However, as the recent turmoil in world financial markets underscores, crises can manifest in countries at various stages of development. In order to detect any failures or crisis possibility in an early stage the IMF uses vulnerability indicators. These cover the government, the financial sector, household and corporate sectors. When economies are under stress, a problem in one sector often spreads to other sectors. In order to control this, the IMF uses the following indicators’ (IMF Factsheet, 2008).

- Indicators of external and domestic debt¹³
- Indicators of reserves adequacy¹⁴ .
- Financial soundness indicators¹⁵
- Corporate sector indicators¹⁶

‘It is useful to start with a definition of debt sustainability as a situation in which a borrower is expected to be able to continue servicing its debts without an unrealistically large future correction to the balance of income and expenditure. Sustainability rules out any of the following: a situation in which a debt restructuring is already needed (or expected to be needed); a situation where the borrower keeps on indefinitely accumulating debt faster than its capacity to service these debts is growing; or a situation in which the borrower lives beyond its means by accumulating debt in the knowledge that a major retrenchment will be needed to service these debts. The cost of financing is a key factor influencing debt accumulation and

¹³ This includes debt maturity profiles, repayment schedules, interest rate sensitivity and currency composition. The ratios of external debt to exports and to GDP are useful indicators of trends in debt and repayment capacity. Where public sector borrowing is significant, the ratio of debt to tax revenue is particularly important to gauge the country's repayment capacity.

¹⁴ These are central to assessing a country's ability to avert liquidity crises. The ratio of reserves to short-term debt in particular is key to gauging the vulnerability of countries with significant but uncertain access to capital markets

¹⁵ These are used to assess the strengths and weaknesses of countries' financial sectors. They cover the capital adequacy of financial institutions, the quality of assets and off-balance sheet positions, profitability and liquidity, and the pace and quality of credit growth. Financial soundness indicators are for instance used to assess financial systems' sensitivity to market risk, including changes in interest rates and exchange rates.

¹⁶ The foreign exchange and interest rate exposure of companies are particularly important when assessing the potential impact of exchange rate and interest rate changes on corporate sector balance sheets. Indicators related to corporate leverage, profitability, cash flow, and financial structure are also relevant.

thus sustainability. Sustainability thus incorporates the concepts of solvency and of liquidity, without making a demarcation between them' (IMF Assessing sustainability, 2002)¹⁷.

The following types of sustainability can be assessed:

1. External Sustainability

Assessing external sustainability has a number of dimensions judgments about whether the current account can be financed through private and official capital flows; projections of the medium-term balance of payments and the associated debt (or net foreign liabilities) dynamics; and assessments about the appropriate level of the exchange rate that are clearly related through various stock-flow and trade elasticity relationships. Existing work at the Fund, whether in a program or surveillance context, touches upon each of these dimensions, while emphasizing those aspects that are particularly relevant to the application at hand. In addition to the standard indicators of debt and debt service, the main tools are medium-term balance of payments projections and benchmarks for assessing medium-term current account projections (IMF Assessing sustainability, 2002)¹⁸.

2. Fiscal Sustainability

Assessments of fiscal sustainability are a second key element in the work of Fund staff. These assessments have two main dimensions: indicators of public debt and deficits and medium-term fiscal projections. Each of these elements is based on an extensive body of information, which highlights both the substance and the limitations of these tools (IMF Assessing sustainability, 2002).

3. Financial Sector Stability

There are important interactions between the stability of the financial system and sustainability of public and external debt. On the one hand, the government often acts as the ultimate guarantor (explicit or implicit) of the financial system, which confronts it with potentially large contingent liabilities in the face of widespread bank insolvencies. On the other hand, an unsustainable stock of government debt could cause broader financial

¹⁷ Which aspect of sustainability solvency or liquidity is more relevant in making the sustainability assessment depends on the country circumstances and, in particular, its source of finance. For low-income countries that do not borrow from private capital markets, but may have a high debt ratio, liquidity is likely to be less of a concern than solvency. For many emerging market countries, although debt ratios may be moderate, the main sustainability risk may arise from liquidity problems.

¹⁸ Medium-term balance of payments projections are a standard tool, used inter alia to assess a members exchange rate, its need for Fund financing, and its ability to repay the Fund

instability, because government securities often constitute a large share of the assets of banks and other financial institutions due to their unique role as a source of collateral or low-risk assets, as well as their role in providing a benchmark for interest rates.

