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Equity portfolio management: A practical approach

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ABSTRACT

In this paper I will explain some of the pricing models of capital assets which try to explain financial assets behaviour, the more relevant ones, studied previously in "valuation of financial instruments". These are: Markowitz model, Sharpe diagonal model, Capital Asset Pricing Model (CAPM), Arbitrage Valuation Model (APT) and the three factor model by Fama-French one of the latest in finance literature which is as APT a multifactor model. In the analysis I will include: birth of theories, hypothesis, planning and development and reviews of each of the models exposed trying to contrast them with the latest available models used by the Academia and professionals and describing their limitations.

I will deeply explain them and compute some basic parameters for each model with Excel such as portfolio return, variance, covariance, correlation coefficient, CML in the case of Markowitz, SML in the case of the CAPM model comparing each portfolio against a benchmark, mainly the reference index for the stocks (IBEX, S&P500, etc.) to obtain some concussions and to see whether it is possible through an active strategy in the management of portfolios to beat the market or is just a chimera and we should just conform with passive management strategies such as buying ETF´s which replicates the stock market behaviour.

Moreover, I will see the benefits or not of an active portfolio strategy in contrast to a passive one, in my research I will consider mainly two type of financial assets: European equities and American equities, benefiting of the recovery of this economic regions and the better business results that are experiencing many well diversified companies, leaving aside emerging market ones considered not suitable for the risk profile of my investors.

The reason for this is that I will set up a fund consisting of two funds available mainly for value investors that want to invest their money and get a good return for their retirement plan, investing in companies that are probably underperforming and are able to grow because fundamental analysis tells us so and their intrinsic value is higher than the one market is actually giving. I will provide empirical market data as if I were a fund/portfolio manager assessing, advising and giving information to my client's which are investors.

1. INTRODUCTION

The first step before even knowing the risk profile of your client and doing the IPS (information policy statement), it is key to comment and deeply understand the global economic outlook, the financial markets evolution and performance of the stock market in particular when talking about portfolio management. Doesn´t matter the strategy to follow (active or passive) we will always be surrounded by uncertainty.

This uncertainty may rise for example, purely from a financial perspective, due to market or credit risk (endogenous to financial market) or from external factors such as political or legal instability, geopolitical factors are also to be considered. Credit risk and market risk are some of the at least eight general risk considered in the financial literature.

So what risks does a portfolio manager face? Many such as financial and political just to mention two of them and others from the day-to-day such as legal or operational. What ways can a fund manager mitigate this risk? Hedging the portfolio. What instruments have fund managers to hedge the portfolios against this risks? With derivatives instruments as Swaps, options and Fras but also with futures, mainly with futures, the hedging with options is not perfect.

Risks a fund manager faces almost the same risk banks may face such as:

- Credit risk which is the risk of loss arising from a borrower who does not make payments as compromised.
- Liquidity risk, the risk that a given security or asset cannot be traded quickly enough in the market to prevent a loss (or make the required profit).
- Market risk, risk that the value of a portfolio, either an investment portfolio or a trading, will decrease due to the change in value of the market risk factors.
- Operational risk, arising from the execution of the funds functions.
- Interest rate risk, any changes in the interest rates may erode its profitability.
- Legal risk mainly has to do with not breaking the law in the jurisdictions we operate and the prevention of illegal operations such as money laundering.
- Reputational risk that has to do with the trustworthiness of the business.
- Macroeconomic risk which has to with the aggregate economy the firm is operating in.

In our management team fund/portfolio managers will use the value investment philosophy whose maximum representative is Warren Buffet and his disciple Benjamin Graham which were pioneers in achieving returns in equity that bet in many cases the benchmark and surpassed the index average.

In Spain followers of this philosophy are Francisco Garcia Parames which left a few years ago Bestinver and Ivan Martín Aranguez, CFA, that has founded with Blanca Hernandez Magallanes value investors (in tribute to Peter Lynch who managed the Magellan fund at Fidelity between 1977 and 1990´s, I coincide with Ivan in the summer of 2012 in the period I was doing my internship at Aviva investors.

This means we are searching for companies with good fundamentals whose intrinsic value is higher than the real quote, with strong cash generation and whose major part of business comes from out of Spain.

But we will deal with this in the final part of the paper, in the analysis part, first let´s comment current economic environment in particular starting in emerging countries such as China and other emergent economies moving through USA and the Eurozone area therefore mitigating currency risk. My portfolios will be denominated in euros and dollars ($) to mitigate the currency risk of other more volatile currencies.

1.1. CHINESE ECONOMIC OUTLOOK

China has decoupled from being the engine of the world manufacturing products growing at double digit mainly due to the openness to the world economy in the 1970´s to having a slower growth of around a 6 % and trying to shift into a more medium to high value added products and services exporter, this implies a switch of productive model.

China has committed the same mistakes and bad investments that Europeans and among others particularly Spaniards made in the 2007 -2009, cheap and rapid banking credit to finance the real estate bubble that has also boomed and busted the residential bubble leaving ghost cities in many areas of modern China, the same that has happened in Spain from 2008 and onwards.

China as well as other emergent economies as Brazil is starting to slow down in the middle of the gradual recovery of the Eurozone and with the States entering another expansionary period of economic growth and rising in federal rates set up by the Federal Reserve.

China has been since the "Great Recession" the driver of economic growth via fiscal and monetary stimulus. The economic growth of China has contributed specially to the recovery of emergent countries through the demand of raw materials with very high prices in those times.

Recent decrease of the demand and prices of raw materials means the plummeting of income from exports of producing countries, at the same time that the external financing sources have dried up quickly.

Both factors have created a skilful circle, of lower income due to raw materials and a fall in growth or recession in emerging economies, this has as a consequence decreases of demand from these emergent economies which provoke lower Chinese exports and this at the same time lower demand of raw materials, then increasing pressure for downward prices in the raw materials etc. in a downward spiral.

Finally, the drop of income due to exports and economic recessions provoke the collapse of capital flows to these economies and the sinking of their currencies.

All this effects have their translation into the more advanced or developed economies in the form of deflationary risks, meanwhile growth rates show volatility due to the fall down of economic activity, in part, compensated for the enhancement of the purchasing power of the households in the developed economies.

The emergent countries were the first to receive the negative impact of the change in monetary policy made by the Federal Reserve.

First of all, were those emerging countries which had the strongest economic and financial disequilibrium's and with very deteriorated levels of competitiveness. In this scenario are the vast majority of Latin-American countries and some producers and exporters of raw materials.

A second group, mainly Asiatic countries, that due to the deterioration of global demand has suffered a notable deterioration and have a greater chance of recession.

Finally, the devaluation of the yuan and the strong intervention of Chinese authorities in the financial markets have evidenced the strong slowdown of the Chinese economy and the difficulty in translating into an economy more biased towards private consumption and services sector as occurs in the denominated advanced economies.

On the other side, the crisis in the peripheral countries of the Eurozone have contributed to increase the global risks and to deviate the attention of the danger of a global slowdown.

Currently the slowdown of the Chinese economy and the recent first upward move of the Federal Reserve questions this tandem that has given stability to the financial markets.

A positive response to this risk or challenge would mean a necessary and very positive contribution to the efficient global risks management, both financial and macroeconomic ones. The globalization process now mature may be very affected by the outcome of this crisis.

China as commented above have been one of the last economies that used and abused of credit as engine of growth, as a matter of fact $ 1 of every $ 4 of increase at a global level since 2008 has been dedicated to the residential sector in China and now that the adjustment is on its way, this will lead to a lower rate of growth in this sector (reached a 15 % in the peak), this is called growth by means of leverage.

Chart 1. Evolution of GDP and of the Credit. Annual variation(%).

PIB %. Anua.l (Izda)   Crecimiento del Crédito. % anual

Source: Bloomberg

From the credit viewpoint this was the big bet that China did for growth since the Big Recession with a call to capital markets that ended up in the typical bubble of the real estate market as other countries have recently experienced.

Chart 2. China 70 Cities Newly Built Residential Prices

Source: Bloomberg

But there is the risk of blowing the bubble and that a new one appears. The vast majority of the strong rate of savings was channelled through the stock market which animated investors driven by the government's policy of channelling funds to the development of capital markets bearing the risk again of inflating a bubble. Chinese government will use all the monetary policy tools to control risks that are huge from a finance point of view.

Chart 3. Evolution of leveraged purchases and the Chinese index CSI 300
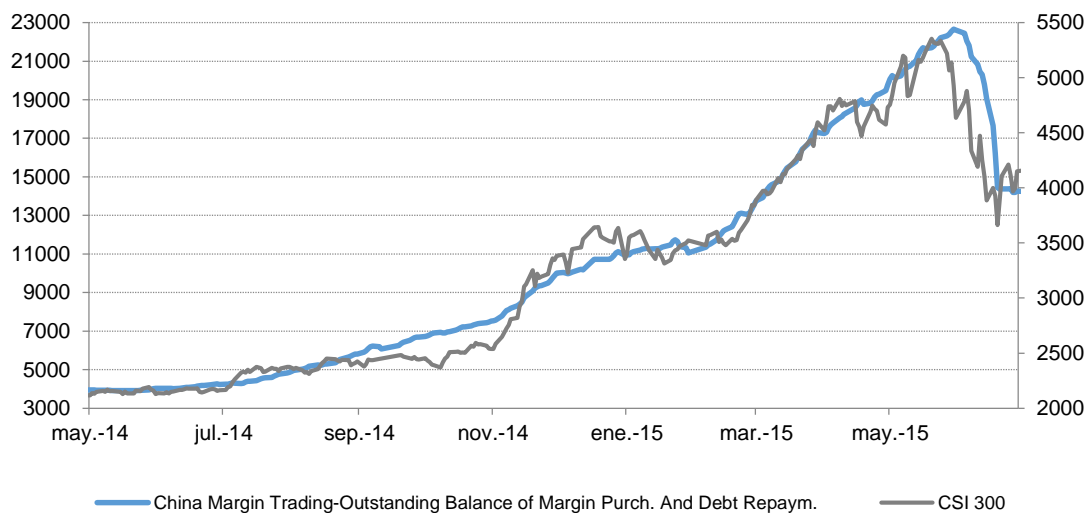
Source: Bloomberg

Chinese government will use all the available tools of monetary policy to control risks which are huge from the financial and economic point of view. The strong increase of the Chinese economy took place under the situation of stability of the Chinese yuan against the dollar until the "Great Recession".

The appreciation of the yuan fostered at the beginning a very expansive credit environment which affected the real activity (GDP), this has diluted reaching nowadays a critical point. We can ensure that the growth model based on leverage is over and now all the necessary adjustments that markets demand have to been made.

Chart 4. Evolution of the GDP and the dollar-yuan
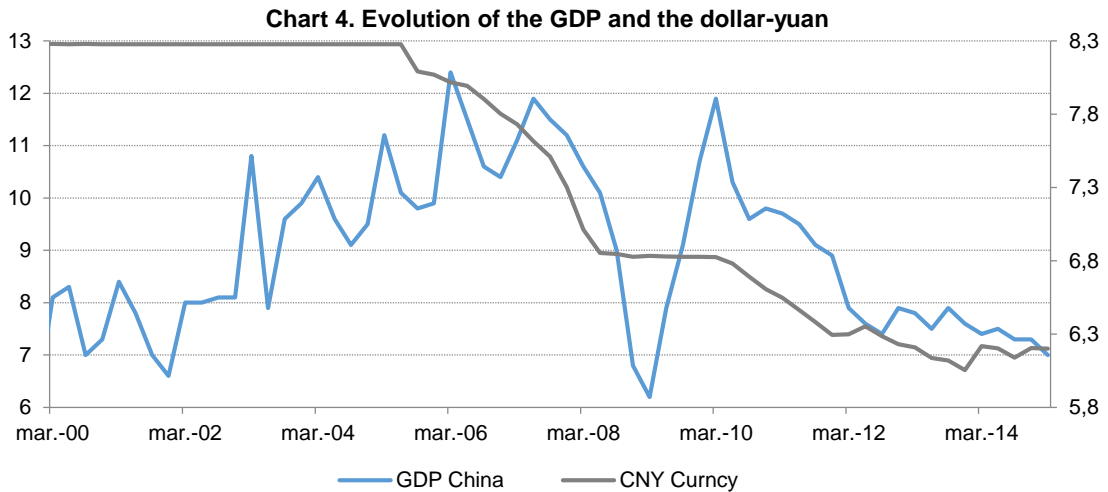
Source: Bloomberg

As we have seen due to globalization and a more interconnected world China is not immune to financial risks that bubbles leave once they have exploited, monetary authorities are managing a prudent policy as a consequence of the imminent "credit crunch" that will affect an important part of companies in the emerging market. So the central bank reacts with strong measures via strong liquidity injections, although the flight of capital has been very intense.

Chart 5. Evolution of the financing costs in China
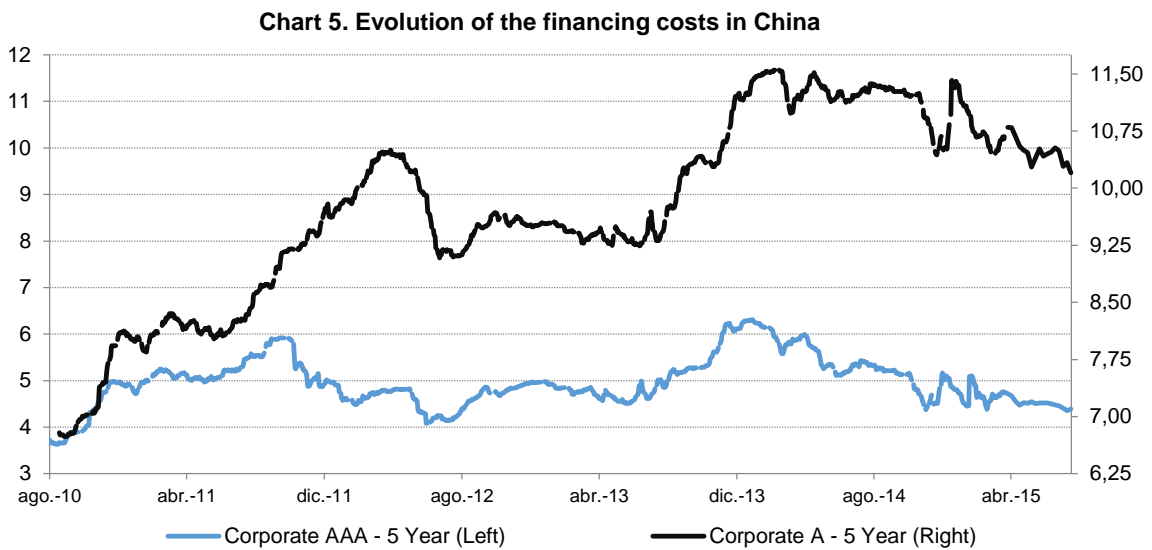
Source: Bloomberg

The measures of support of the PBOC to the financial system will only serve for a temporal delay of the necessary adjustments. After a long period of credit expansion, now appears the high delinquency rates at the same time that corporate profits have fallen down and that exterior investment is falling still with intensity, this could foster or increase at least the breakdown of the "peg" of the dollar with the yuan.

