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Greece

Greece entered into the European Union on June 19th 2000; this changed their currency from the Drachma to the Euro. The recent economic crisis in Greece began in 2009, starting with investors fearing that Greece would not be able to repay its debts because of increases in government debt. Due to the Greek economy being one of the fastest growing economies, at a rate of 4.2% between the years of 2000 and 2007, foreign capital was strong. With the strong economy the Greek government was able to build up a large deficit. This deficit is what struck the fear in Greece's investors leading them to have a loss in confidence. On May 2nd 2010 the International Monetary Fund put in place a 110 billion Euro loan, because the Greek government had caused fears in financial markets when government debt fell down to junk bonds. Later in October 2011 leaders of the Euro zone agreed to write of fifty percent of Greek debt that is owed to private creditors (banks), this required European banks to reach and maintain a nine percent level of capitalization to help prevent contagion to other countries. Even with this write off of debt, Greece's debt was only brought down to one hundred and twenty percent of their Gross Domestic Product (GDP). This economic crisis can be blamed on Greece for the tactics they took since entering the European Union. One questionable, but legal, method they took was paying Goldman Sachs and other banks to help hide transactions of them borrowing in the billions from EU overseers so their debt would not seem so high. Goldman received three hundred million dollars in fees for arranging these hidden transactions, while this might seem deceptive it is completely legal and is not an uncommon practice, but its just one thing could have helped cause the economic conditions going on now.

There are several figures we included that help portray the economic trends that Greece experienced throughout the recent years. Figure 1 shows M1 (Money Supply) from the pre- and post- 2001 period. M1 is the total amount of money available in the economy at a specific time. The source of this figure is the Bank of Greece. Figure 2 is Greece's Consumer Price Index Average annually from 2001 to 2011. We used the average price as opposed to N-year because it is more accurate considering the fluctuations of the index throughout the year. An expected average CPI is included in this figure annually up to 2016. This data was taken from the IMF (International Financial Statistics) and TradingEconomics.com. Figure 3 is Greece's average inflation rate from 2001 to 2011 annually. Similarly to the CPI figure, the inflation rate is measured as an annual average to better represent the fluctuations as well as an annual expected average inflation up to 2016. The data was taken from the IMF and TradingEconomics.com. Figure 4 is the Euro Area Interest Rate starting from 2002. The graph was retrieved from the European Central Bank through TradingEconomics.com. Figure 5 is the exchange rate of US dollar per 1 Euro starting from 2002 from xe.com. Figure 6 shows the US interest rate from 2002 to date. We included this figure from the Federal Reserve through TradingEconomics.com to show the parallelism between interest rates and

exchange rates. Figure 7 is Greece's GDP annually from 2004 to 2011. It was taken from The World Bank Group through TradingEconomics.com. Figure 8 is Greece's unemployment rate. It is given by the percentage of the labor force quarter-annually from 2006 to 2011 from the National Statistical Service of Greece through TradingEconomics.com. Figure 9 is Greece's Current Account from 2006 to 2011 sourced by the Bank of Greece through TradingEconomics.com. Figure 10 is Greece's Financial Capital Account tri-annually from 2005 to 2011 taken from Greece's Central Bank. Figure 11 is Greece's annual Net Capital Account from 2000 to 2009 sourced by TradingEconomics.com. Figure 12 is Greece's Total Reserves annually from 2004 to 2009 sourced by TradingEconomics.com. Figure 13 is Greece's debt from 2001 to 2011. Figure 14 shows the annual change of Private financial flows, Euro system loans, government, current account, and change in reserves from 2000 to 2010 sourced by the International Financial Statistics. The final figure, Figure 15 shows the difference between domestic credit, monetary base, total reserves, and debits to the Euro system annually from 2000 to 2010 sourced by International Financial Statistic, central bank survey.

We begin our analysis by determining which time paths to use, after gathering all of the information, we have decided to use the time paths for nominal M1(Money Supply), Greece consumer prices index average, Greece inflation average, Euro area interest rate, US per 1 Eur exchange rate, and the US interest Rate. Given the Greece crisis being a very recent issue, we decided on a time frame to map out the movements, which we have decided from 2001 to present time. Based on our observations we have noticed four major movements along the time paths: First, from 2001 to 2005; second, from 2005 to 2008; third, 2008 to 2010; last, 2010 to current present day 2011.