The importance of financial system stability has increasingly been recognized. (IMF Assessing sustainability, 2002)

2.3 Theoretical Framework

‘While the purpose is to provide greater uniformity and discipline to sustainability exercises, it is not intended that the framework be applied in a completely mechanical and rigid fashion depending upon country circumstances, there may be good reasons for deviating from it to some extent’(IMF Assessing sustainability, 2002).

However to a certain extent the, basic logic of the framework should be followed and any deviations from the reality should be noted and explained.

‘The framework may be useful in three different situations:

1. For countries that have moderately high indebtedness, but are not facing an imminent crisis, the framework can help identify vulnerabilities (how the country might eventually get into insolvency territory)
2. For countries that are on the brink, or in the midst of a crisis, experiencing severe stress characterized by high borrowing costs or lack of market access, the framework can be used to examine the plausibility of the debt-stabilizing dynamics articulated in the program projections.
3. Finally, in the aftermath of a default, the framework can be used to examine whether alternative structures and levels of restructured debt are consistent with projected outcomes’ (IMF Assessing sustainability, 2002).

Assessments of sustainability are probabilistic, since one can figure out for which states a country’s debt would be sustainable and for which not. ‘But the proposed framework does not supply these probabilities explicitly. It traces the implications of alternative scenarios and leaves the user to determine the probabilities that should be attached.

In the following part some rules for assessing the external debt-to-GDP ratio are mentioned. The analysis suggests that an external debt ratio of about 40 percent provides a useful benchmark. ‘For countries with debt ratios below this level, the conditional probability of a debt crisis or correction is around 2-5 percent. For countries with debt ratios above this level, the conditional probability rises to about 15-20 percent. The estimated benchmark level thus

provides a rough guide for assessing a country's debt ratio, with an appreciable increase in the probability of a crisis at debt levels above it. At the same time, it bears emphasizing that a debt ratio above 40 percent of GDP by no means necessarily implies a crisis indeed' (IMF Assessing sustainability, 2002)

Based on this it can be concluded, that one cannot always make correct predictions based solely on the ratios mentioned above, more variables need to be included. And a thorough research must be conducted first.

'The scenarios for the debt ratio generated by the framework need to be viewed in the context of the structure of the debt (such as its maturity structure, whether it is fixed or floating rate, whether it is indexed, and by whom is it held) as well as various vulnerability indicators and information provided by markets, including expectations of interest rates and spreads embedded in the position and shape of yield curves, access to new borrowing, and whether there have been interruptions in such access or difficulties in issuing long-term debt.

The framework also proposes a set of sensitivity tests, but further work will be necessary to settle on a precise calibration' (IMF Assessing sustainability, 2002)¹⁹.

Below, a theoretical framework is outlined specially for Low income countries. The theory that was previously discussed can be applied to Medium and High income countries. The main reason why the framework was adapted for Low income countries is the fact that low income countries do not have as much access to capital markets as medium and high income countries.

Low Income Countries

'The DSF analyzes both external and public sector debt. Given that loans to LICs vary considerably in their interest rates and length of repayment, the framework focuses on the net present value (NPV) of debt obligations. This ensures comparability over time and across countries. To assess debt sustainability, debt burden indicators are compared to indicative thresholds over a 20-year projection period. A debt-burden indicator that exceeds its indicative threshold suggests a risk of experiencing some form of debt distress. There are four possible ratings for the risk of external debt distress:

- Low risk occurs when all the debt burden indicators are well below the thresholds

¹⁹ A 'Vulnerability Indicators for External Debt Sustainability Assessments test' can be found in the INTERNATIONAL MONETARY FUND - Assessing Sustainability, 28th of May 2002 Pg 57-59

- Moderate risk occurs when debt burden indicators are below the thresholds in the baseline scenario
- High risk occurs when one or more debt burden indicators breach the thresholds under the baseline scenario
- The term ‘in debt distress’ is used when the country is already having repayment difficulties.

LICs with weaker policies and institutions tend to face repayment problems at lower levels of debt than countries with stronger policies and institutions. The DSF, therefore, classifies countries into one of three policy performance categories (strong, medium, and poor) using the World Bank’s Country Policy and Institutional Assessment (CPIA) index, and uses different indicative thresholds for debt burdens depending on the performance category. Thresholds corresponding to strong policy performers are highest—indicating that in countries with good policies debt accumulation is less risky. (IMF factsheet, 2011)

3. Sovereign Default

3.1 Introduction

In the previous chapter we discussed the DSF, when countries are not able to implement the DSF a consequence is that the country will default. Sovereign defaults are widespread throughout history. In particular, after Russia defaulted on its sovereign debt in 1998, numerous episodes of sovereign default followed (Hatchondo et al, 2007). Table 2 presents a list of default events since 1824 grouped in seven temporal clusters.