Chart 6. Companies debt over GDP and financial arrearage

Source: Bloomberg

Lastly to comment the no response of Chinese families to the slowdown of the financing costs, also the stabilization or slowdown of the wages suppose a slowdown to the expansion of credit to families, so expectations seem to worsen off.

Chart 7. Survey of evolution in wages
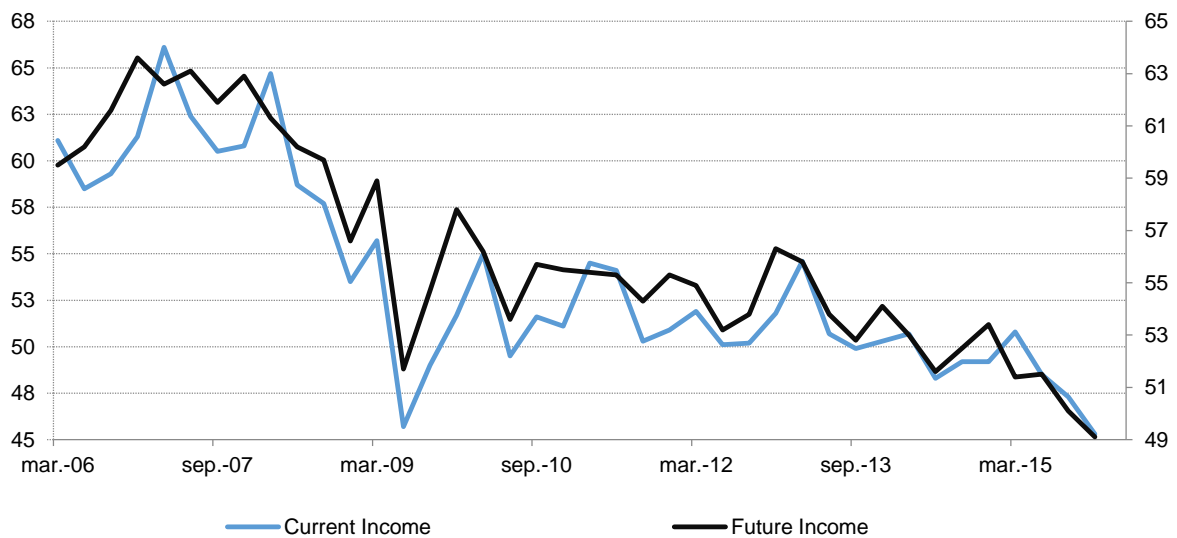
Source: Bloomberg

1.2.   ADVANCED ECONOMIES OUTLOOK

The main objective of this section is to cover the current economic outlook of the biggest economic areas of the developed world which I think are the Eurozone and USA. Both are in a different part of the business cycle but are both areas recovering from the turmoil and stress that had its origin in the financial crisis which starting point (before contagion) all around the globe we can date as the day giant investment bank Lehman Brothers failed, considered as a systemic financial institution.

After Lehman´s collapse, the government of USA step in and had to bailout (rescuing a company with taxpayer's money) AIG to avoid further contagion effects, despite this state deficit started to evidence the weakness of Europe´s economic and financial situation, bringing many state members of the Eurozone to implement austerity and structural measures to address the problem as the IMF, and other supranational organisms recommended.

Regulations and legislative enhancements were made with the intention of having a better financial system (banking and insurance too) as theory stands that soundness in the banking sector is intimate related with economic growth, an example of this in Europe is Basel III implementation. Further issues in the regulatory agenda are the capital market union and MREL (minimum requirements for eligible liabilities) and TLAC (total loss absorbing capacity) among others as the European guarantee scheme of deposits.

1.3. ENERGY AND RAW MATERIALS

Energy prices and other raw materials were not feasible in some developed economies and for many emergent ones, but the strong credit growth at a global level filled this disequilibrium. On the other hand, it meant an impulse of the revenues for producer countries and exporters of raw materials, global demand grew but with strong disequilibrium's.

In developed countries consumption broke and investment also due to the pressure of the business margins, the deterioration of employment and income wages.

In the non-producers of oil and raw materials the PPP of families got worse, investment broke but the level of expenses maintained supported by the external indebtedness to grow.

On the contrary, in the producer countries of energy and raw materials the income of raw materials supplemented the growing needs of consumption and investment and their savings were in part destined to the finance of deficits of other developed and emerging countries.

Now the process inverts with the end of the expansive cycle of raw materials.

The revolution in the energy sector is already paying off. United States on its way to energy Independence and the exportation of hydrocarbons. The revolution in gas exploration and crude oil means two things:

➢ The increase in the supply of crude oil supposes a downward pressure in prices.

➢ The increase in the global reserves of gas and the significant difference between the gas and the oil prices lead to a substitution process of crude oil for gas in the electricity production, in the transport of merchandise, as input in the chemical industry, etc.

United States exports its surplus of carbon and gas which provokes strong reductions in the electricity cost in other geographical zones. The countries that best manages this challenge will be the leading countries in terms of competitiveness.

The silent revolution is on. The change is the substitution of the crude oil for natural gas. In the short term carbon plays a fundamental role in the transmission of downward in energy prices. In the medium term there is a convergence between the crude oil prices and those of natural gas.

Market data points out that the convergence will be in the natural gas price. Moreover, there will be a homogenization of liquated gas prices, also with a downward trend, this is the energy revolution that is taking place.

Chart 8. Natural gas prices evolution and Oil (Brent)
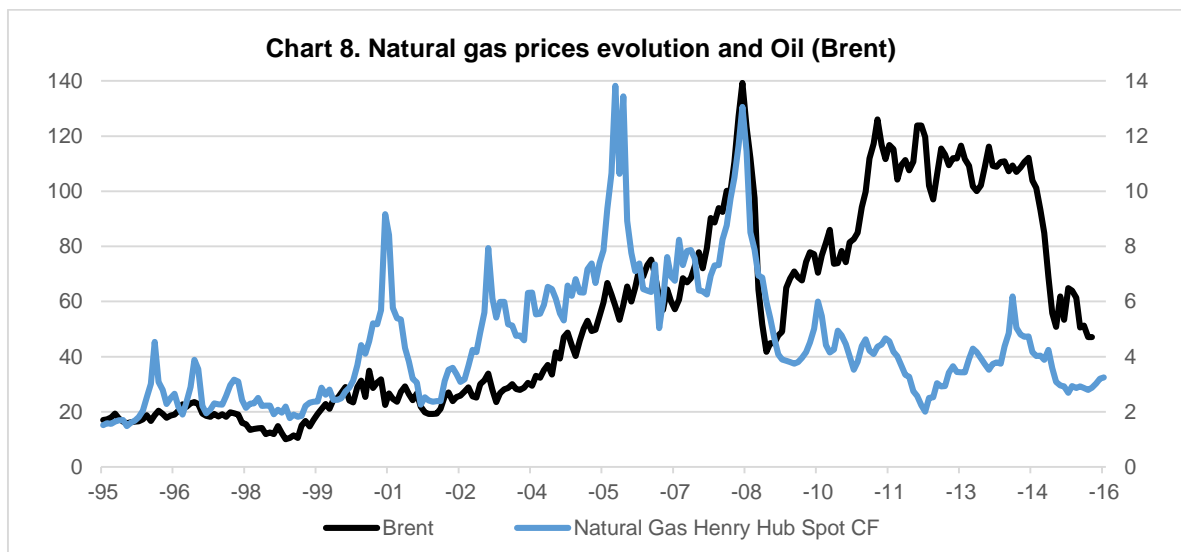
Source: Bloomberg

The energy revolution is currently a reality that reflects the strong fall of electricity prices also in Europe.

Saudi Arabia has had to reduce the premiums to be able to place its crude oil in the international markets.

The return of Iran to the markets supposes an impulse to the quotas war and indeed a bigger pressure on energy prices in general.

Chart 9. Wholesale prices of electricity. New Year Euros/MWh.M
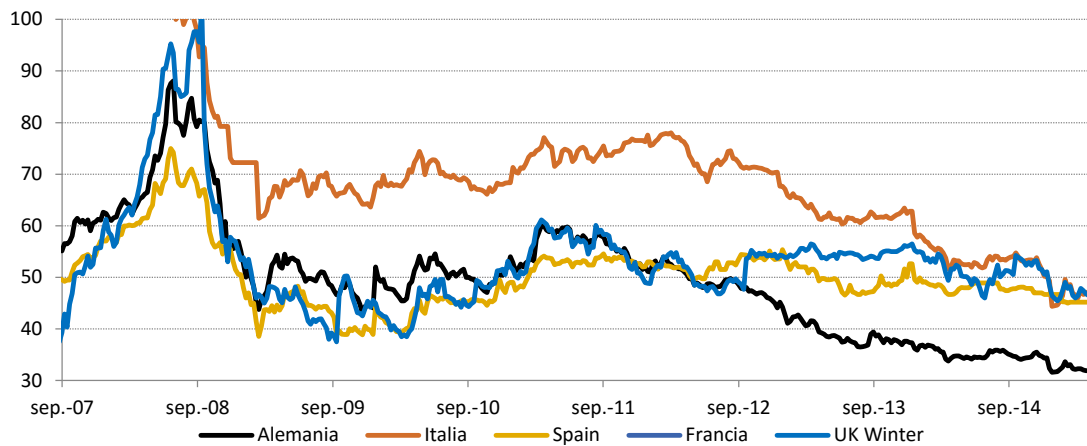
Source: Bloomberg

The recent fall of energy prices leaves a side winners and losers. China is without doubt the most benefited economy due to its high cost as importer of energy and it low efficiency. The most harmed in this situation is the exporter countries such as Saudi Arabia and Russia. In the short term, the Eurozone also benefits although its efficiency is very high. United States, also benefits from the cheapening of the importing cost, but the activity in this sector in which it is pioneer will suffer a stop, exploring throughout the fracking technique is very expensive (more than the shale gas) so the investing in this particular technique stops, but with gains in terms of efficiency in the energy sector due to the cheapening of prices and of the importing cost.

Chart 10. Energy Intensity. Total Primary Energy Consumption per Dollar of GDP (Btu per Year 2005 U.S. Dollars)
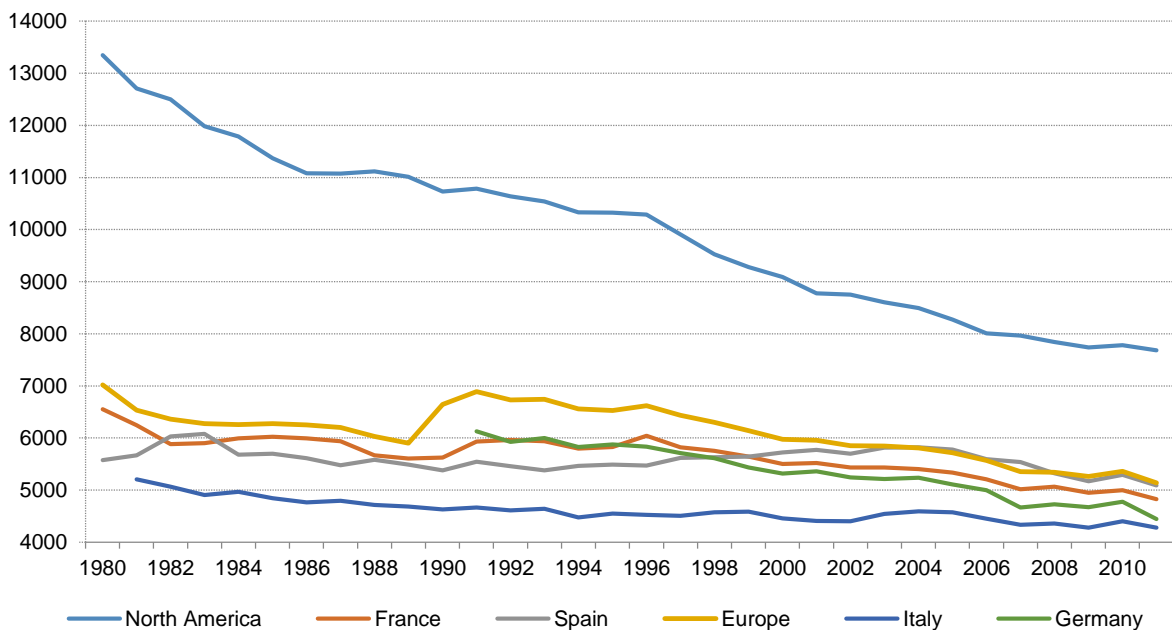
Source: Bloomberg

1.4.   USA ECONOMIC OUTLOOK

One of the main drivers of the American economy is private consumption boosted by the fall of oil prices (commodities) and the recovery of their labour market due to its intrinsic flexibility. Fracking has made it possible for the States to stop investing more money on Shale oil which is more expensive than the Fracking technique currently used in many cases.

Modest economic recovery seems to be the path USA main macro data is providing us. Private consumption growth, benefitting from the labour market's recovery and falling energy prices, was particularly strong in 2015 and remains the key driving force behind USA´s economic recovery.

USA, pioneer in the management of the "Great Recession" has maintained private consumption and the residential sector as the pillars of the recovery under the context of low interest rates. But globalization has its costs in the income distribution and the labor market. The millennials (87 millions) are trapped in low wages and high indebtedness.

Chart 11. Evolution of the median family income and real disposable income per capita

Real Median Household Income in the United States (MEHOINUSA672N), 2012 CPI-U-RS Adjusted Dollars, Annual, Not Seasonally Adjusted

Real disposable personal income: Per capita (A229RX0A048NBEA), Chained 2009 Dollars, Annual, Not Seasonally Adjusted

Source: Bloomberg

Chart 12. Evolution of the disposable income and the public transfers to families

Transferencias sobre RDB   Renta disponible (%anual. Media anual)

Source: Bloomberg

The fall of business profits is a trend but can suppose a drag on the level of investment and employment the same as in past cycles, in this sense, the evolution of the dollar is

a determinant factor.

Chart 13. Profits evolution and investment

Var. anual t.m.c.

Inversión B. de Equipo — Beneficios Empresariales. Dcha.
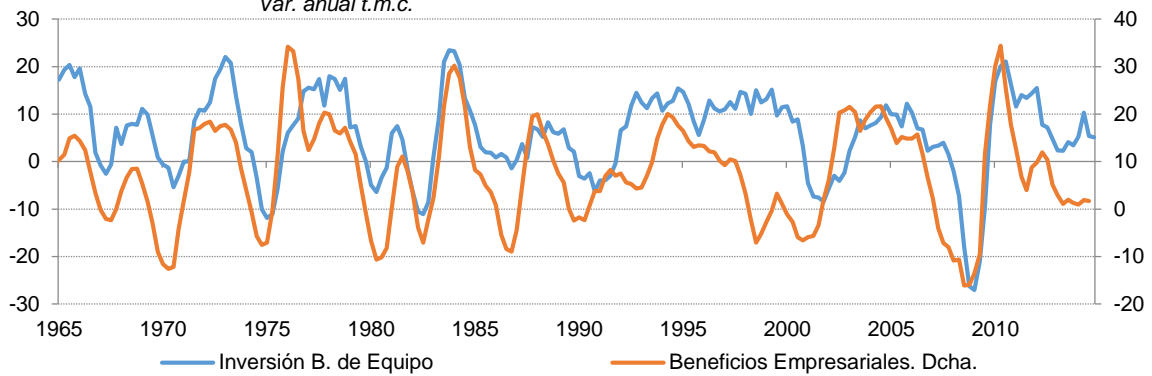
Source: Bloomberg

The structural changes suffered by the American economy are evident since the 70´s the economic recoveries moderate, to the level of the GDP growth, private consumption and overall labor market globalization therefore has made its way. The dislocation that started in the early 90´s continues its process.