2001 - 2005 First Movement Analysis

We looked at the money supply graph first (All refer to Figure 1) and compared it with the CPI Average (All refer to Figure 2). We have concluded that the Greece CPI Average could also be considered Greece's price level. From 2001 to 2005, we noticed that there was a steady trend upwards. Greece's money supply was consistently growing, therefore we then looked at the CPI Average to see whether or not it was moving along with the money supply; which we found out that they were both moving in a positive direction. Even without having a real money supply time path we can still conclude that M1 and CPI were moving together, without having the exact numbers of M1 growth rate, we would not be able to tell if real money supply depreciated or appreciated. If inflation (All refer to Figure 3) was greater than money supply growth than real GDP would depreciate, vice versa.

After looking at M1 we realize that M1 is growing, so in order for M1 to be growing, we would have to look at Euro Area interest rate (All refer to Figure 4). Euro Area interest rates from 2002 to 2003 drop from 3.25% to 2%, which would be consistent with the growth of money supply, as well as Inflation dropping from its high, 2002, at 4% to its low, 2004, at 3%. When Euro Area interest rates are low, the cost of money to hold in the bank is lower than investing it and spending it, therefore more money is taken out, alas money supply is growing. From 2003 to 2005, Euro Area interest rates were consistent at 2%.

In order to figure out exchange rates (All refer to Figure 5), we look at both the Euro Area interest rate and the US interest rate (All refer to Figure 6). The Euro interest rate decreases then flattens out within the time period, which would appreciate US to Euro Exchange Rate from 2002 to 2005, and with US interest rates going down, from 2002 to 2004, it would depreciate the US to Euro Exchange Rate. The US interest rate from 2004 to 2005 is climbing, therefore US to Euro Exchange rates should be even more appreciated, but after looking at exchange rates (figure 5), we see the exact opposite; USD per 1 Eur is consistently depreciating, where it takes more US dollars to buy 1 Eur. Another factor that would play in, which we are

unable to graph, is Greece's Exchange rate expectations. If foreign exchange rate expectations is very high that it offsets both the decrease in foreign interest rates and the increase in US interest rates, it can cause the USD per 1 Eur to depreciate.

2006 - 2008 Second Movement Analysis

Money Supply from 2005 to 2008 is pretty consistent where it does not increase nor decrease. Greece's price level on the other hand is still increasing, which would cause real money supply to decrease. Inflation is also still decreasing, so even though price level is increasing, it is increasing at a decreasing rate, alas real money supply decreases significantly than lowers at a slower rate than the initial decrease. Since the price level has increased, that would mean that the price of the same basket of goods has increased, which than the value of money is less because the amount of money supply is consistent while price level is decreasing causing a decrease in the real money supply (Money / Price Level).

Since money supply is constant, we look at the Euro Area interest rate, which we see is increasing from 2% to 4%. The Euro Area interest rate is consistent with the nominal money supply movement, since with Euro Area Interest Rate was low at 2% from 2003 to 2006, the Money supply was growing at a constant rate, but when the Euro Area Interest Rate began to rise to 4% from 2006 to 2008, the M1 money supply begins to flatten out and discontinues to rise.

By observing Euro Area Interest Rate, we see that from 2006 to 2008, the interest rate is rising, which would depreciate the US to Euro exchange rate. We also observe the US interest rate, which is steady from 2006 to 2008, which both interest rates are consistent with the movement in US to Euro Exchange Rate. From 2006 to 2008 the US to Euro Exchange rate is depreciating from 1.20$ per 1 euro to 1.60$ per 1 Euro.

2008 - 2010 Third Movement Analysis

The nominal money supply from 2008 to 2010 slowly decreases, but then climbs from Jan 2009 to Jan 2010. Greece Consumer Price Index also climbs from 2008 to 2010. Since both nominal money supply and price level increase at the same time, nominal money supply would be consistent from 2008 to 2010. From 2008 to 2009 inflation in Greece drops from 4% all the way to 1.4%.

With this 2.6% decrease in inflation from 2008 to 2009, there is also a decrease in the Euro Area Interest Rate from 4.25% to 1% from 2009 to 2010. After observing both these decreases, we look back at the money supply during the time of 2009 to 2010 which we see that the money supply increases within that year. We notice that the movement in interest rate is consistent with the movement in nominal money supply.

After observing the Euro Area Interest Rate, we see that the interest rate is steady at 4% from 2008 to 2009 and decreases 3.25% from 2009 to 2010. The US Interest Rate from 2008 to 2010 decreases significantly as well from 4% to .15%. With both

decreases in US Interest Rate and Euro Area Interest Rate, they both should counter act each other and the US to Euro Interest Rate should be pretty consistent. We observe that the US Interest Rate decreases first following the decrease in Euro Area Interest Rate. Based on our US to Euro Exchange Rate graph we can see that since US Interest Rate decreased first, there was first an depreciation to US to Euro Exchange Rate, secondly after Euro Area Interest Rate dropped, there was an appreciation to US to Euro Exchange Rate. The further fluctuations from 2009 to 2010 in Exchange Rates with both Euro and US Interest Rates being consistent, could be due to foreign exchange rate expectations.