3.2 Literature review

Sovereign debt refers to debt incurred by governments. ‘Sovereign borrowing can be a key policy tool to finance investment or to respond to a cyclical downturn. There are different definitions of a sovereign default. First, from a legal point of view, a default event is an episode in which a scheduled debt service is not paid beyond a grace period specified in the debt contract. Second, credit-rating agencies consider a “technical” default an episode in which the sovereign makes a restructuring offer that contains terms less favorable than the original debt’ (Hatchondo et al, 2007). Spain defaulted six times between 1550 and 1650, and France defaulted eight times between 1550 and 1800 (Reinhart, Rogoff, and Savastano 2003). The amount of sovereign debt in default peaked at more than \$335 billion in 1990. This debt

was issued by 55 countries (Beers and Chambers 2006). One of the largest defaults occurred in 2001 when Argentina defaulted, with a total of \$82 billion.

Table 2. Selected Government Defaults and Rescheduling of Privately Held Bonds and Loans (1824-2003)

	1824– 1834	1867– 1882	1890– 1900	1911– 1921	1931– 1940	1976– 1989	1998– 2003
Europe							
Austria		1868		1914	1932		
Bulgaria				1915	1932		
Germany					1932		
Greece	1824		1893				
Hungary					1931		
Italy					1940		
Moldova							2002
Poland					1936	1981	
Portugal	1834		1892				
Romania				1915	1933	1981	
Russia				1917			1998
Serbia-Yugoslavia			1895		1933	1983	
Spain	1831	1867, '82					
Turkey		1876		1915	1940	1978	
Ukraine							1998
Latin America							
Argentina	1830		1890	1915	1930s	1982	2001
Bolivia		1874			1931	1980	
Brazil	1826		1898	1914	1931	1983	
Chile	1826	1880			1931	1983	
Columbia	1826	1879	1900		1932		
Costa Rica	1827	1874	1895		1937	1983	
Cuba					1933	1982	
Dominica							2003
Dom. Republic		1869	1899		1931	1982	
Ecuador	1832	1868		1911, '14	1931	1982	1999
El Salvador	1827			1921	1931		
Guatemala	1828	1876	1894		1933		
Honduras	1827	1873		1914		1981	
Mexico	1827	1867		1914		1982	
Nicaragua	1828		1894	1911	1932	1980	

Source: Hatchondo (2007)

Table 2 (Continued) Selected Government Defaults and Rescheduling of Privately Held Bonds and Loans (1824-2003)

	1824– 1834	1867– 1882	1890– 1900	1911– 1921	1931– 1940	1976– 1989	1998– 2003
Latin America (continued)							
Panama					1932	1982	
Paraguay	1827	1874	1892	1920	1932	1986	
Peru	1826	1876			1931	1978, '83	
Uruguay		1876	1891	1915	1933	1983	2003
Venezuela	1832	1878	1892, '98			1982	
Africa							
Angola						1988	
Cameroon						1989	
Congo						1986	
Cote d'Ivoire						1984	
Egypt		1876				1984	
Gabon						1986	
Gambia						1986	
Liberia		1874		1912		1980	
Madagascar						1981	
Malawi						1982	
Morocco						1983	
Mozambique						1984	
Niger						1983	
Nigeria						1983	
Senegal						1981	
Sierra Leone						1977	
South Africa						1985	
Sudan						1979	
Tanzania						1984	
Togo						1979	
Uganda						1981	
Zaire						1976	
Zambia						1983	
Other							
Jordan						1989	
Pakistan						1981	1999
Philippines						1983	
Vietnam						1985	

Notes: Defaults are excluded unless they coincide with a cluster. Russia also defaulted in 1839; Venezuela in 1847 and 1864; and Spain, in 1820 and 1851. U.S. southern states defaulted in the 1840s. Defaults are federal except for Argentina's defaults in 1915 and during the 1930s, which were at the provincial level. The year listed refers to the initial rescheduling or default.