Chart A. GDP volume evolution in different recoveries

1970 — 1975 — 1980 — 1982 — 1991 — 2001 — 2009
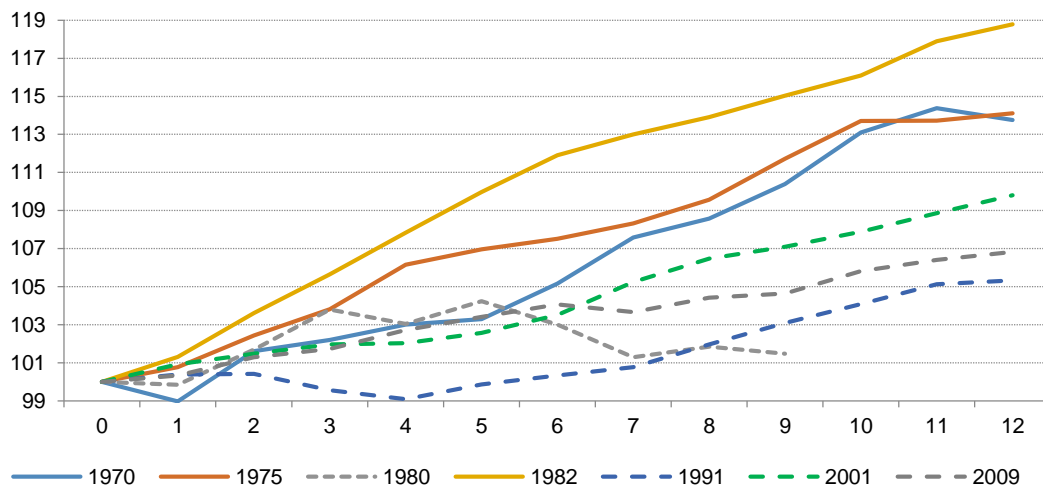
Source: Bloomberg

Other structural changes are less evident in other variables such as investment, industrial production, and business profits (deflated), also in the American economy we can appreciate the effects of globalization and the contribution of the energy revolution in exigencies of investment and as determinant factor of the dynamism of the American industrial sector.

Chart B. Evolution of investment in different recoveries
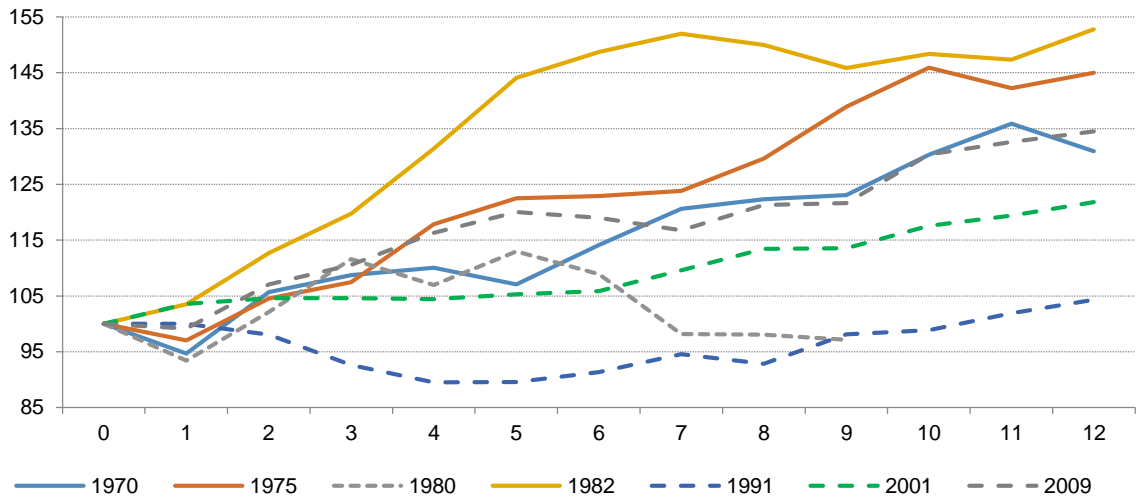
Source: Bloomberg

Let´s comment some macroeconomic indicators of the American economy. This table gathers the most important ones.

Figure 1. Main forecasts for USA

Main features of country forecast - USA

		2014		Annual percentage change						
	bn USD	Curr. prices	% GDP	96-11	2012	2013	2014	2015	2016	2017
GDP		17348.1	100.0	2.5	2.2	1.5	2.4	2.5	2.7	2.6
Private Consumption		11865.9	68.4	2.9	1.5	1.7	2.7	3.1	3.0	2.6
Public Consumption		2556.3	14.7	1.6	-0.9	-2.5	-0.5	0.4	1.7	2.1
Gross fixed capital formation		3378.7	19.5	2.3	6.3	2.4	4.1	3.9	4.4	4.5
of which: equipment		1180.3	6.8	4.5	8.8	2.2	5.0	2.7	4.3	4.6
Exports (goods and services)		2341.9	13.5	4.7	3.4	2.8	3.4	1.3	2.6	3.6
Imports (goods and services)		2871.9	16.6	5.4	2.2	1.1	3.8	5.1	4.8	4.8
GNI (GDP deflator)		17611.2	101.5	2.6	2.1	1.5	2.4	2.2	2.9	2.7
Contribution to GDP growth:		Domestic demand		2.7	2.0	1.2	2.6	2.9	3.1	3.0
		Inventories		0.0	0.1	0.1	0.0	0.2	-0.1	0.0
		Net exports		-0.2	0.1	0.2	-0.2	-0.7	-0.4	-0.3
Employment				0.7	1.8	1.0	1.6	1.7	1.3	1.3
Unemployment rate (a)				5.8	8.1	7.4	6.2	5.3	4.8	4.7
Compensation of employees / f.t.e.				3.5	2.2	1.5	2.8	2.8	3.7	3.7
Unit labour costs whole economy				1.7	1.7	1.0	1.9	2.1	2.3	2.4
Real unit labour cost				-0.3	-0.1	-0.7	0.3	1.0	0.6	0.1
Saving rate of households (b)				10.3	12.9	10.3	10.4	10.1	10.4	10.1
GDP deflator				2.0	1.8	1.6	1.6	1.0	1.7	2.2
Consumer-price index				2.5	2.1	1.5	1.6	0.1	1.2	2.2
Terms of trade goods				-0.4	-0.2	0.6	-0.2	2.2	1.3	-0.5
Trade balance (goods) (c)				-4.4	-4.8	-4.4	-4.4	-4.3	-4.3	-4.6
Current-account balance (c)				-3.7	-2.9	-2.4	-2.3	-3.3	-3.1	-3.2
Net lending (+) or borrowing (-) vis-a-vis ROW (c)				-3.7	-2.9	-2.4	-2.3	-3.3	-3.1	-3.2
General government balance (c)				-4.7	-8.8	-5.3	-4.9	-4.2	-4.3	-4.4
Cyclically-adjusted budget balance (d)				-	-	-	-	-	-	-
Structural budget balance (d)				-	-	-	-	-	-	-
General government gross debt (c)				67.9	102.5	104.8	104.8	105.6	106.3	106.4

(a) as % of total labour force. (b) gross saving divided by gross disposable income. (c) as a % of GDP. (d) as a % of potential GDP.
(*) Employment data from the BLS household survey.

Source: European Commission, Fall Forecasts (December2015)

Some basic facts:

- Lower rate of unemployment than the Eurozone average

- Growing nominal and real GDP

- Increasing labour cost due to higher employment

- Trade deficit as drawback of the improvement of economic situation.

- Chronic current account deficit.

The fall in oil prices over recent months has had a significant impact on the US energy sector, prompting cutbacks in both employment and capital expenditures.

The GDP in a simple definition is the total value of all final goods and services produced in an economy during a given period, usually a year. But adding up the total value of final goods and services produced isn´t the only way of calculating GDP but is the most common one.

The GDP has a direct effect on prices and this effect affects the labour market, the financial system, the public sector and the external sector.

As mentioned above the GDP of USA has reasons to grow but this trend reaches its maximum point in 2016 for the period considered reaching a growth of 2.7%, modest and gradual recovery compared to other less developed economies as for example China, which in the case of USA enables the labour market to create jobs at a faster rhythm.

GDP is the reference leading indicator of the economic evolution of any given economy in this case the American one.

Figure 2. Nominal and Real GDP of USA
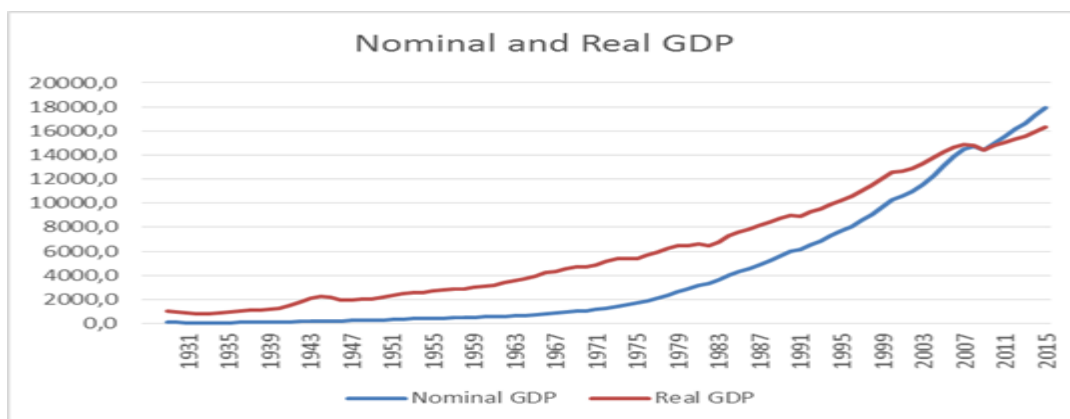
Source: Own elaboration

Net exports refer to the value of a country's total exports minus the value of its total imports. In other words, net exports are the amount by which foreign spending on a home country's goods and services exceeds the home country's spending on foreign goods and services. For the period of the chart below running a deficit since 2011 and before, this graphs represent the trade balance which is the same as the net exports (X-M).

Figure 3. US international trade balance

U.S. International Trade in Goods and Services
(Billions of Dollars)

Source: SafeHaven.com based on data at:

http://www.bea.gov/newsreleases/international/trade/tradnewsrelease.htm

Labor market

As defined by the International Labor Organization (ILO), an unemployed person is someone who is actively looking for work but does not have a job. To be considered actively looking for a job a person must be in contact with employers, getting interviews, reaching out to government employment agencies, or simply sending out applications four weeks prior to polling or who are in college.

Unemployment rate is calculated as follows: $\text{Unemployment rate} = \frac{\text{Unemployed workers}}{\text{Total labor force}} * 100\%$

Unemployment rate is countercyclical when comparing it with the GDP because a decrease of GDP affects employment as demand decreases. It is lagged compared with the GDP. In the case of the States it has been declining since the beginning of the period in 2012, going from an 8.1 % to a 4.7 % forecasted for 2017 which is an acceptable rate just below 5 % (for instance, one of targets besides inflation rate near but below 2 % of the Federal Reserve is to keep a low level of unemployment).

Figure 4. US unemployment rate
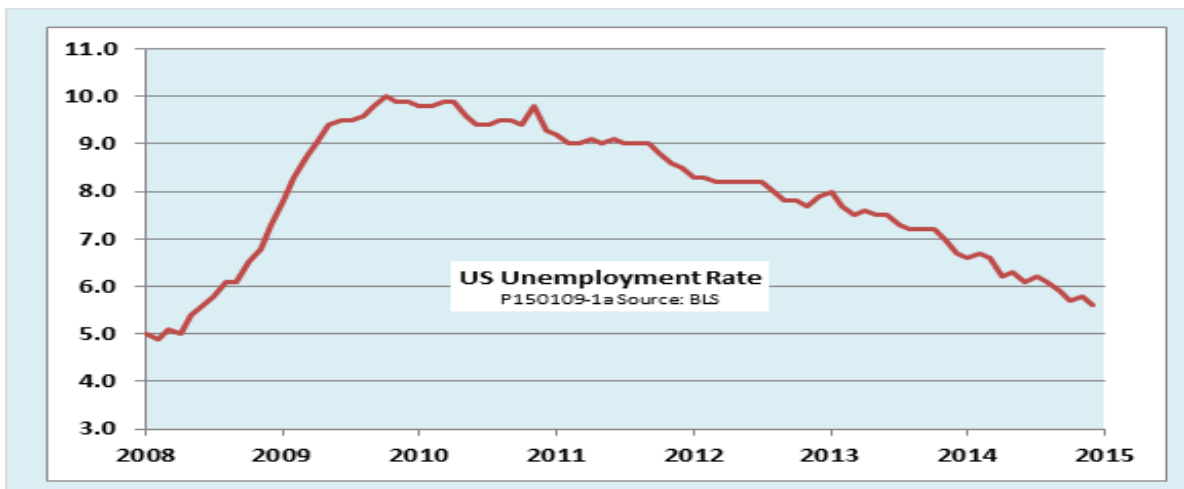
Source: US. Department of labor: Bureau of Labor statistics

Total/Full employment: A situation in which all available labor resources are being used in the most economically efficient way.

Full employment embodies the highest amount of skilled and unskilled labor that could be employed within an economy at any given time. This figure remains more or less stable throughout the period analysed and is of 1.3 for 2017 (forecast).