2010 - Present-Time 2011 Last Movement Analysis

The nominal money supply from 2010 to Present-Time 2011 decreases. Greece Consumer Price Index levels are still increasing from 2010 to 2011, with the IMF Forecast, we see that the CPI will also continue to increase from 2010 to 2016. From 2001 to 2008, there had been an average of 3% - 4% increases in inflation, while during the time of 2009 to 2011 and with the IMF forecast from 2011 to 2016, inflation is only around 1% to 1.5%. With the decrease in nominal money supply and the increase in CPI this will cause real money supply to decrease even more. The initial decreases in real money supply from 2001 to 2008 are significant compared to the decreases in the later years of 2008 to 2011.

The Euro Area Interest Rate from 2010 to present day is steady until a slight increase a few months into year 2011. With the initial drop of Euro Area Interest Rate from 2009 to mid 2009, nominal money supply has been increasing, but when interest rate stopped decreasing and flattened out the money supply began to decrease.

After observing the Euro Area Interest Rate being consistent, and the US Interest Rate also being consistent, we looked at the US to Euro Exchange Rate. From 2010 to Present day the interest rate has been fluctuating anywhere from 1.40$ per 1 Euro to 1.20$ per 1 Euro. Within this time frame there is a appreciation from beginning of 2010 to mid 2010 and a depreciation from mid 2010 to 2011. These fluctuations may be due to foreign exchange rate expectations increasing or decreasing, but regardless there is no significant climbing or falling trend with the US to Euro Exchange rate within this time frame.

Greece's balance of payments paints an interesting picture over the last few years. As seen in Figure 9 starting in 2006 their Current Account has remained in a deficit. Their Capital Account has been increasing since 2006; while there Financial Account has been increasing and decreasing in a consistent pattern since 2005. If we look at their Reserves we can see they increased a little in 2006-2007, but have remained stable from 2008 on.

Since 2008 tens of billions of Euros have deserted Greek bank accounts, according to the article *Greece: The Sudden Stop That Wasn't*. This is puzzling because they still have a large Current Account deficit. This leads us to wonder where this money is coming from. The data we are looking at is not normal for this type of crisis. We would expect that Greece would have experienced a sudden stop. A sudden stop is when a country begins to have trouble meeting payments on foreign loans, so foreign creditors become reluctant to lend them new funds. Greece has endured severe capital flight yet its Current Account deficit has remained the same. Also their reserves have been the same since 2008. Using the CA+FKA=ΔR, we are seeing ↓+↓=↔ which we know is impossible. If we look at the Capital Account we see that it is increasing even though there has been tens of billions of Euros fleeing the Greek bank accounts.

The money is coming from loans provided by the Eurozone central banks to Greece's central bank. These loans are over and beyond those in the Eurozone central bank's government bond-purchase program. They are also different from the EU's rescue package to Greece. The loans do not need parliamentary ratification, and have no restrictions such as public spending cuts to them. In Figure 14 you can see them represented by the red line.

These loans have allowed Greece to avoid the sharp cut in public and private expenditures that is characteristically seen in countries experiencing a dramatic reversal in private capital inflows. In Figure 14 you can see how in 2009 private financial flows plummet.

In theory these loans should not be considered long-term debt because they are transitory. They are supposed to allow for a smooth settlement of trades in goods and services. If this is true then the Euro loans should not stray far from zero for any prolonged period of time on the graph. In 2007 the loans, represented by the red line, go above zero and do not look like they will converge back to zero. There magnitude makes them seem anything but transitory.

From 2008 till 2010 these loans have allowed Greece to escape the sharp adjustment in its Current Account by allowing the Greek central bank to increase domestic credit. This can be seen in Figure 15. The increase in domestic credit mimics the Greeks liabilities to the Eurosystem which is mostly comprised of the Eurozone loans.

We can compare this to Mexico's Tequila Crisis. Mexico had a current account deficit that led to a deep recession in 1995, but by 1996 they were seeing economic growth and a recovery in their net exports. Mexico and presently Greece both decided to increase domestic credit to delay a recession. The difference is that Mexico ran down there reserves. When we look at Figure 12, we can see that Greece's reserves have remained stable since 2008. Greece instead used the Eurosystem loans and rescue packages to increase domestic credit.