Source: Hatchondo et al 2007

3.3 Default risk

According to Hatchondo et al (2007), the following circumstances are likely to lead to a sovereign default. Calculating the probability of the realization of these circumstances can help to estimate the probability of a default. Shapiro (1999) defines country risk as the general level of political and economic uncertainty in a country affecting the value of loans or investments in that country. Prior to lending, decisions such as whether or not to lend, how much to lend, and how much risk premium it should charge, are based on the measured risk. After lending, periodic country risk analysis serves as a monitoring device, providing a pre-warning system (Nath, 2008). According to the research that was conducted by Kalotychou & Staikouras (2005), debt levels, trade recourses, internal economics environment and international factors do play an important role in determining default. In particular, net international reserves account for much of the volatility in debt repayment followed by changes in exports. Another important domestic variable is the domestic financial resources provided to the private sector, which seems to explain equally well credit irregularities.

When current resources are low, to avoid defaulting on debt, large adjustments to expenditures and revenues would be required and these adjustments can be costly (Hatchondo et al, 2007). According to a study done by Tomz and Wright (2007) in which they used a dataset of 169 sovereign defaults, 62 percent of these defaults occurred in years when the output level in the defaulting country was below its trend. Cantor and Packer (1996) find that sovereign credit ratings strongly respond to macroeconomic factors, such as the GDP growth rate and per capita income. Except pure economic variables also political factors are determinant of default. Bilson et al (2002) define political risk as “the risk that arises from the potential actions of governments and other influential domestic forces, which threaten expected returns on investment. Citron and Nickelsburg (1987) find that political instability is statistically significant as a determinant of a country’s default probability. Political risk is a non-business risk arising out of political events and conditions in a country that could cause loss to international business, has been an important component of country risk analysis. Political events and conditions such as wars, internal and external conflicts, government regime change, terrorist attacks, and political legitimacy may seriously affect the profitability of international businesses and therefore constitute crucial elements in assessment of country risk (Nath, 2008)

4. Data and Analysis

4.1 Introduction

In this chapter a summary of the development of Greece's economy will be given. The purpose of providing the background information for Greece is to help to better understand, since when and why Greece's economy has been deteriorating. Further the results of the research will be provided and also, the consequences of a default of a country will be discussed.

4.2 Historical development of Greece's economy/debt

The Greek economy grew significantly after World War II, but declined in the 1970s due to poor economic policies implemented by the government. Greece faced economic hardships and defaulted on its loans in 1826, 1843, 1860 and 1893.²⁰ As a result, Greece has spent much of the 20th century and early 21st century rebuilding and strengthening the economy. This makes Greece one of the least economically developed member countries of the EU (Ekathimerini, 2011). 'In 2001 the government still controlled many sectors through state owned banks and industries. Its public sector accounted for approximately half of Greece's GDP. Limited natural resources, high debt payments, and a low level of industrialization have proved problematic for the Greek economy and prevented high economic growth in the 1990s. The Greek government took measures in the late 1980s and 1990s to reduce the number of state-owned businesses and to revitalize the economy through a plan of privatization. Despite these efforts, a decline in investments and the use of economic stabilization policies caused a downfall in the economy during the 1990s' (Ekathimerini, 2011). In the late 1990s, the government reformed its economic policy to be eligible to join the EU's single currency (Euro). Greece was accepted into the Economic and Monetary Union of the European Union by the European Council on 19 June 2000, based on a number of criteria using 1999 as the reference year. Measures included cutting Greece's budget deficit to below 2% of the GDP and strengthening its monetary policy, causing inflation to fall below 4% at the end of 1998 (the lowest in 26 years). After 15 consecutive years of economic growth, Greece went into recession in 2009. By the end of 2009, the Greek economy faced a

²⁰ Ekathimerini.com: http://www.ekathimerini.com/4dcgi/w_articles_wsite3_11833_27/03/2011_384716

budget deficit of 15.4% of GDP. This and rising debt levels (127% of GDP in 2009) led to rising borrowing costs and this resulted in a severe economic crisis²¹. The economy of Greece is the 27th largest in the world by nominal gross domestic product (GDP) and the 34th largest at purchasing power parity (PPP), according to data by the World Bank for the year 2009 (Nationencyclopedia)²². In the first weeks of 2010, there was renewed anxiety about excessive national debt. On 23 April 2010, the Greek government requested that the EU/IMF bailout package, made of high-interest loans be activated (The Irish times, 2010)²³. The initial size of the loan package was €45 billion and its first installment covered €8.5 billion of Greek bonds that became due for repayment²⁴. On 27 April 2010, the Greek debt rating was decreased to BB+ (a 'junk' status) by Standard & Poor amid fears of default by the Greek government (The Australian, 2010)²⁵. On 1 May, a series of austerity measures was proposed. On 13 June 2011, Standard and Poor lowered the Greek sovereign debt to a CCC rating, the lowest in the world, following the findings of a bilateral EU-IMF audit which called for further austerity measures²⁶ (Table 3).