Figure 5. Civilian labor force and civilian employment
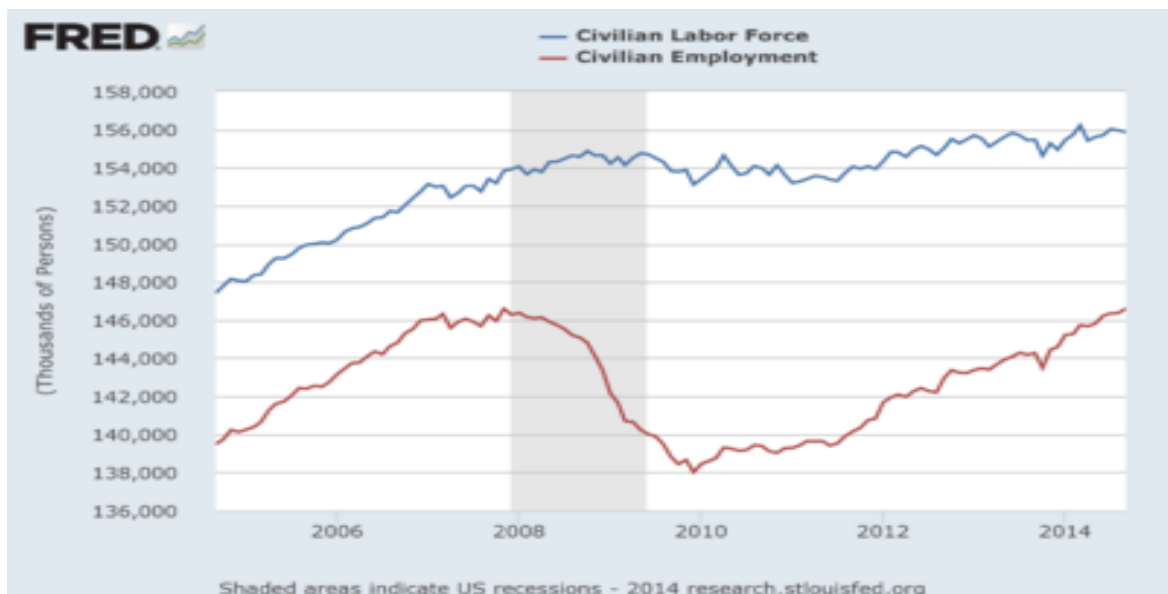
Source: US. Department of labor: Bureau of labor statistics

Private consumption (consumption indicator, C) is defined as the value of the consumption goods and services acquired and consumed by households. Normally accounts the biggest percentage of the GDP for economies like the American one as is the case accounting for a 68.4 % of the GDP, this is a procyclical measure very correlated with the GDP performance.

Inflation: Headline vs Core.

Below is a chart of the Consumer Price Index. The headline rate (all items) is in blue, and the core CPI (excluding food and energy) is in red. We can see the same pattern in which both headline and core inflation are trending higher. Also, note that core CPI has crossed the 2% threshold.

Figure 6. Headline vs core inflation.
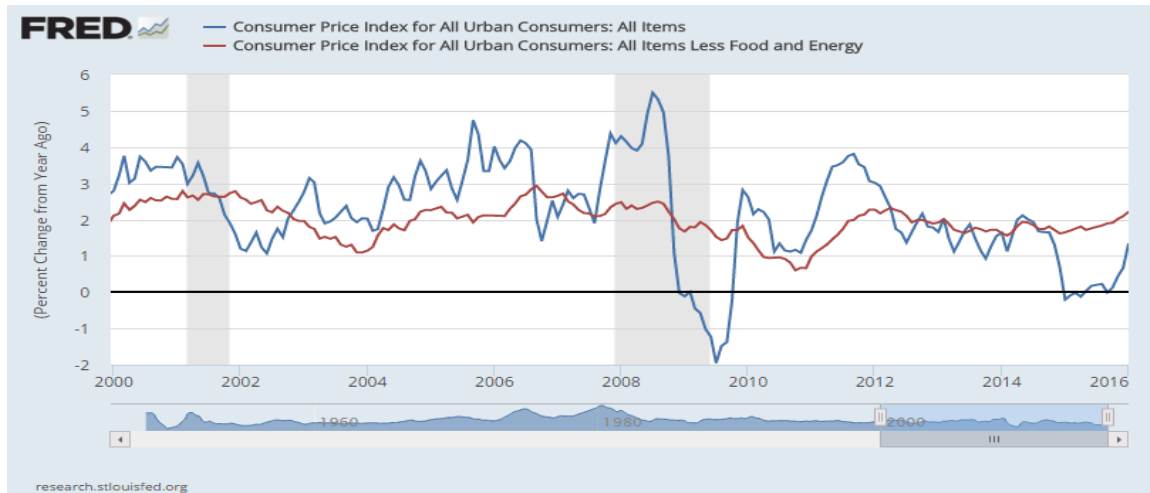
Source: US. Department of labor: Bureau of labor statistics

The graph shows the year-over-year change using the quarterly wage data from the Employment Cost Index (data starts in 2001). Once again this shows nominal wages have increasing about 2% per year, and real wages have been mostly unchanged.

Figure 7. Employment cost index and real wages
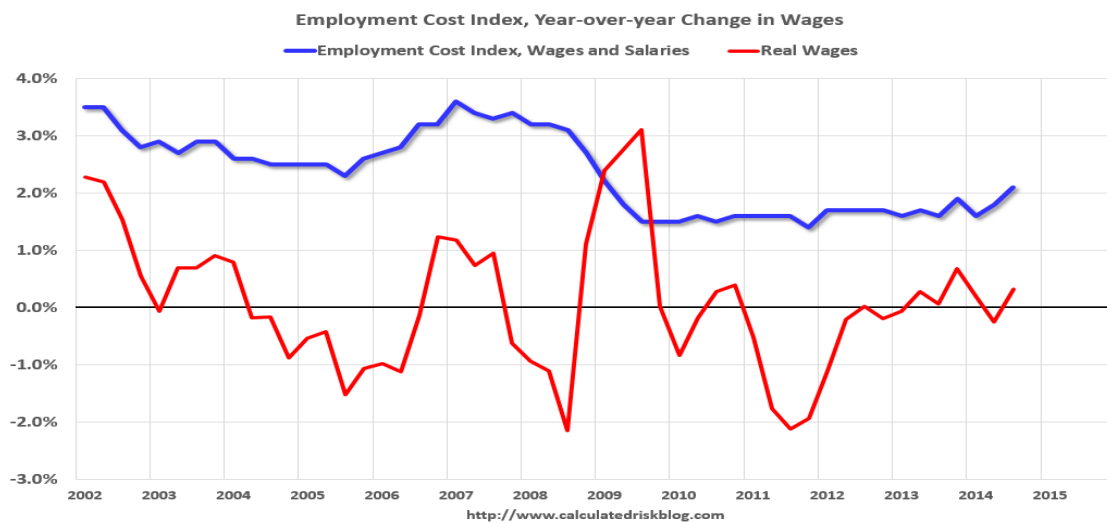
Source: US. Department of labor: Bureau of labor statistics

Current account balance it is procyclical when comparing it with the GDP growth. Government net lending/borrowing is procyciclical because deficit is countercyclical. Gross debt is countercyclical with respect to the GDP growth because it increases when GDP decreases.

Some conclusions of the outlook for the US economy are:

1.) American recovery is well based in private consumption which accounts for more than 2/3 of the GDP growth in the States, despite the fact of income inequality.
2.) Despite the hit of Big Recession of 2007, the structure of American labor market characterized by flexibility and investment outside oil sector (dropping oil prices and fracking vs shale gas) allows the American economy to recover faster than others.
3.) Despite some good macro indicators, net exports act as a drag for the American economy, in the context of weak economic environment for emerging economies, this could persist for the near future.
4.) The FED will act with prudence regarding further increase in interest rates and dollar appreciation to avoid an economic slowdown and financial crisis.

1.5. EUROZONE OUTLOOK

The Eurozone has nowadays very balanced macro variables that are at least potentially expansive and that present a great opportunity for investors. The Eurozone has recovered from the "Great recession" after several years of adjustment and has gained competiveness through internal devaluations. Now we have the scope for growth stimulus.

On the investments side, we have a great opportunity and a big potential for stimulating investment because since the crisis investment in EU member's countries has fallen to historical minimums. Also private consumption recovers due to employment creation, external sector is more competitive now.

On the monetary policy side, the QE (quantitative expansion) of the ECB has stimulated the economic growth deprecating therefore the euro and making cheaper the cost of financing. At the same time the fall of raw materials prices has enhanced the disposable income of households. So we can ensure that all the key factors will contribute positively to growth, fundamentals remain solid.

The Eurozone was in the last months of 2015 entering in a fall of prices reaching historical minimums and with a historical surplus on its current account. In that period with the fall of prices of raw materials, the target of prices was in danger, and the ECB should step in and extend or increase QE.

Chart 15. Oil price and inflation evolution

Precios subyacentes. Var. anual — Precios del Crudo en Euros
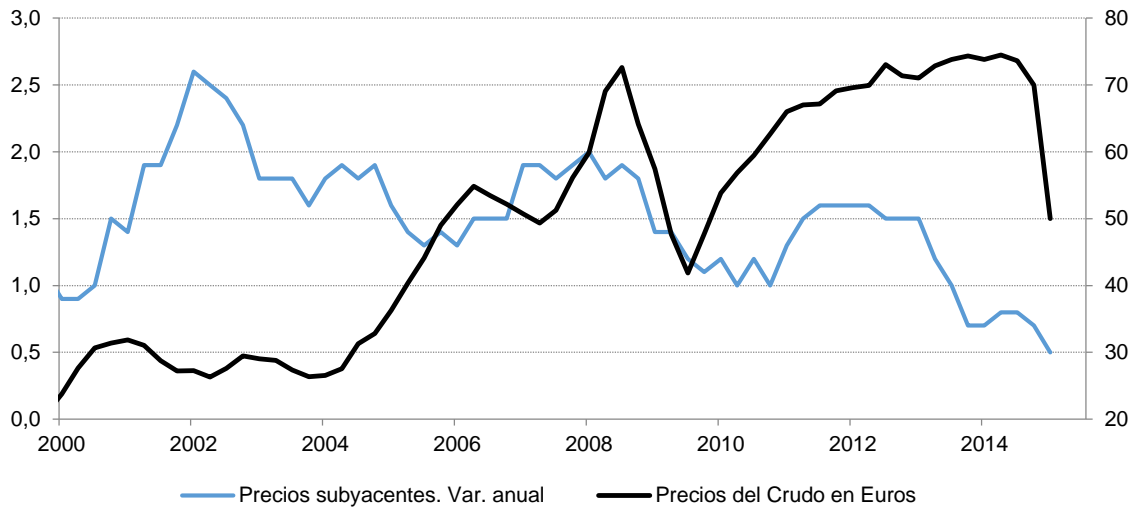
Source: Bloomberg

The monetary policy of the ECB has delivered a good financial outcome in relation to the product (GDP) because the measures taken by the central bank has helped in reducing the credit differential in the Eurozone and the levels of unemployment have also been reduced in part thanks to structural reforms in the labor market, the expansive cycle has already started.

Chart 16. Bank Loan Rates Euro Area
MFI rates to NFCs for credit up tu 1 million euros, 1y<maturity<5y

ECB refinancing rate — German rate — French rate — Spanish rate — Italian rate
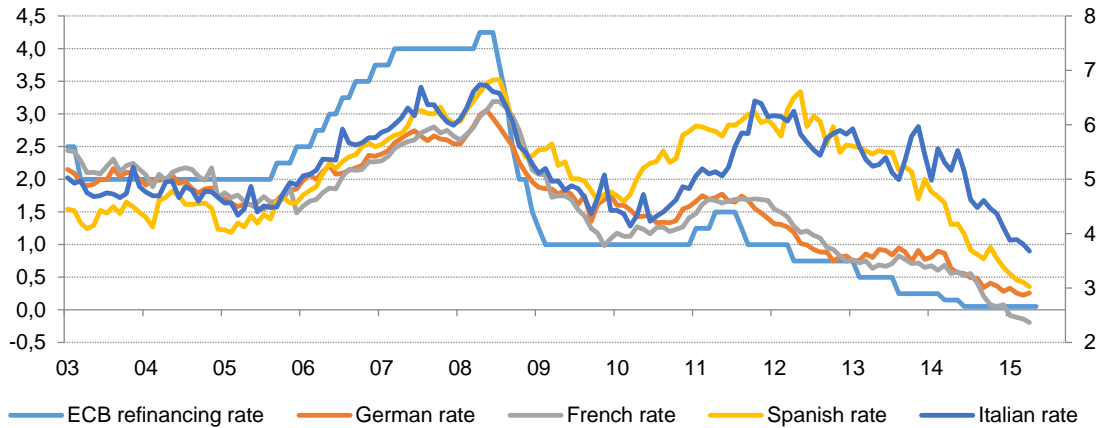
Source: Bloomberg

We have seen especially in 2015 that the monetary policy of the ECB is paying off, thus contributing to growth in the Eurozone, but strong disequilibrium's required structural adjustments in several European countries, particularly in Spain which at those low levels offered a high potential of growth in the external sector, but is now the turn for other economies. The depreciation of the Euro has elevated (one-off) the levels of competitiveness and will contribute to enhance the foreign trade.

Chart 17. Exports evolution. Base-Index 100: 2002.

Legend: Italy, Spain, Germany, France, Euro area (18), United States, Japan, United Kingdom
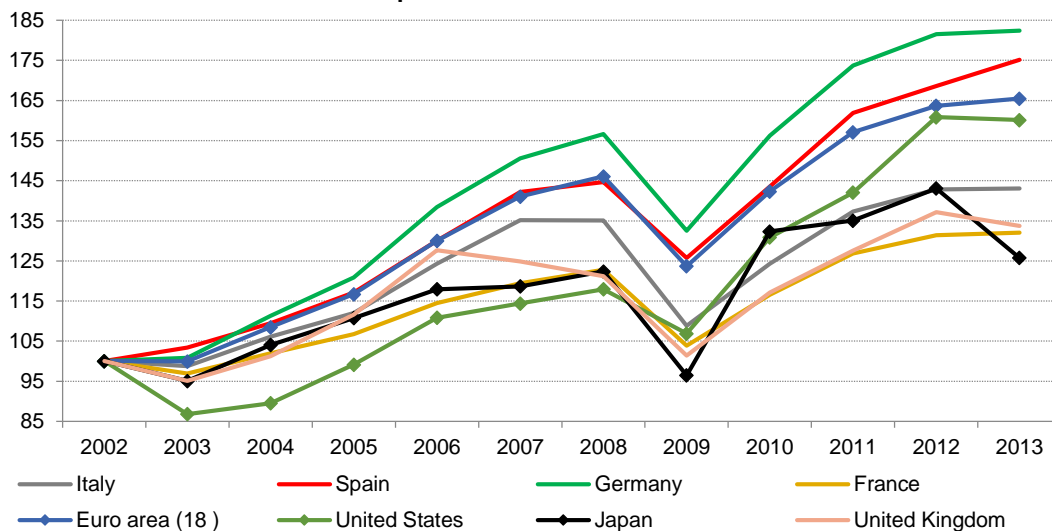
Source: Bloomberg

The fall of inflation entrenched the expectative of investors and the last actions by the ECB haven´t translated in a sustained enhancement of them. In this scenario the ECB was forced to extend the QE in line with other central banks as the Federal Reserve, the BOE[1] or BOJ[2]. The situation got worse with the plummeting of inflation expectations in the USA.

The fall of raw materials and currencies prices in South-eastern Asia, is another synthon of global weakness, in this case form the supply side. A hypothetical devaluation of the Yuan means a dramatic event in financial markets and will drag down inflation.