Unemployment is reaching extremely high levels. If you look at Figure 8, you can see that starting in late 2009 the unemployment rate has been increasing dramatically. With more spending cuts and tax increases unemployment is likely to rise even more. There are massive riots going on in Athens over unemployment. The people are not pleased with the government or with the rescue packages being offered.

The debt percentage of GDP in Figure 13 is also a frightening sight. The first thing you can see is that Greece's debt is way above the average of the Eurozone. In 2008 Greece's debt escalated to new heights. In 2010 it was at 142.8%. It would appear that there is no way they can pay back all that they owe. This explains why most investors are skeptical of investing in Greece or even other Euro countries.

Figure 1

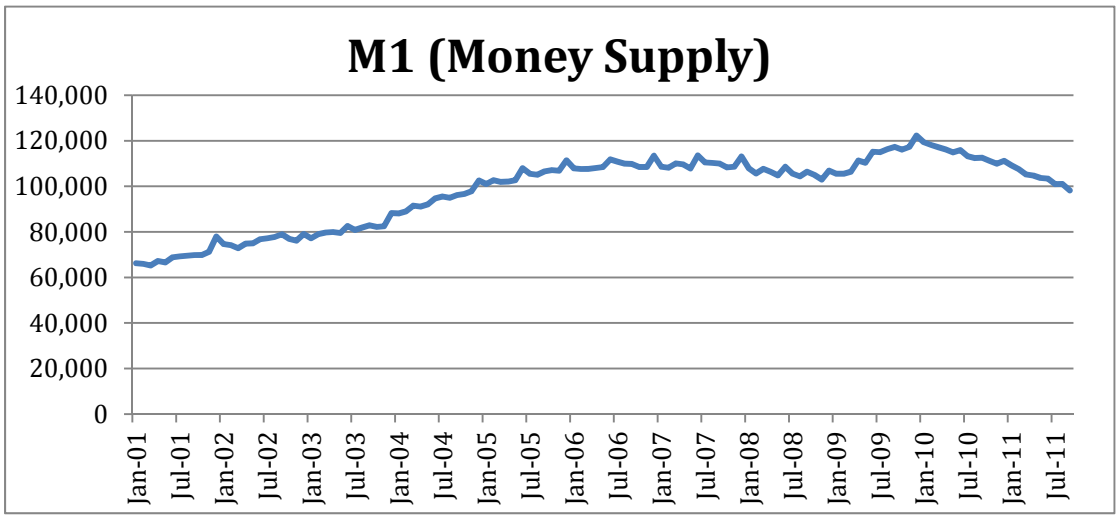


Figure 2

Figure 3

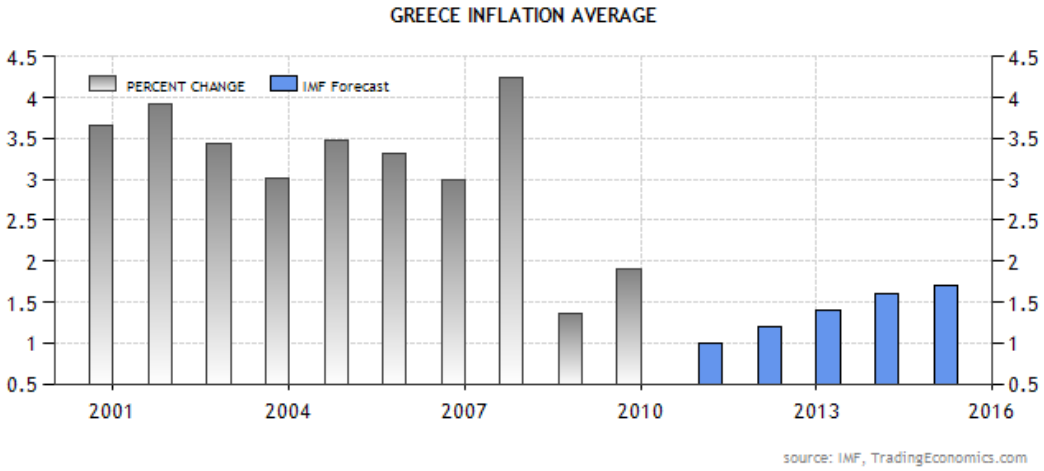
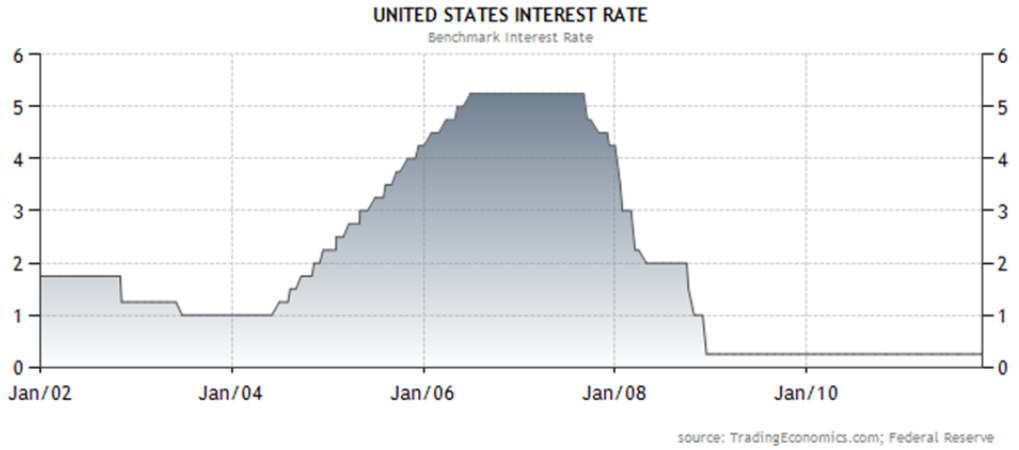