In order to improve the economic situation and to cut on cost, Greece adopted different austerity packages since 2010. These austerity packages contained a list of measurement that should be implemented by Greece's government and the result would be a better economic situation. These austerity packages failed to reach the goal proposed.

²¹ Charter, David. *Storm over bailout of Greece, EU's most ailing economy*. Time Online: Brussels, 2010

²² Nationencyclopedia: <http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP.pdf>,
http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP_PPP.pdf

²³ The Irish Times: <http://www.irishtimes.com/newspaper/breaking/2010/0423/breaking28.html>

²⁴ The maven project. Com : <http://themavenproject.com/>

²⁵ The Australian: <http://www.theaustralian.com.au/business/markets/sp-downgrades-greek-debt-to-junk/story-e6frg91o-1225859110788>

²⁶ Dynamic Asset Recovery : <http://www.dynamicassetrecovery.com/is-europes-economy-in-meltdown>

Table 3. History of government debt and deficit (1999–present)

	1999	2000	2001 ¹	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 (predictions)	2012 (predictions)
€ billion ¹	122.3	141	151.9	159.2	168	183.2	195.4	224.2	239.4	262.3	298.7	328.6	–	–
% GDP ²	94	103.4	103.7	101.7	97.4	98.6	100	106.1	105.4	110.7	127.1	142.8	157.7 (10.4%)	166.1 (5.3%)
GDP growth ³	3.4	4.5	4.2	3.4	5.9	4.4	2.3	5.2	4.3	1.0	-2.0	-4.5	-3.5	1.1
Deficit ⁴	–	-3.7	-4.5	-4.8	-5.6	-7.5	-5.2	-5.7	-6.4	-9.8	-15.4	-10.5	-9.5	-9.3

Source: Eurostat

¹ year Greece was accepted to the EU

These measurements that had to be implemented included e.g.: the lowering of salaries, cutting on bonuses, increase the Value added tax (VAT). The last austerity package which was issued in 2011, contained measurements such as, denationalizing companies and selling national property, more increase in taxes. On the 20th of August 2011 it was published that the government of Greece has not succeeded with the implementation of the austerity packages. The revenue of the government declines with 1.9 billion euro, but the expenditures increased with 2.1 billion Euros

4.3 Estimation of the probability of default/Calculation of default risk

Debt Rating

As was mentioned above, in the previous paragraph Greece's debt rating was decreased from BB+ (a 'junk' status) by S&P to a CCC rating. The CCC rating is equivalent to the CAA rating used by Moody's. A CCC rating represents an extremely high risk bond or investment, because of the risk involved banks are not allowed to invest in CCC rated bonds. CCC bonds are junk bonds.²⁷ By analyzing the decrease of the bond rating, we can conclude that Greece's outstanding debt has reached a very risky state. In conclusive observing the development of the debt rating we can conclude that the probability for Greece to default is high.

Economic, Financial and Political risk

In order to determine the value of these risks for Greece, the database of International Country Risk Guide was consulted.

To evaluate the scores presented by the ICRG we will be using Table 4. ICRG Risk Categories. This table contains the composite score ranges, calculated by the ICRG and their meaning.

As was mentioned in previously, we will approximate the default risk, by observing the development of the Economics, Financial and Political Risk, known as the Composite risk.

To calculate the Composite Risk the following formula has been applied:

$$CR=0.5 (PR+ER+FR) \text{ where } PR=\sum PR_i, ER=\sum ER_i, FR=\sum FR_i$$

Table 5. Composite Risk Rating contains an overview of the development of the composite Risk Rating for Greece. This is an overview for the months February 2010 till January of

²⁷ The free dictionary. <http://financial-dictionary.thefreedictionary.com/CCC>

2011. As we can see we can conclude from the table 5. In the beginning of 2010 the CR for Greece was categorized as moderate, with the passing of the months the CR has decreased and reached a high risk level for the months June and august of 2010. Judging by the current deteriorated (since January 2011) economical, financial and political situation that Greece is facing, we can assume that the CR of Greece has decreased from the latest know level of '61.5' which is denoted as moderate. The assumption is that the CR level of Greece has decreased below '59.5' causing it to reach a high risk level.

Table 4. ICRG Risk Categories	
Risk Category	Composite Score Range
Very High	0.0-49.5
High	50.0-59.5
Moderate	60.0-69.5
Low	70.0-84.5
Very Low	85.0-100.0

Source: Erb et al, 1996

Also when we consider Figure 1. Inflation 2006-2011, we can see that the inflation in Greece rose sharply in comparison with the previous years. The rise of the inflation occurred in conjunction with a strong decrease in the growth of the GDP, the deficit and the debt ratio (Table 3).