Chart 18. Inflation expectations (5 yrs vs 5 yrs)

Legend: Eurozona, EE.UU. (dcha)
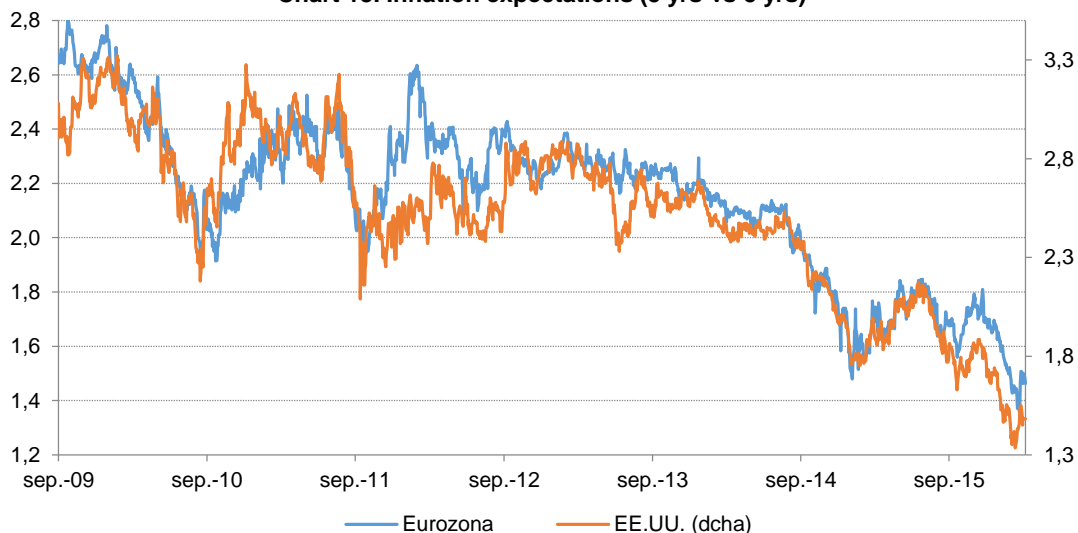
Source: Bloomberg

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[1] Bank of England

[2] Bank of Japan

So the ECB had to take decisive action, so it decided to increase its balance reaching minimum levels of 2011, there raised the possibility of the 1 QE, leaving the door opened to more depending on the level of inflation in the Eurozone, that were at last complemented with other non-conventional measures. The weakness of other economic areas, as the Asian South-eastern can rise the balance of the PBOC[3] and the Bank of Japan. The euro loses ground as reserve currency.

Chart 19. Central Banks balances. *(Base 100= December 2006)*
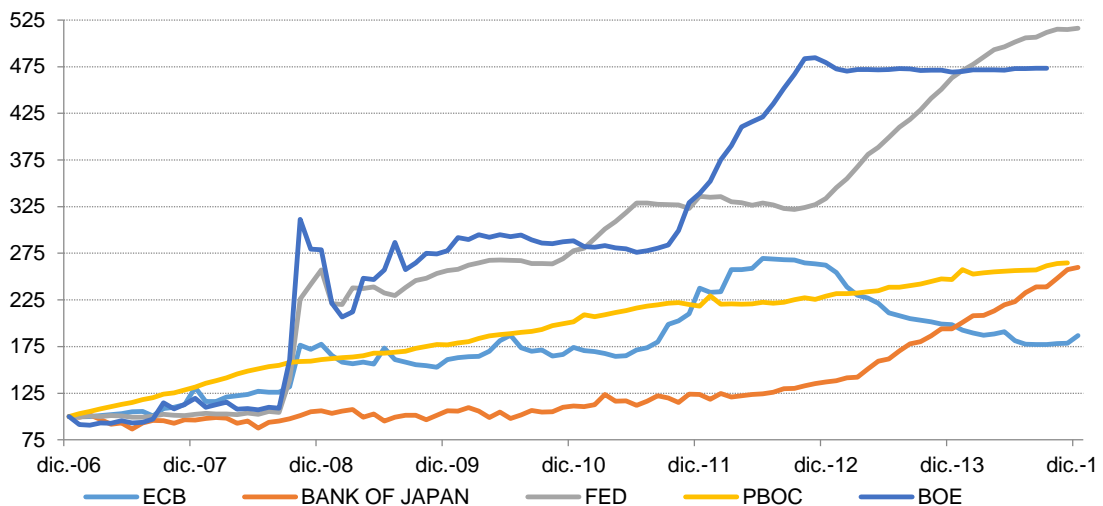
Source: Bloomberg

The ECB is the monetary institution that will capitalize the efforts to generate inflation expectations, if not investors are not likely to invest in fixed income products and will move to riskier assets in search of more alpha and/or beta to gain a good return on their investment, despite volatility. The mutualisation of sovereign risks through the ECB is and will be very limited because the financial solvency of the German economy is not as much as it looks like. The German government maintains a high risk in contingent items in Non-Governmental entities.

The member states of the Eurozone are obliged to follow adjustment policies and institutional reforms to gain competitiveness and reduce basic disequilibrium's.

I still remember those famous words by Mario Draghi of "I will do whatever it takes to save the euro" thus going from saving the euro to its fall via the QE[4] meanwhile China enters a soft or hard lending. In the meantime, in the Eurozone growth consolidates from the centre to the periphery but the strength of the Yuan and the maturation of the expansive cycle weakens the Chinese economy as we have already seen in several charts.

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[3] People´s Bank of China
[4] Quantitative Expansion which is an non conventional monetary policy measure

Chart 20. Public debt and contingent liabilities over GDP

Total. Pasivos Contingentes y Deuda sobre PIB
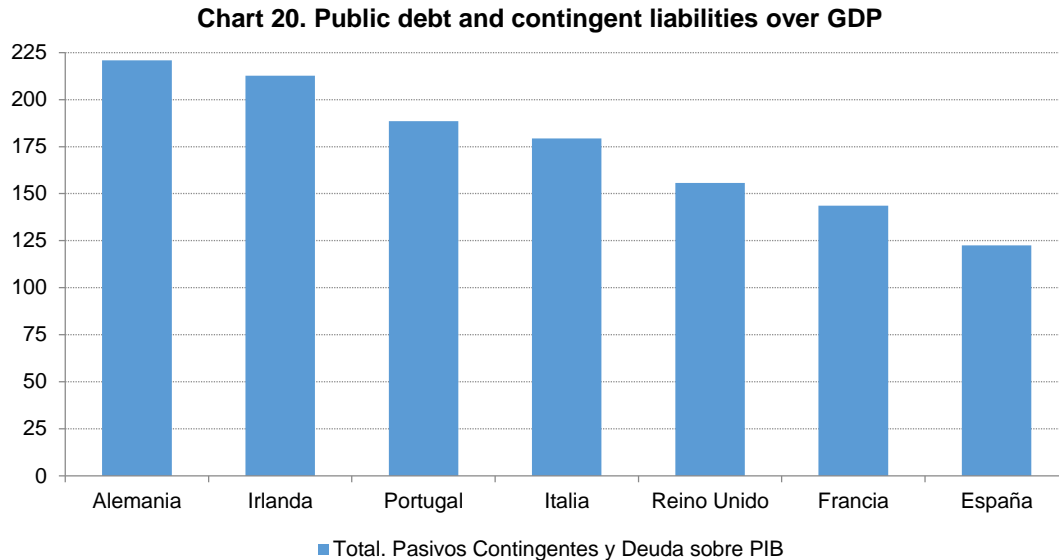
Source: Bloomberg

1.6. ECONOMIC OUTLOOK SCENARIO SUMMARY

We are seeing that the benefits of globalization are drying out. Some examples are the deceleration of the global trade in relation to the product and the decrease of the productivity and with this the fall of wages.

Global growth has deaccelerated and inflation grows at a very moderated pace, deflationary risks in the developed economies still remain despite the ultra-accommodative measures taken by the ECB with the monthly buying of 80 billion of assets with several programmes like the expanded asset purchase programme to address the risks of low inflation which consists of the following:

➢ Third covered bond purchase programme (CBPP3)
➢ Asset-backed securities purchase programme (ABSPP).
➢ Public sector purchase programme(PSPP)

The excess of productive capacity has generalized at a global level in advanced economies as the States and Germany on the advanced economies side and in the emergent side mainly China and Brazil with public investment programmes. As a consequence of the global recession and downturn of the major economies and bad investments and bubbles in emergent markets, these economies are suffering now strong recessions.

If before the "Great Recession" we could see a convergence between advanced economies and developing and poor economies this trend has currently stopped and there is in some cases a reversion.

Among BRICS cohesion has also disappeared, e.g. Brazil, Russia and South Africa suffer stronger recessions due to their heavy dependence on raw materials. China that since the "Great Recession" functioned as the economic engine, in the last years has suffered a strong deceleration and now manages a change in its economic model heavy loaded of financial risks.

On the contrary India presents a more positive outlook. The strong deceleration suffered by China has produced a strong decrease in the price of raw materials which in the stock market are traded OTC commodities such as oil, cocoa and soy.

The emergent countries have been since some years ago in a virtuous circle:

Let's analyze what happens. The fall of prices in raw materials means a high downturn in the revenues by exports of producer countries, this deteriorates at the same the external sector which provokes uncertainty and distrust of international investors making more difficult their finance in the international markets.

Ultimately, the rise of interest rates in the States and the appreciation of the dollar has supposed a strong financial deterioration of the raw materials producer's countries and dependent on external savings. The sequence is the following: The external debt of these economies issued in dollars rises its cost, on the other side, revenues reduce due to the decrease of the raw materials prices.

In the last years of the globalization process the economic growth has been associated each time with a greater intensity with a strong process of leveraging, not only governments also corporates and families have followed with several degrees of intensity this leveraging process while the cost of finance was cheap enough and the bubble which very few alerted was ignored.

This process, in a first period associated with the developed countries, since the "Great Recession" extended to the emergent economies, the last the great engine of economic progress: China, which ratios of debt over GDP are comparable to developed economies.

The current situation up to this respect summarizes in the following:

➢ Moderate economic growth and deflationary risk on developed countries.
➢ High levels of debt over GDP.
➢ Excess of productive capacity and weakness of business margins.
➢ The financial markets very stressed and very dependents on the movements of the central banks and particularly of the Federal Reserve.

Data about the economic weakness of the States and therefore of falling expectations on rising the interest rates (at this time Yellen has already spoken about a gradual upward move but no consideration of timing mentioned) which provoke the depreciation of the dollar and the return of the capital flows to the emergent economies and even a greater stability on the prices of raw materials.

This process is called "Carry Trade": The dollar becomes again a principal source of finance.

1.7. SPAINS ECONOMIC OUTLOOK

Figure 8. Macro forecasts for the Spanish economy provided by the Bank of Spain

Cuadro 2
PROYECCIÓN DE LAS PRINCIPALES MACROMAGNITUDES DE LA ECONOMÍA ESPAÑOLA (a)
Tasas de variación anual sobre volumen y % del PIB

	2014	2015	Proyección 2016	Proyección 2017	Diferencia entre las previsiones actuales y las realizadas en diciembre de 2015 2015	Diferencia entre las previsiones actuales y las realizadas en diciembre de 2015 2016
PIB	1,4	3,2	2,7	2,3	0,1	-0,1
Consumo privado	1,2	3,1	2,9	2,0	0,0	-0,3
Consumo público	0,0	2,7	1,0	0,5	0,2	0,6
Formación bruta de capital fijo	3,5	6,4	5,0	5,4	0,2	-0,4
Inversión en bienes de equipo	10,5	10,2	8,3	7,3	0,4	-0,3
Inversión en construcción	-0,2	5,3	3,5	4,9	-0,2	-0,7
Exportación de bienes y servicios	5,1	5,4	4,4	5,2	-0,4	-0,3
Importación de bienes y servicios	6,4	7,5	5,3	5,9	0,0	-0,6
Demanda nacional (contribución al crecimiento) (b)	1,6	3,7	2,9	2,4	0,1	-0,2
Demanda exterior neta (contribución al crecimiento)	-0,2	-0,5	-0,2	-0,1	-0,1	0,1
PIB nominal	1,0	3,8	3,4	3,4	-0,2	-0,3
Deflactor del PIB	-0,4	0,6	0,7	1,0	-0,2	-0,2
Índice de precios de consumo (IPC)	-0,2	-0,5	-0,1	1,6	0,0	-0,8
IPSEBENE	0,0	0,6	1,1	1,4	–	–
Empleo (puestos de trabajo equivalente)	1,1	3,0	2,3	1,9	0,0	-0,1
Tasa de paro (% de la población activa)	24,4	22,1	20,3	18,9	–	–
Capacidad (+) / necesidad (–) de financiación de la nación (% del PIB)	1,6	2,1	1,9	1,5	0,1	0,3
Capacidad(+) / necesidad (–) de financiación de las AAPP (% del PIB)	-5,9	-5,2	-4,4	-3,4	–	–

Source: Bank of Spain

In the data provided by the bank of Spain we can observe in the first row the GDP (as we already know GDP is the sum of all the value added by the goods and services provided in any given economy), figure with the annual growth computed for 2014 and 2015 and the forecasts for 2016 in 2.7 % and 2.3 % for 2017, so moderate growth is expected.

Private consumption as well as public consumption peak up but is not the core of the economic recovery. My reason is simple, if we follow the analysis line by line the next one is gross formation of fixed capital where we can see that the increments are higher on the investment for equipment's goods than those of the construction which its recovering from the low numbers that from 2014 and before was accounting for.

It is also public information that Spain has gone through a deep recession suffering from wage deflation and internal structural reforms to foster among other things a rise in labour productivity with a high cost in term of unemployment (specially for young people) that are hopefully now laying the foundations of a sound and sustained recovery that could soften business cycles shocks in the near term, as in a globalized world economic and financial crisis spread faster than in isolated economies.

Let me continue with the macro variables of my analysis, as one of the worst symptoms of the recovery of Spain of this recession (that started after giant investment bank Lehman Brothers failed) is its high unemployment rate, even if we consider a rate of growth for the economy above the 2%, data tells us that still for 2017 the unemployment rate forecast is of 18.9 % which is high if we compare

ourselves with European peers, despite the fact that employment is being pushed forward due to the general increase in activity. Even nowadays with the new labor reform in place we might not see a drop in the structural level of unemployment.

In a first moment of the recession exports (net exterior demand) pulled a little bit of the sluggish economy but the trend has switched as we can see that the negative numbers in terms of contribution to growth are now from the net external demand (acting as a drag), contributing more the national demand side to the economic growth the Spanish economy is experiencing.

Global evolution of economic and financial conditions stressed mainly in emerging markets economies such as China and the others such as Brazil may harm and weaken favouring economic conditions which Europe and particularly Spain are experiencing.

Low IPC, broadly speaking is the cost of life in terms of PPP which makes it easy for consumers to buy and boost a little minor commerce. Looking and supporting the data in the penultimate row we must take into account two factors that contribute to enhance the financing capacity of the Spanish economy, on one side the cheapening of the energy bill (due to lower global commodities prices) and the relief of the interest charged on national debt due to favourable exterior financing conditions.

Finally, the last row shows the deficit Spain is running which is compromised to be reduced, in my view the rhythm at which deficit is reduced must be taken into account, so deleveraging has already started on the private side (households and firms mainly) but not in the public sector.