Figure 4

Figure 5

Figure 6



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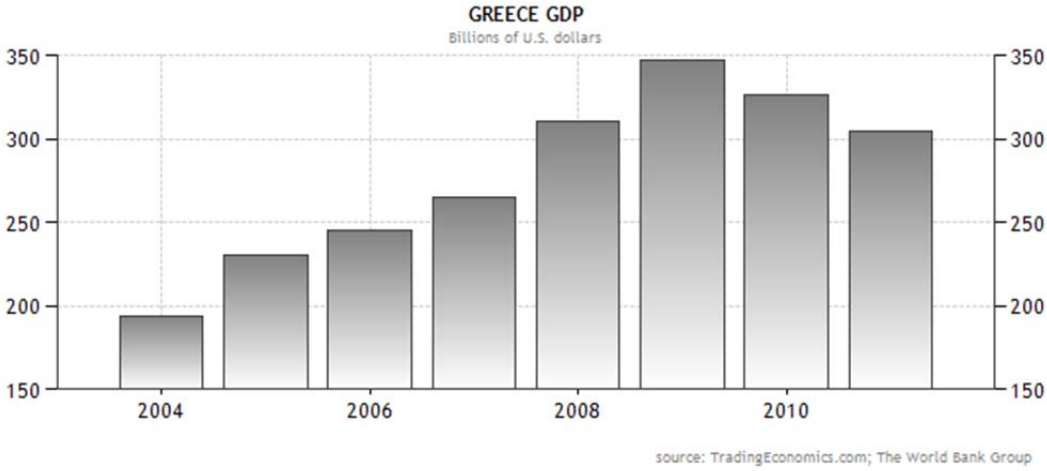