Table 5. Composite Risk Ratings

Year	Risk Rating	Risk Category	Year	Risk Rating	Risk Category
Feb 2010	69.5	Moderate	Aug 2010	59.5	High
March 2010	69.5	Moderate	Sept 2010	60.3	Moderate
April 2010	68.8	Moderate	Oct 2010	61.0	Moderate
May 2010	60.0	Moderate	Nov 2010	61.5	Moderate
June 2010	59.5	High	Dec 2010	61.5	Moderate
Jul 2010	60.3	Moderate	Jan,1st 2010	61.5	Moderate

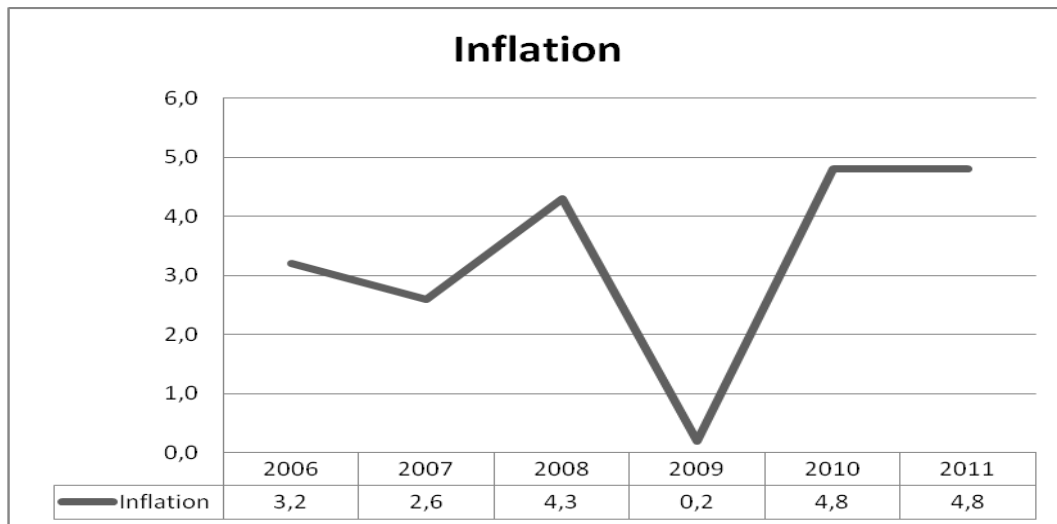
Source: International Country Risk Guide

Considering the debt rating, that is at a CCC level. The economical developments that have been mentioned previously, the calculation of the CR, which includes the ratings for the economical, financial and political risks. Also taken into account the debt sustainability framework provided in chapter 2.

We can reach the conclusion that the probability for Greece to default on their loan is high. And thus we would expect a CR risk of lower than 59.5, which coincide with a high risk.

Expressing our conclusion in a probabilistically, we then would reach to a probability of default for Greece of more than 50%. And thus Greece’s economy is at high risk.

Figure 1. Inflation 2006-2011



Source: ICRG

4.4 Costs and consequences in case of default

It is very important to identify the costs of a sovereign default, by doing this we can understand why we observe sovereign debt in the first place. 'If there were no costs of defaulting, the sovereign would default under all circumstances. If investors could anticipate the behavior of countries then, they will never invest in the first place and there would be no sovereign debt. That is, for sovereign debt to exist, it is necessary that at least in some circumstances it would be more costly for a sovereign to default than to pay back its debt. Similarly, for sovereign defaults to exist, it is necessary that at least in some circumstances it would be more costly for a sovereign to pay back its debt than to default. There is an ongoing debate about the importance of different costs of a sovereign default. The remainder of this section describes two costs that are often mentioned in the literature: sanctions imposed by creditors and signaling costs (Hatchondo, 2007)

If creditors' sentiment about Greece is sufficiently pessimistic that they are *de-facto* excluded from long-term credit markets, then its position can be expected to worsen (Foley, 2010)

Needless to say other costs of defaulting can be summarized in three points:

1. A defaulting government loses reputation and will have difficulty borrowing in the future when necessary (Grossman and van Huyck, 1988; Chari and Kehoe, 1990)
2. Default leads to income redistribution. Governments concerned with their popularity may not want to hurt the constituencies of debt-holders which would bear a disproportionate share of the costs of default (Alesina, 1988; Tabellini, 1991)
3. If financial institutions hold a significant amount of government debt in their portfolios, default may lead to bankruptcies in the financial sector, leading to financial instability and, possibly, to 'bank panics' (Spaventa, 1988; Alesina, 1988). These three arguments are sufficiently strong to make outright default a very remote and unlikely possibility in OECD economies

5. Summary and Conclusion

5.1 Summary

The main purpose of this thesis was to find out what the probability is, for Greece to default on their outstanding debt. In order to determine this probability we, have observed different factors that play an important role in the determination process. We started with the

introduction the topic, the research question and its sub-questions. A chapter was dedicated to the debt sustainability framework, in this chapter we observed the regulations prepared by the International Monetary Fund, here we provided information on the different frameworks that have been created by the IMF and the possible ways they could be applied. A factor that is important when choosing the appropriate framework is the economic situation of the country. In chapter three we discussed the sovereign default. We started introducing the topic; a review was given about the sovereign defaults that have taken place in the past. We also discussed the factors that are important in order to determining whether a country is defaulting or not. In chapter four we analyzed our data, taking into account all the topics and factors we determined that were essential (factors discussed in the previous chapters). We used all these factors in order to reach to a appropriate answer to our research question.

5.2 Conclusion

Considering the fact that Greece already passed the phase of rescheduling, we can practically conclude that it will not take long for Greece to default on its outstanding debt. Even after they have been provided with financial help by the other countries of the European Union, the conditions that were composed by the providers of capitals (austerity package) are so harsh, that in my opinion Greece might not be able to accomplish them. After considering all the factors that we determine were essential in order to reach to a proper answer to our research question, which was: What is the probability for Greece to default on its debt?

We reach the conclusion that it is highly probable for Greece to default on its debt. Considering Greece Composite Risk, which consists of the economic, financial and political risk, we can conclude that Greece current CR must gave an ICRG rate of lower than 59.5 which coincides with our finding. In 2010 Greece CR, was on the border (61.5), and rated 'moderate'. Thus considering this, we can assume that Greece's current CR and Debt Rating (has deteriorated even more), the probability for Greece to default on its debt is higher than 50%. Whether Greece indeed defaults, is another issue. Greece's government showed to be uncooperative and not to comply with all the regulations that the EU asked of them. Despite this, the EU has issued several declarations in which they indicate that they will keep assisting Greece as long as they comply with the conditions that were prescribed. If this is the case, that Greece will not be defaulting. If the EU decides to abandon the agreement, than Greece will surely default on its outstanding debt.

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Appendix A. Tables

The table below provides a comparison between the CR of the countries Greece, Germany and the Netherlands. These countries are all member of the EU. Germany and the Netherlands are 2 member countries of EU, who have always had a healthy economy. And this is what we can see in this table, they risk level is 'Low'. However Greece risk level is considered 'Moderate'.