Figure 9. Spanish current account balance
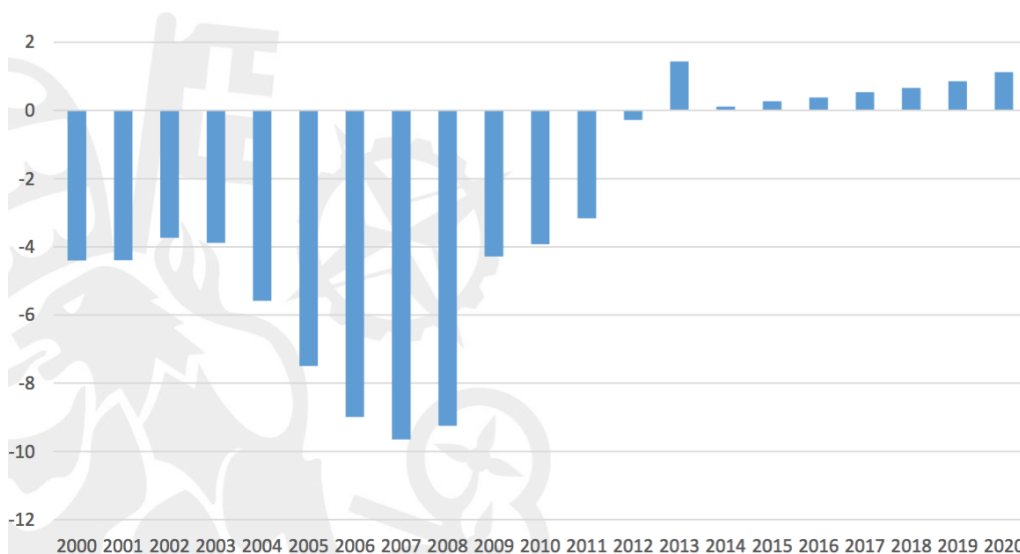
Source: IMF, WEO. October 2015

Let´s now consider the external sector, being the current account the principle variable, current account[5] is the difference between a nation's savings and its investment. The current account is an important indicator about an economy's health. It is defined as the sum of the balance of trade (goods and services exports less imports), net income from abroad and net current transfers.

This variable is normally countercyclical and it´s related to the external sector. The minimum point is reached in the year 2007 just at the starting period of the "Great Recession" running a deficit of nearly 10 % of the GDP and the maximum is in year 2013 recovering from the recession suffered in Spain.

The current account balance showed a negative evolution until the "Great Recession"[6]. In the last years, previous to the Great Recession the deterioration has been very intense, surpassing punctually the 10% of GDP; to the continuous deterioration of our external sector two factors joined: the strong increase in the energy prices (nearly 50 billon of euros) and a significant increase in the expenditure of external financing (the net debt reaches 1 billion of euros), this is that a variation of a 1% in the cost of the debt suppose a 1% of GDP.

The "Great Recession" brought the slowdown of the imports while energy prices and the cost of financing the external debt plummeted. All these meant a huge saving of payments to the exterior for both concepts and a surplus for current account.

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[5] Definition of the current account
[6] Great Recession is the financial crisis that started in the summer of 2007 after the fall of giant investment bank Lehman Brothers

The economic recovery translates in a slight deterioration of our external sector-the domestic demand pushes imports in the recovery period and economic growth and the external balance reduces.

Despite the fact of a significant increase in the economic growth, our external jump has remained positive contributing to these various factors as the following:

➢ Improvement of competitiveness. The reform of the labour market and the recession translates in a fall of the unitary labour cost, and our productive sector has gained share in terms of competitiveness.
➢ Spanish companies show the trend towards internationalization with a permanent vocation.

Both factors reflect a constant growth of our exports in terms of GDP. From levels slightly above 20% of GDP in the previous years to the recession to shares of above the 30% of GDP currently. Moreover, our international trade recovers smoothly.

To the mentioned above, if we sum up the fall of energy costs and external debt: from the start of the recession this means several points of the GDP.

Looking forward, the evolution of the external sector looks positive because the gains in competiveness that come from the labour market reform remain. On the other hand, the very positive evolution of the services sector stands out: on one hand the tourism sector, on a year basis reaches new maximums of visitors and income. And on the other hand, other services: Engineering, transports, banks, insurances, telecommunications, etc. have been very involved internationally and register significant growth.

The improvement of the employment and financing conditions contributed in a decisive manner to the recovery (2014), as also in the second half of the year, the decline in the oil price and the depreciation of the euro, in a context of progressive consolidation of economic improvement in the Euro area and the intensified tone of the expansive monetary police of the ECB.

In particular, the financing costs reduced in a significant manner- both for the public sector and the private sector-, approximately to the levels observed in the rest of the EMU in accordance with the expansive tone of the monetary policy.

In this context, the Spanish economy registered again, by third consecutive year, an external surplus in 2014. In line with the data of the balance of payments of the Bank of Spain, the financing capacity of the nation reached the 1,2% of the GDP, that was below the registered the previous year (of 2,1% of GDP).

The Spanish economy presents four drivers for growth which have to do with institutional and structural changes as:

Competitiveness: As commented previously strong gains in competiveness that come from a process of internal devaluation and change of model (due to being a member of the economic union).

Globalization: Openness of the industry and services sector, first to the Eurozone and since the "great recession", commerce and services started to accelerate towards the

emerging countries producing spectacular growth in those countries benefiting from trade.

Energetic efficiency: Strong decrease of energy inputs in terms of cost and consume relation to the GDP. A fall of imports of 30 % in hydrocarbons versus a fall of 7 % in GDP.

External equilibrium. The surplus on the current account balance maintains on a context of economic recovery, which means the fact that there is an upward movement of the potential of growth of the Spanish economy.

During the research, analysis and writing of this paper the international economic context got worse and the expectations of economic growth also, and the fall of the prices of the intensive inputs for the Spanish economy also:

The evolution of the prices of oil and the futures curve marks the fall of these two which contribute to a strong decrease in the energy bill, that implies a significant improvement of the national disposable income.

The external sector goes strong. The last years have meant an increasing adjustment of the competiveness in Spain, mainly against Europe, that is on its way out of the crisis with a high level of competitiveness. In the meantime, among the Spanish companies the culture of exporting grows.

Chart 21 . Unitary labor costs
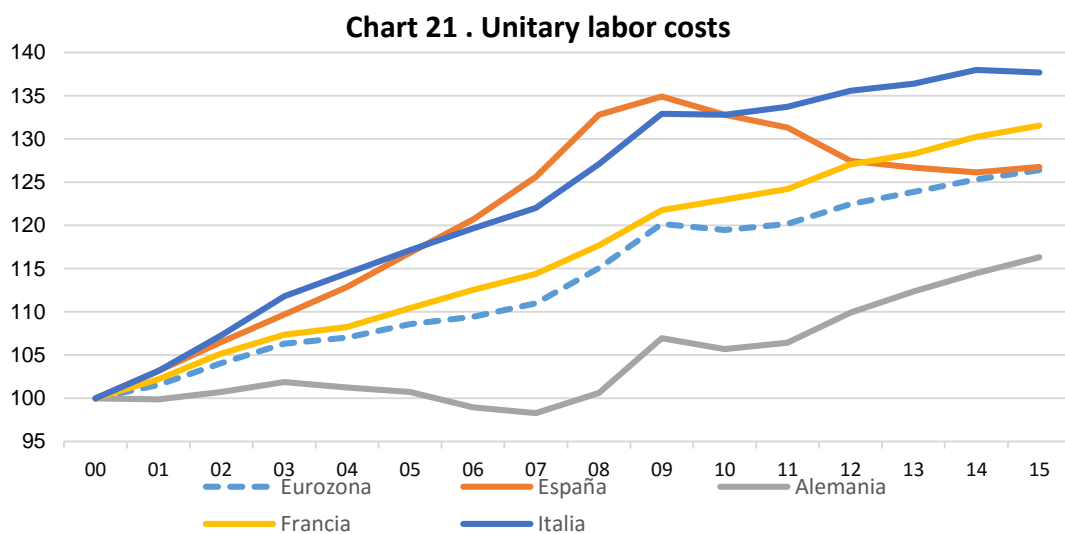
Source: Bloomberg

The improvement in the external sector has consolidated over the last years, despite the fact the euro had remained very overvalued until a few quarters ago. Quantitatively speaking exports have grown eight points in the last fifteen years, now with the depreciation of the European currency and the consolidation of the intracommunity trade, our exports can overcome the barrier of the 35 % of the GDP, twelve points more than the minimum reached in 2009.
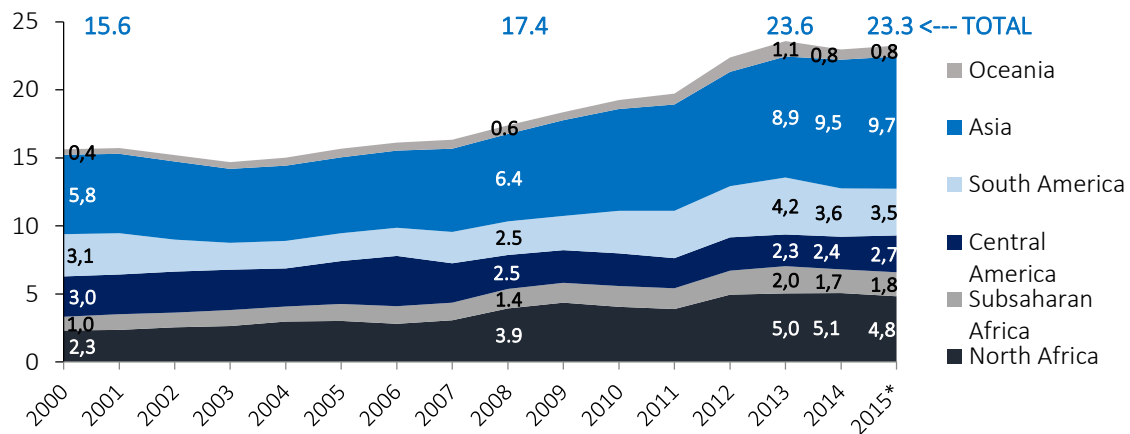
Source: Spanish Treasury

The depreciation of the euro has given an impulse to the gain in competiveness, already supported by the structural reforms provoked since the "Great Recession". The improvement occurs in the same manner against the member states of the European Union as a reflection of the effort of internal devaluation that has been done in the last years.

Chart 22. ITC´s calculated with CPI´s. Against UE-28 and OECD

Gráfico 2.1. ITCs calculados con IPCs
(variación interanual, en porcentaje)

Frente a la UE-28 · Frente a la OCDE
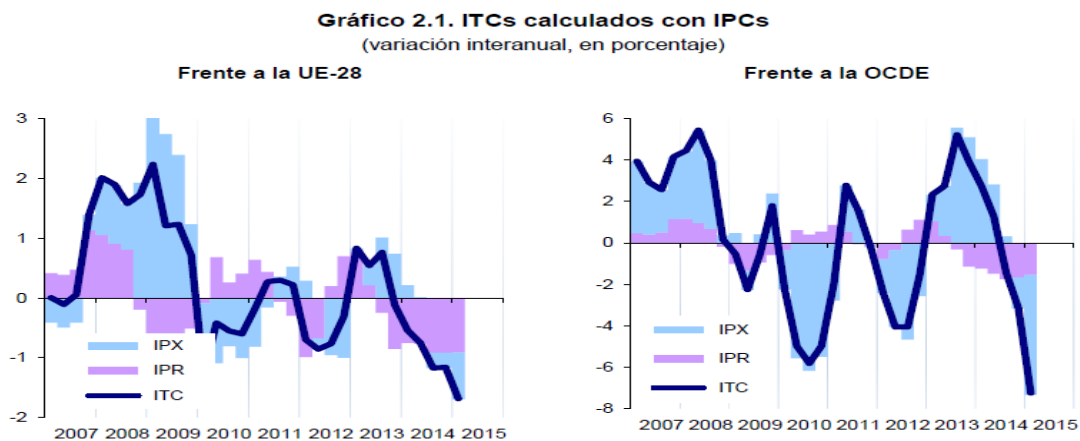
NOTA: un aumento (descenso) de los índices señala una pérdida (ganancia) de competitividad frente a los países respecto a los que se calcula

Source: Office of economy and competitiveness

Strong improvement of competitiveness. The revenues of exports to the Eurozone have reached maximum levels along all the months of the year 2015, the payments for imports also. The revenues for exports to third countries also reach historical maximums, month by month during 2015, while the payments for imports only in the month of July reaches historical maximum.

Spanish economy which is intensive in capital (external debt) and energy (external deficit). Both of these variables move in a positive trend in the long run (fall of costs). They could add up several point to the disposable income of the country.

Chart 23 . Evolution of the exterior balance of energy and crude oil price in euros
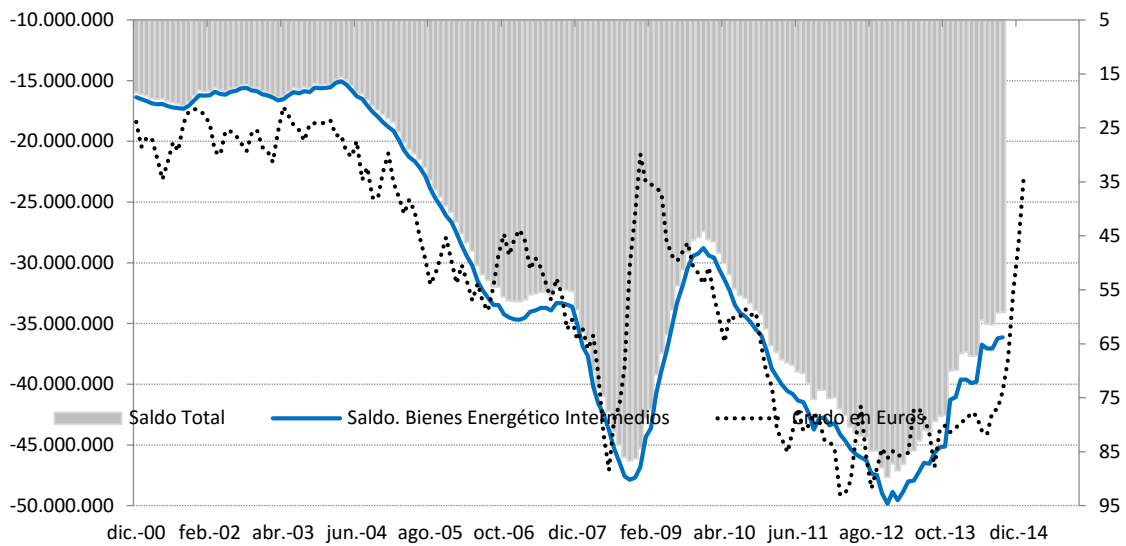
Source: Bloomberg

In the case of Spain, the fall of imports of petroliferous products is due to a significant enhancement of the energy efficiency of the country. This structural change is a solid pillar for a bigger potential growth of the economy.