Figure 8

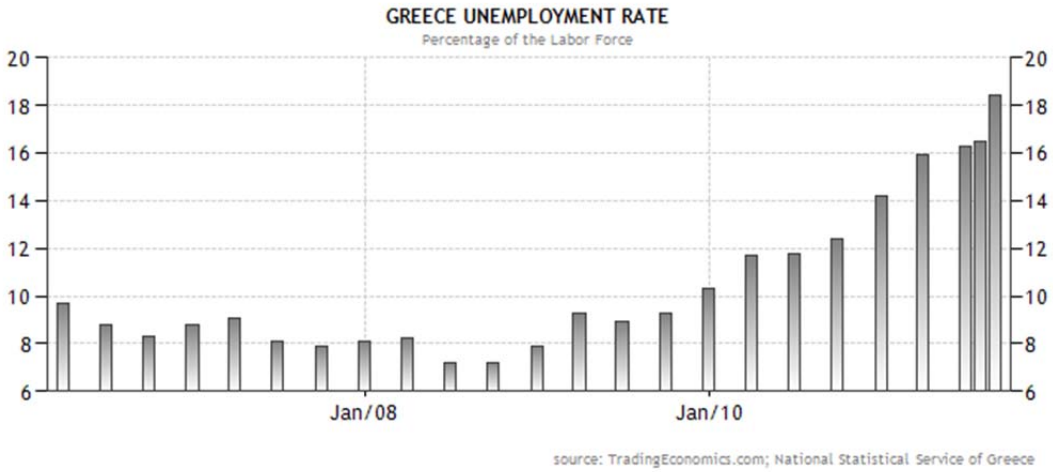


Figure 9

Figure 10

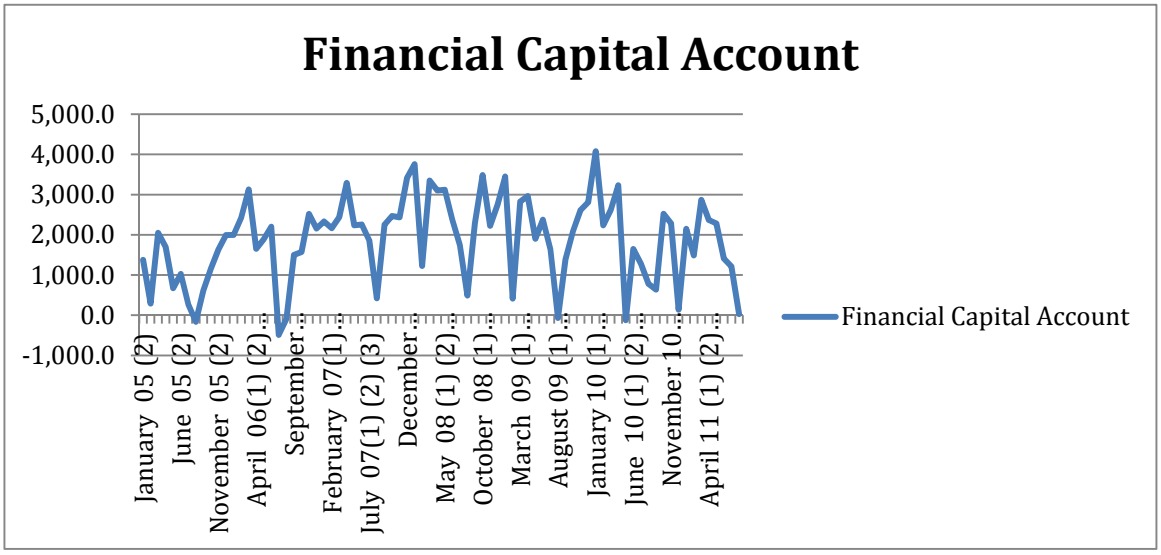


Figure 11

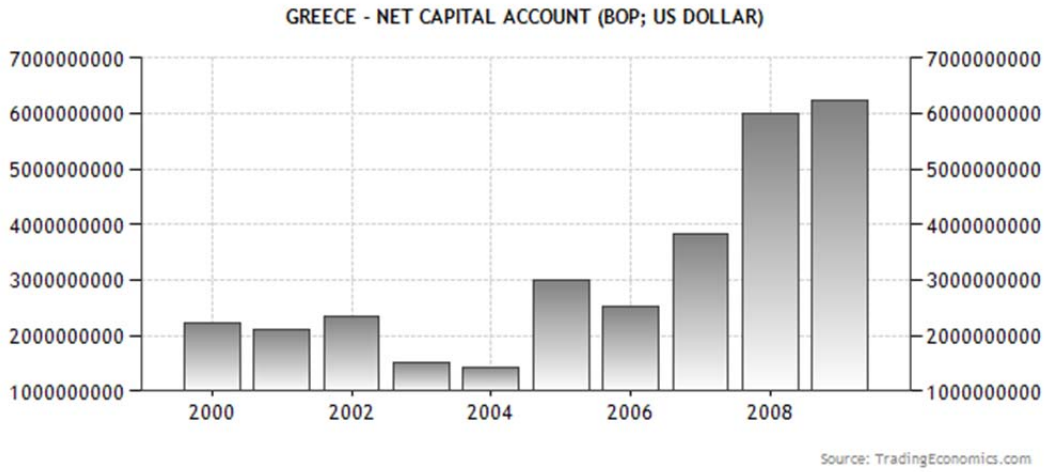


Figure 12

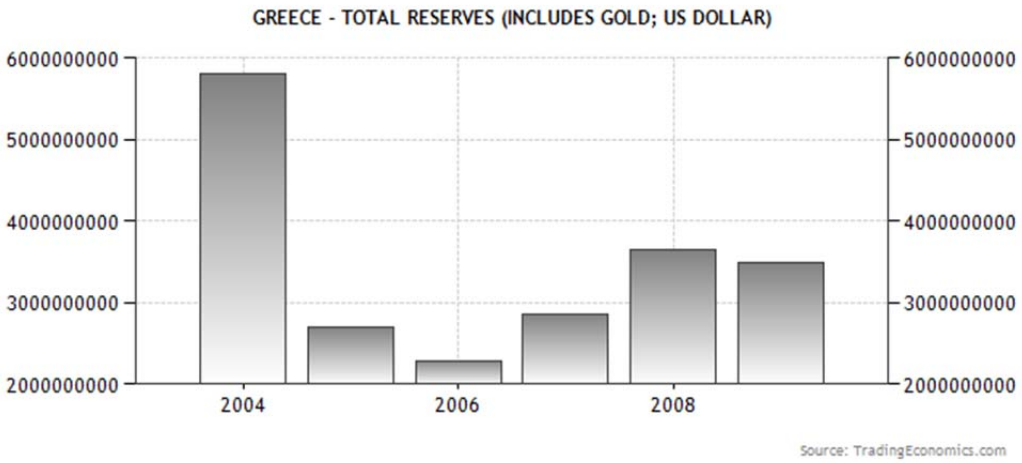


Figure 13

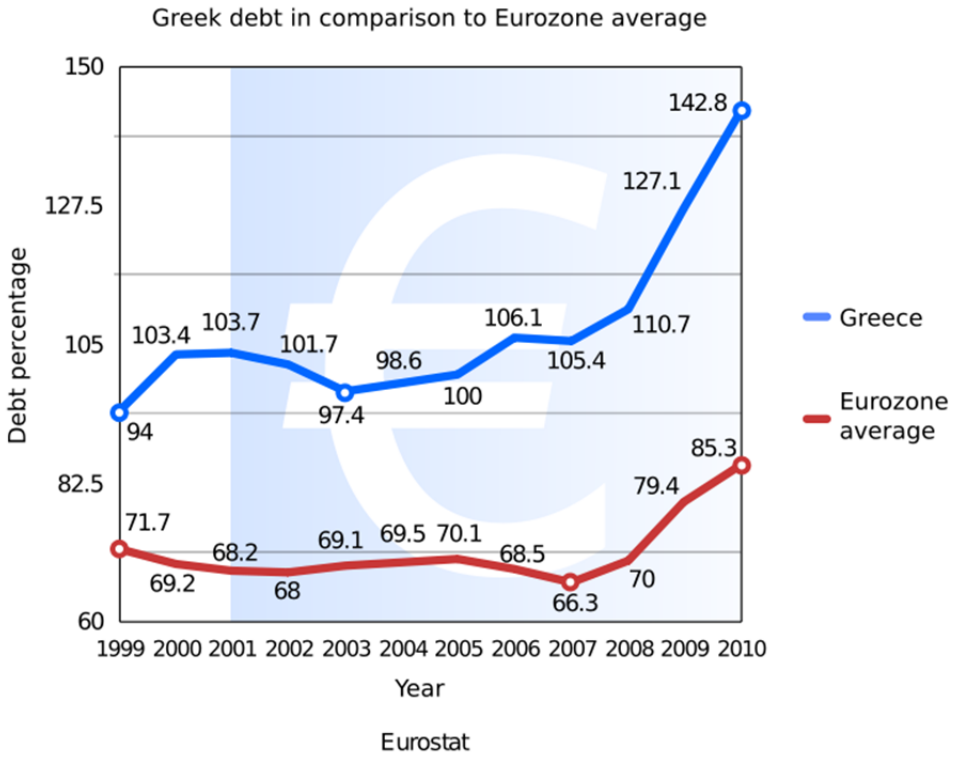
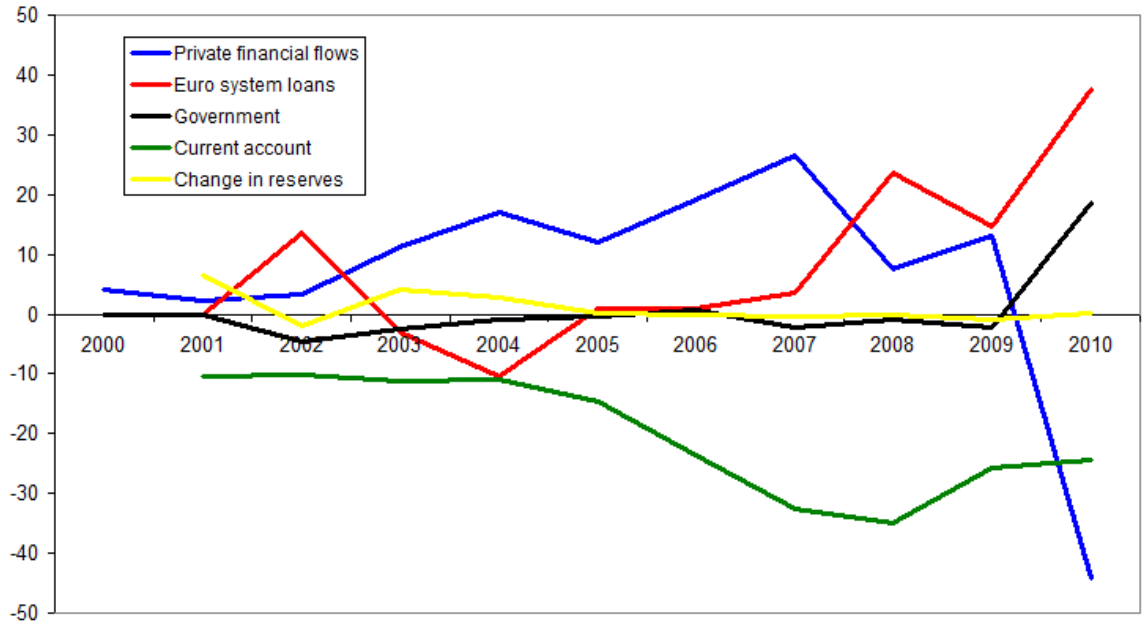
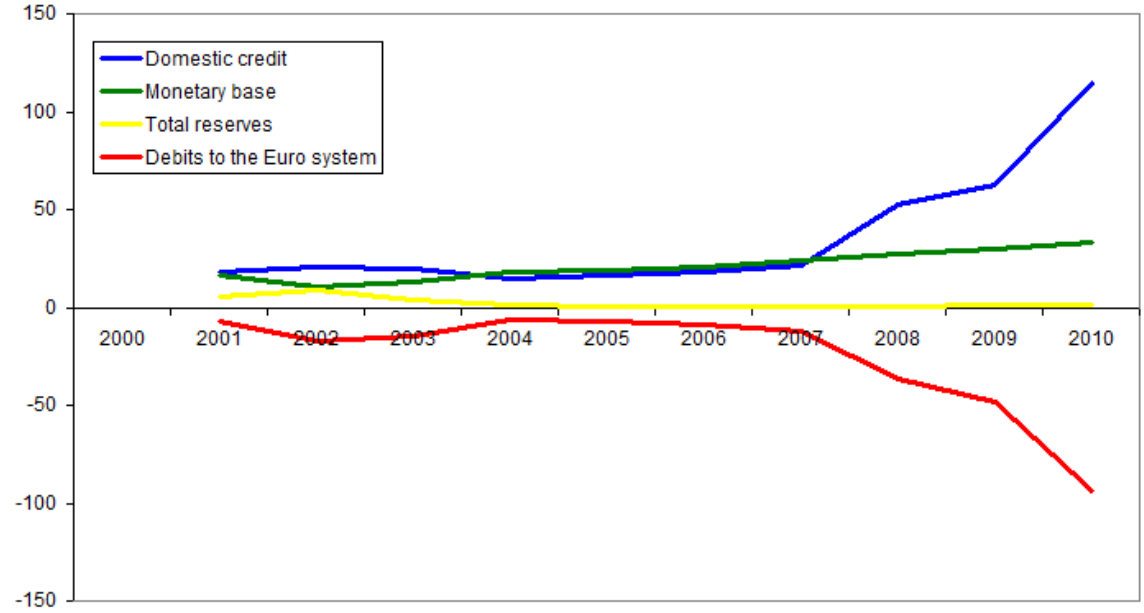


Figure 14



Source: International Financial Statistics, IMF

Figure 15



Source: IFS, International Financial Statistics, central bank survey.

References

Westermann, A. T. (2011). Greece: The Sudden Stop That Wasn't. *Global Economic Intersection* , 1.

https://www.cia.gov/library/publications/the-world-factbook/geos/gr.html

http://www.econstats.com/sdds/Economic_Data_Greece.htm

http://www.npr.org/templates/story/story.php?storyId=123234869

http://www.imf.org/external/

http://www.tradingeconomics.com/greece/indicators

http://www.ecb.int/stats/money/long/html/index.en.html

http://www.xe.com/currencycharts/?from=EUR&to=USD&view=10Y

http://elibrary-data.imf.org/DataReport.aspx?c=1449332&d=33061&e=169393

http://www.businessinsider.com/henry-blodget-greece-paid-goldman-300-million-to-help-it-hide-its-ballooning-debts-2010-2

http://topics.nytimes.com/top/news/international/countriesandterritories/greece/index.html

http://en.wikipedia.org/wiki/Greek_government_debt_crisis#cite_note-10