Table 1. Composite Risk comparison with other European countries

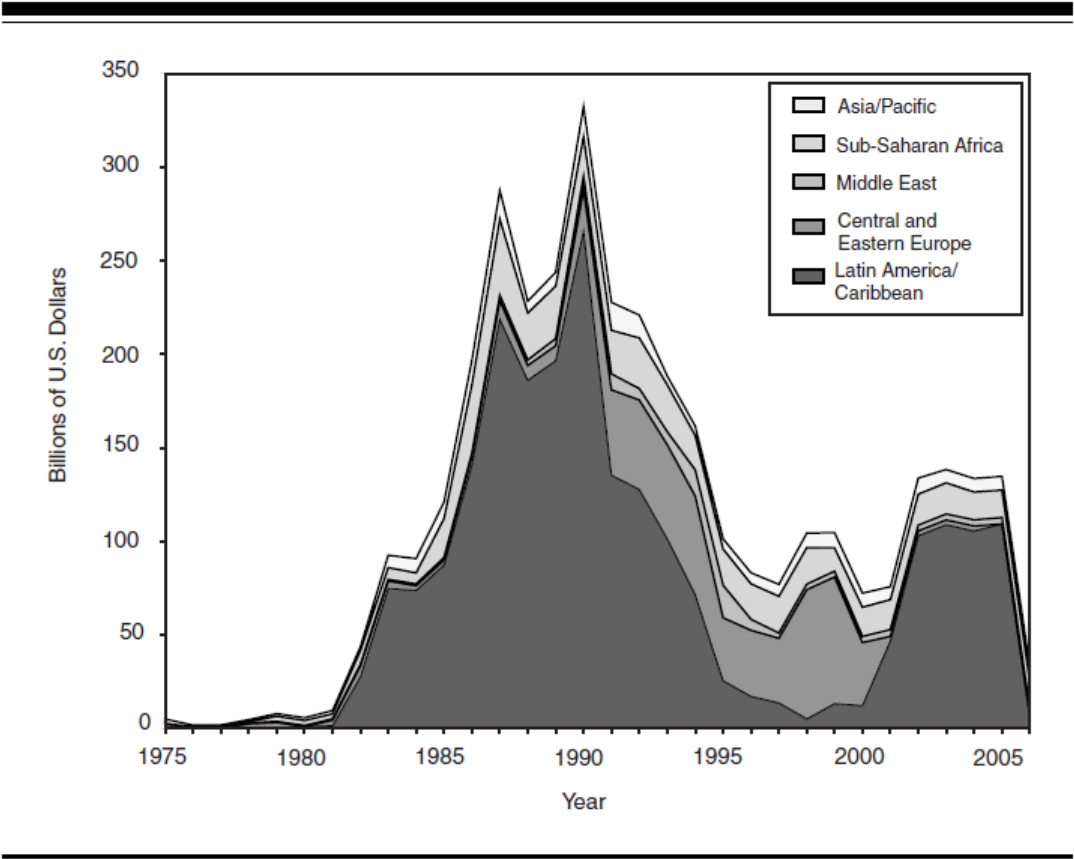
Country	Feb 2010	Jan 2011	Risk Category
Greece	69.5	61.5	Moderate
Germany	83.5	83.5	Low
Netherlands	81.3	82.0	Low

Source: ICRG

Appendix B: Figures

Figure 1 depicts the total sovereign of debt that was accumulated trough the years by the countries that defaulted in billions of US dollars. The figure depicts the sovereign debt for the different region. It noticeable that in the periods 1980-1995 and 2000-2005 the graphs follow the same pattern. These periods are probably periods were certain crises affected the different region in the same time period.

Figure 1: Sovereign debt in default (1975-2006)

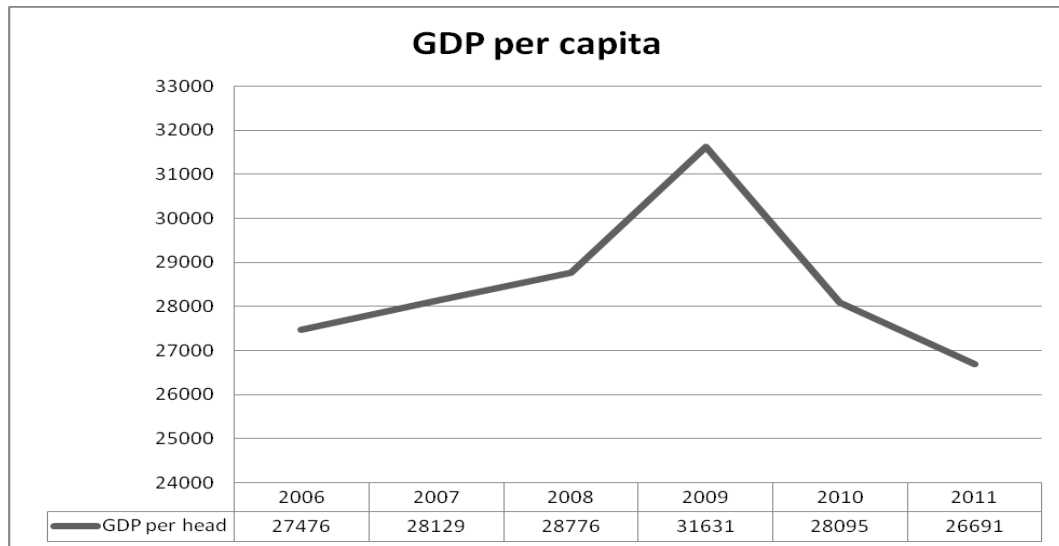


Notes: Sovereign loans from multilateral lending institutions (such as the World Bank) are not considered.

Source: Beers and Chambers (2006)

Figure 2: GDP per Capita 2006-2011

The figure below depicts the GDP per capita, of Greece for the period of 2006- January 2011. In this figure we can see the evolution of the GDP per capita, which depicts a drastically decreasing line since 2009. Since 2010, Greece had to take harsh measures in order to decrease its expenditures, by reducing salaries and bonuses. This figure shows the consequences of these harsh measures.



Source: ICRG