Data shows that the savings in fuels fossils due to the strong increase of the renewable energies in the national energy matrix. Also due the recovery of domestic demand will translate a deterioration in the ratios of external trade, but in the current levels or those of 2015 there exists still a very wide margin for the restrictive effects of the external demand mark their mark on the activity as we can see in the following chart.

Chart 24. Evolution of the activity and electricity consumption

I. Sintético Actividad (CVEC).Indice (2008=100)

Consumo energía eléctrica (CCal y Temp.). Millones de Kwh.
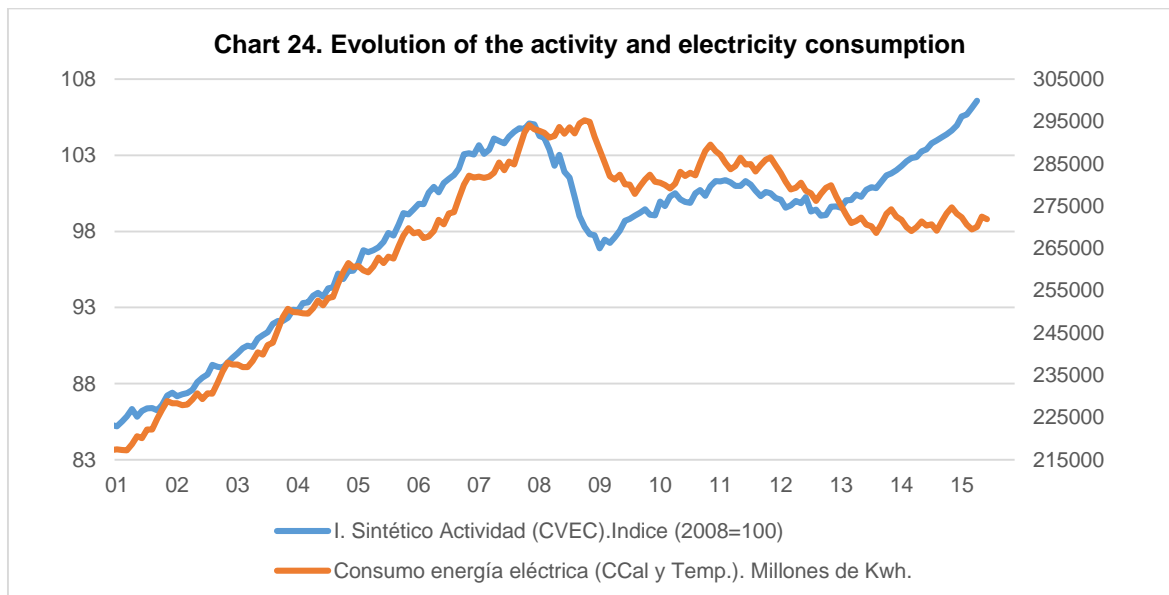
Source: Bloomberg

In Spain as in other countries the gas revolution has also reached, not by means of exploration, but yes by the role of the industrial companies in the energy matrix. This means a downward stabilization of the energy costs; the following bar chart shows the percentage energy consumption depending on the type of product.

Chart 25. Percentage energy consumption by type of product
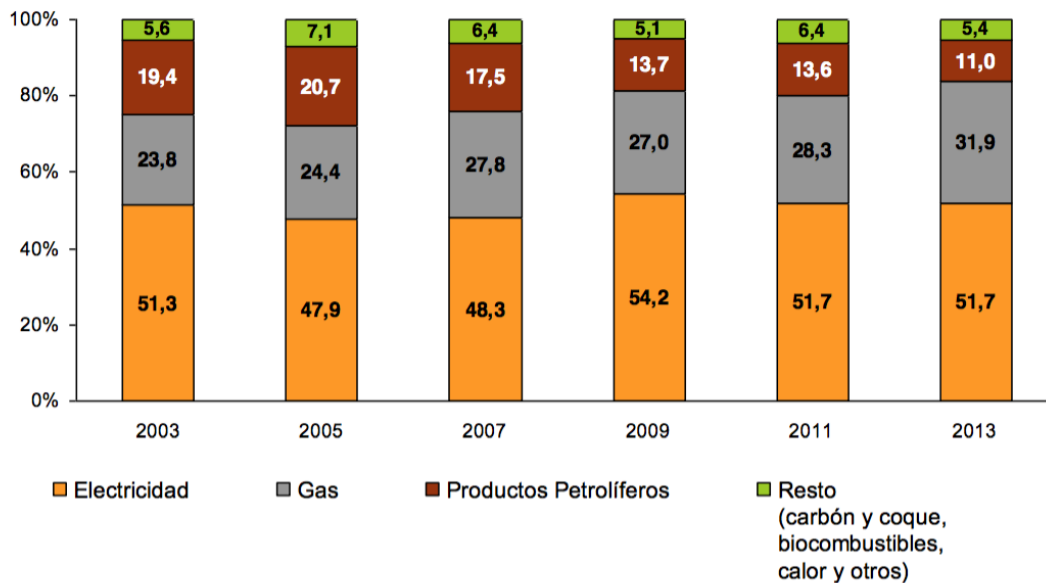
Source: INE. National Institute of Statistics

According to the figures the recovery of internal demand is not translating into a negative result for external trade, we have seen that the substantial improvement of the competitiveness in the Spanish economy has raised the potential of growth, internal and external demand coincide in this expansionary period.

PIB

Contribución al crecimiento interanual (p. p.)

Previsión

Demanda interna   Demanda externa   PIB *
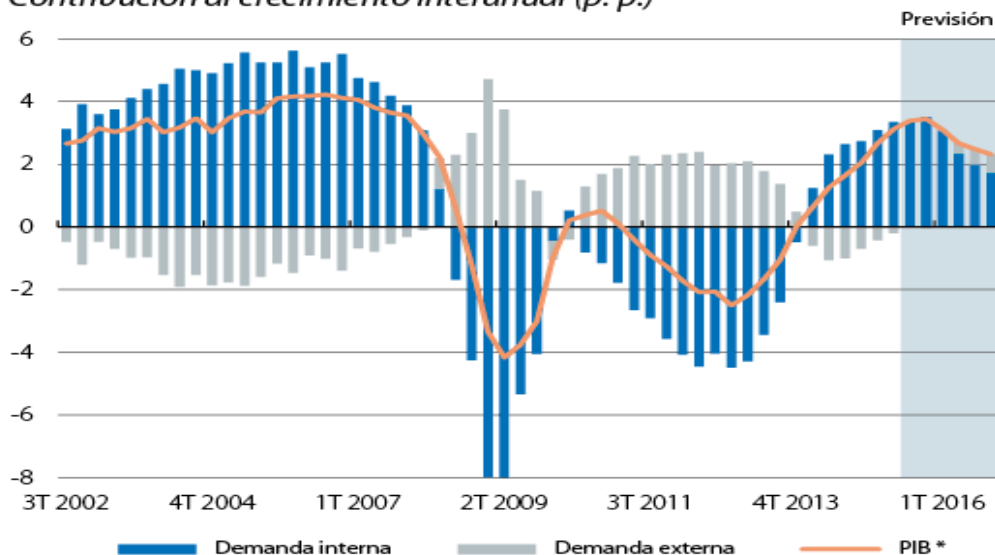
Nota: * *Variación interanual.*
Fuente: *"la Caixa" Research, a partir de datos del INE.*

2015 has been a year were all the sectors contributed in a positive way to growth of the GDP; investment has consolidated with the positive contribution of construction and public investment. The following chart supports this idea.

Chart 26. GAV market economy (Interannual var)

Demanda externa neta (Contr.)	VAB Industria. Vol (2010=100)
VAB Construcción. Vol (2010=100)	
VAB Servicios. Vol (2010=100)	PIB p.m. Vol (2010=100)
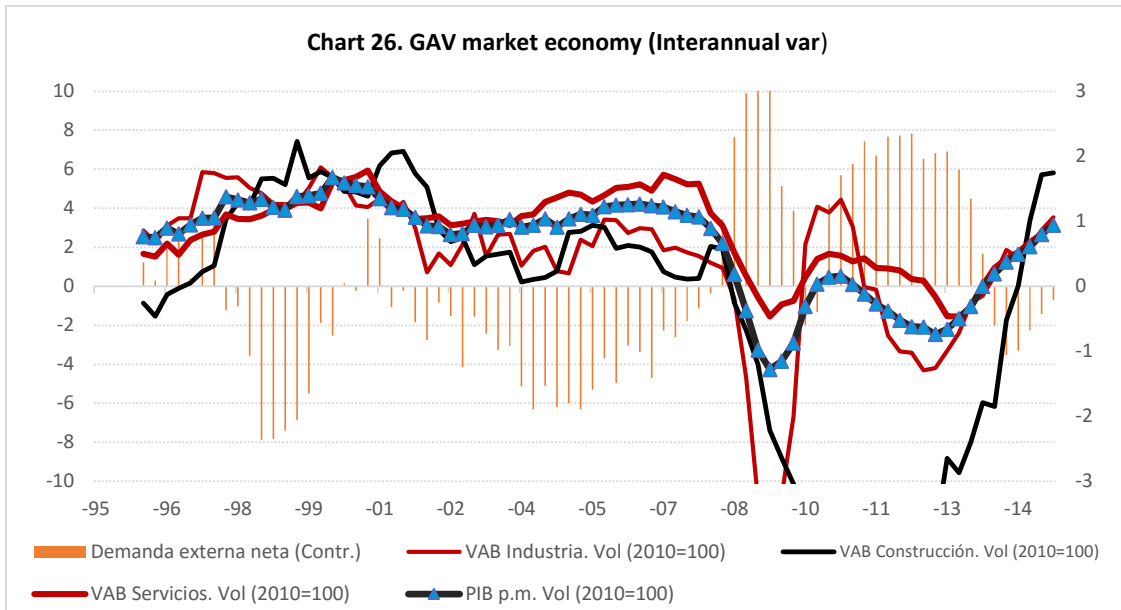
Source: Office of Economy and Competiveness

Economic growth in Spain is gaining momentum. The growth of the GDP at the beginning of the recovery supported in the external sector which benefited from gains in competiveness due to a process of internal devaluation. Private sector as in other modern economies gains strength as well as investment helping employment which recovers at the same pace thanks to the structural reforms implemented by the government. In this economic context financial ratios are quoting the normalization of risks and the virtuous circle will accelerate with the private consumption as main factor of growth, the same that has happened in the United States. The evolution in the following chart is clear.

Chart 27. Evolution of the GDP and its components

Inversión (dcho)	PIB Anual	Consumo
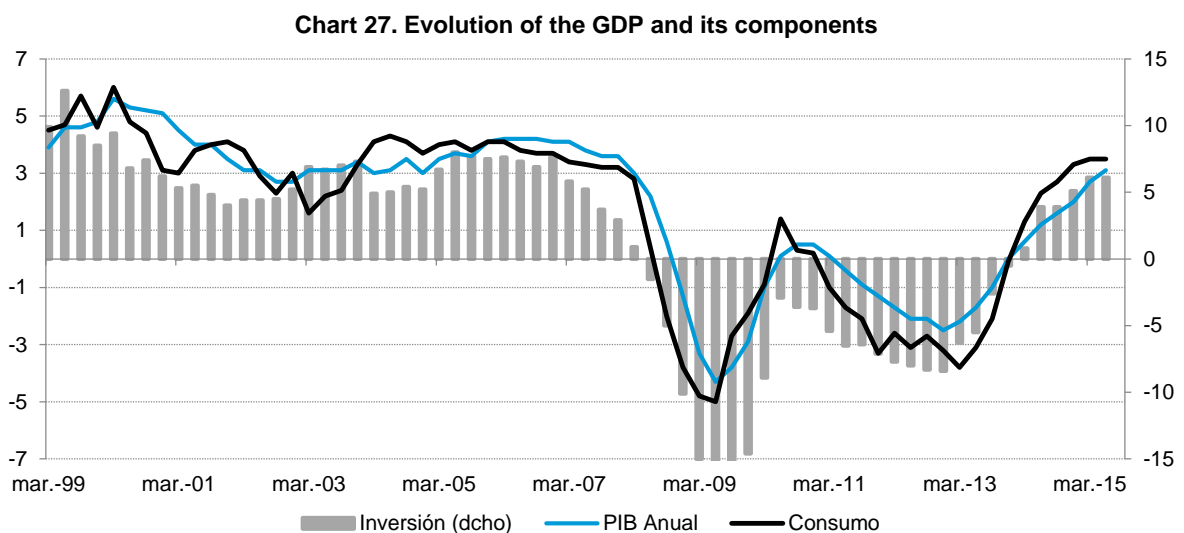
Source: INE. National Institute of Statistics

Spain obliged by the circumstances made what we needed to do but in 2015 still had a long way to go in the recovery to recover normality in all economic parameters. As in other economic historic periods employment creation will boost private consumption

to levels of near a 4 %. We face in this regard to a virtuous scenario based in strong gains of competiveness, high employment creation and the significant sustainability of private consumption and investment.

Chart 28 . Employment and retails sales
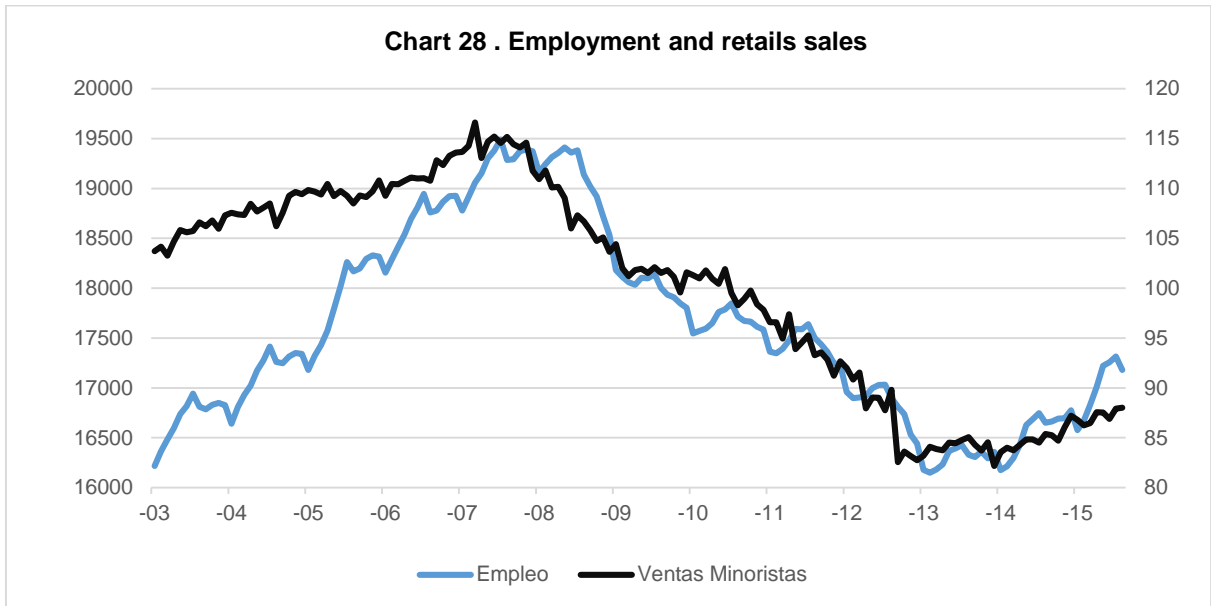
Source: INE. National Institute of Statistics

Finally, companies start to achieve good results: Good economic results signal their recovery based on growth of business activity at the same time excess of capacity are being reduced rapidly and the cost of finance for companies have moderated significantly. The recovery of the gross value added of companies has been intense, pushing upwards employment and personnel costs. The fall of the financing cost and the moderation of salaries is provoking an historical recovery of the net ordinary result in companies.

Chart 29. General activity and industrial
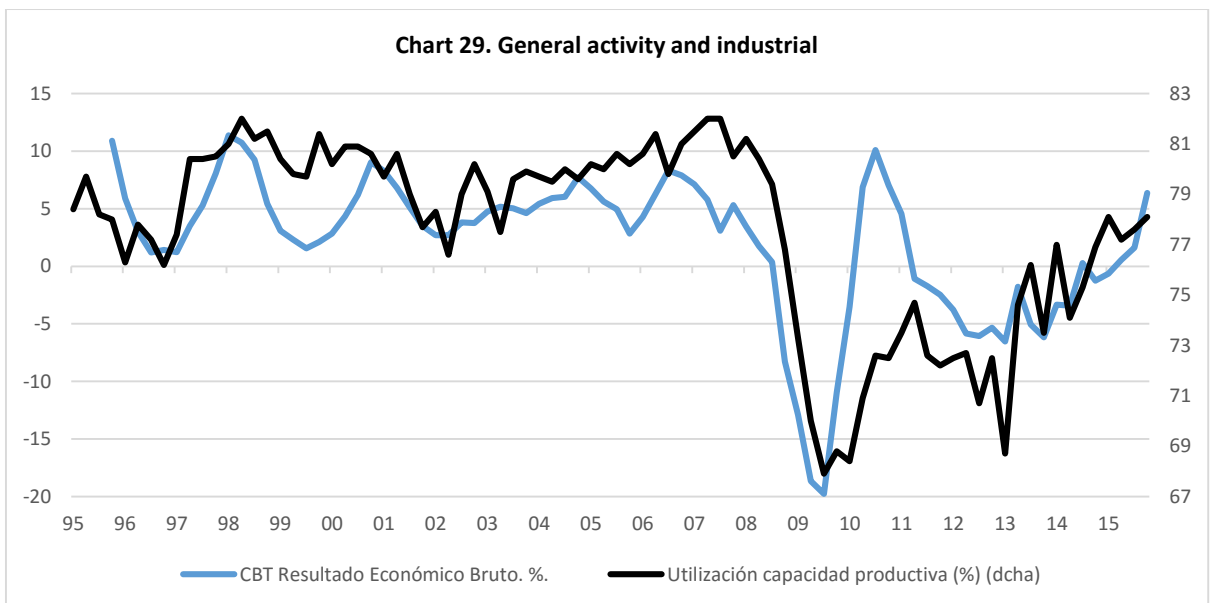
Source: "Central de balances". Bank of Spain

The challenge for the Spanish economy is to maintain current account surplus at the same time the growth of the domestic demand goes to levels of above the 3 %, after 6 consecutive years of contraction. In this several factors account: i.) Competiveness, ii.) external demand, iii.) raw material prices and the cost of finance of external debt. Data confirm the gains of competiveness of the external sector. In five years' exports have gain 10 points over GDP and the boost of internal demand hasn´t weakened exports.

Chart_30. Evolution of internal demanda and current account

Demanda Doméstica (real)   Déficit Cuenta Corriente sobre PIB
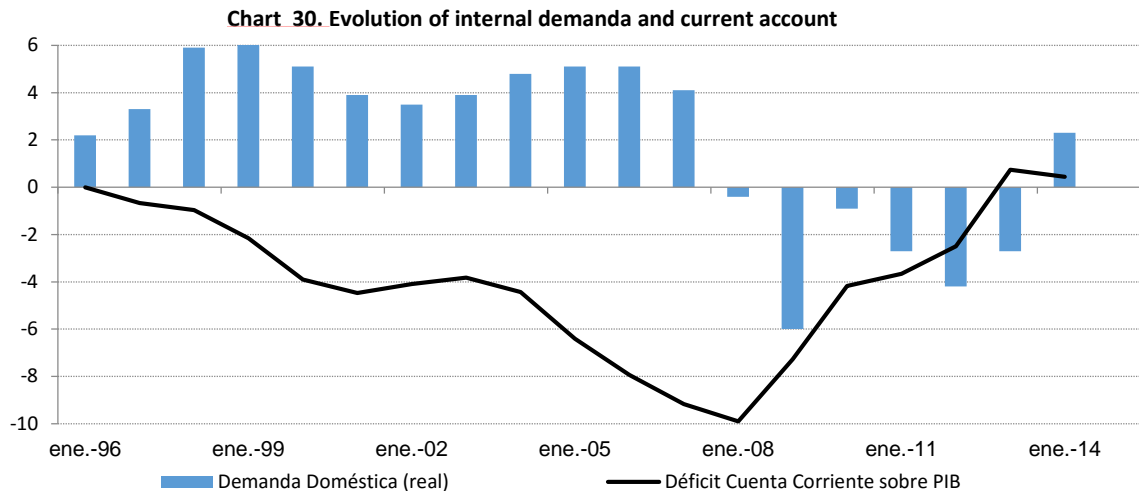
Source: INE. National Institute of Statistics

1.8.   PORTFOLIO MANAGEMENT AND THE ECONOMIC OUTLOOK

Portfolio managers have into account the economic outlook and the actions taken by the economic and financial authorities in the day by day operations. Governments, the economic authorities and the central banks try to influence by means of their policies in the economic cycle looking for a sustained growth in the long run in a context of moderate inflation in words of Mr. Draghi: "close to but below the 2% over the medium and long run" and high rates of employment.

The main measures that these authorities can adopt are grouped in three categories:

1) Measures of fiscal policy: Acting mainly in the public expenditure and taxation.
2) Measures of monetary policy: Acting on the quantity of money in circulation in the economic system (monetary indicators such as M1, M2, M3 and so on) and its price (interest rates)
3) Measures on the exchange rate: Acting on the commercial/trade position of the country with respect to others.

Expansive economic policies are those in charge of favouring or giving an impulse to economic growth (e.g. increase in public expenditure, lowering the price of money by means of decreasing the interest rates, or lowering taxes among others). These policies will be implemented at times in which the economy is considered to be growing above its potential and therefore disequilibrium's could bring outcomes which can convert into future crisis (e.g. growing expectations of rise in inflation among the economic agents).

If we were dealing with fixed income portfolios (which is not the case for this paper) we would have a defensive model in duration terms (low durations), which the target of that if we have a rise in interest rates (that will be anticipated in the bond markets) this effect has a minimum impact in the net asset value.

Equity portfolios managers must focus more or have a macroeconomic global view and study in detail companies before investing, thus is obvious for a value investor to understand the business the company does and the markets it operates. Fundamental analysis and technical analysis are just two tools which helps us understand the functioning and patterns of markets. Finance is a social science were psychological factors also play an important role, the most famous and profitable investors in history indeed were not traditional economists, but psychologists, sociologists or even mathematicians.

1.9. INVESTMENT IN SPAIN

The main institution that captures and manage savings particularly in Spain family savings is the CII (collective investment institutions), the birth and the growth of this investment vehicle since the post transition has grown in importance and is nowadays the main investment vehicle chosen by investors.

The information and data evaluation regarding this funds and their current performance is recorded in a yearly basis by INVERCO. Investment related to the savings of Spanish investors and families have followed a non-banking path, among investment funds, pension funds and direct investment which have increased and now account for a 55,7 % in the total portfolio of Spanish households, in line with the economic recovery Spanish economy is experiencing.

1.9.1. FINANCIAL MARKETS SCENARIO

The main issue in this section is the moderate growth and low inflation are the two key factors that affect financial assets. This two factors produce political and institutional instability as we can see in the case of Spain with new elections taking place in June as well as the Brexit which markets are already discounting. Nevertheless, this gives rise to risks that have to be management and that are inherent to the phase of cycle we are in.

In the currency markets, we have seen in the last period a great adjustment. The dollar has reached the historical maximum two months ago and since now is falling with respect the euro. The evolution of the American economy supposes a challenge to emerging currencies. We are leaving in a transitionary period, as I was commenting the risks are high due to political instability that provokes the flows of capital from emerging countries to hard currencies which are the euro, dollar, yen, Swiss franc, etc.

This crisis ids different from the 98 crisis produced by the plummeting of currencies of the Asian south-eastern, now the weaker position is in Latam and other countries which are related to the raw materials which started their fall. China can provoke a very intense movement which implies volatility.

1.3 FX Volatility: Emerging Markets by Region

percent, 1-month implied volatility
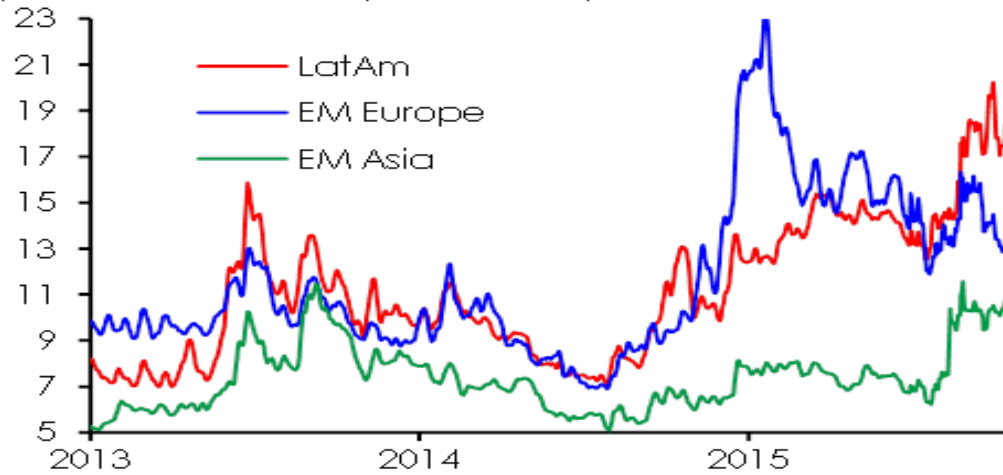
Source: Bloomberg, IIF

Chart 31. Evolution of the amplified index of the dollar

USTWBROA Index
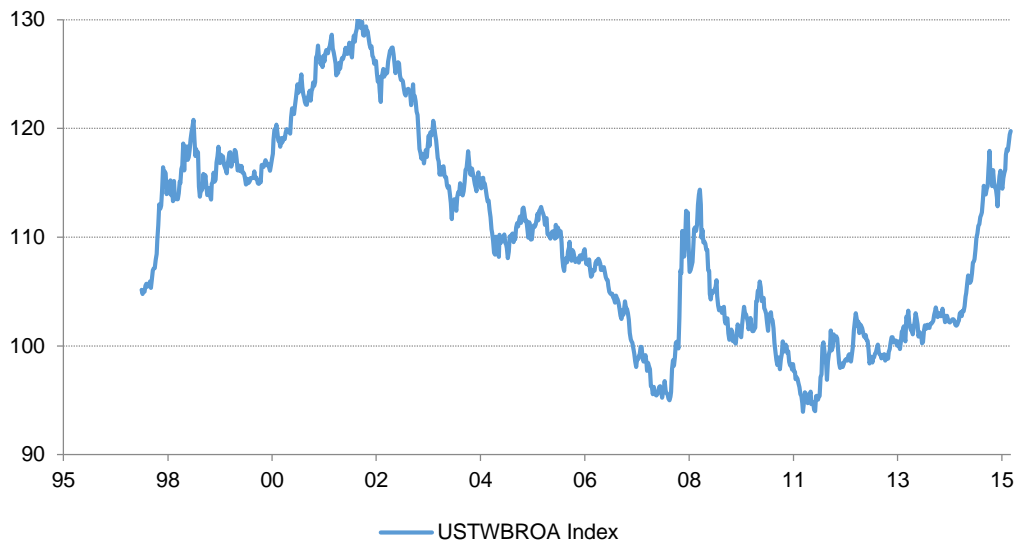
Source: Bloomberg

Chart 32. Evolution of latinamerican currencies index

LACI Index —— ADXY Index ——
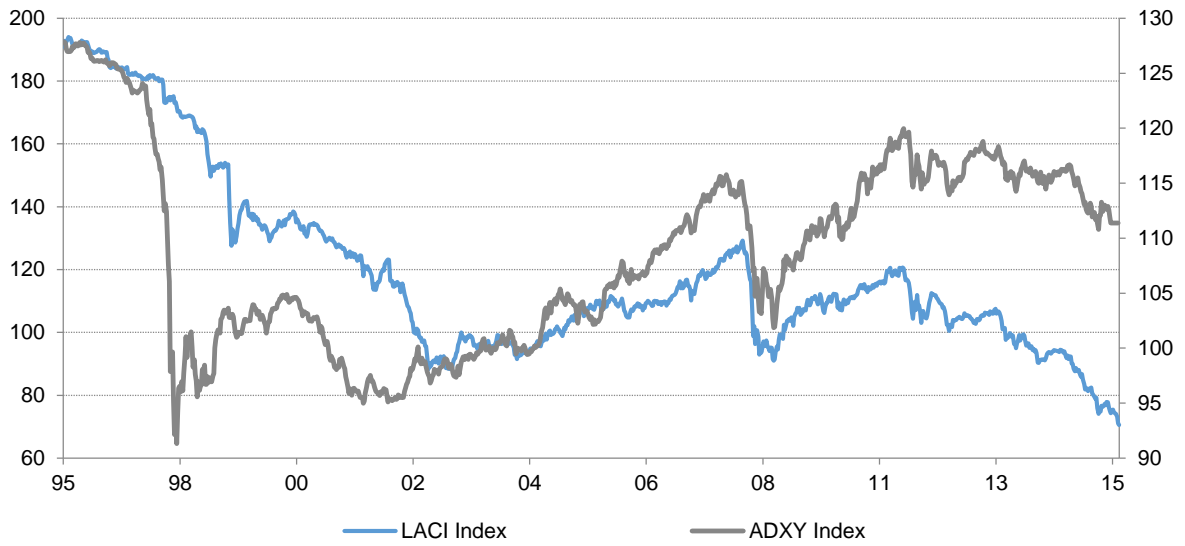
Source: Bloomberg

The evolution of the Chinese economy pose risks and volatility on the financial markets, but the FMI has included the Chinese currency in the currency basket, China equity market are developing and make up only a low share of household assets or corporate financing. For example, in the case of imports the weight of these over the global trade of raw materials could weaken even more the price of these ones and generate a vicious circle with tragic consequences…?

Chart 33. Evolución de los Precios del Cobre y el Índice de Divisas Sudéste Asiático

ADXY Index —— Cobre ($) ——
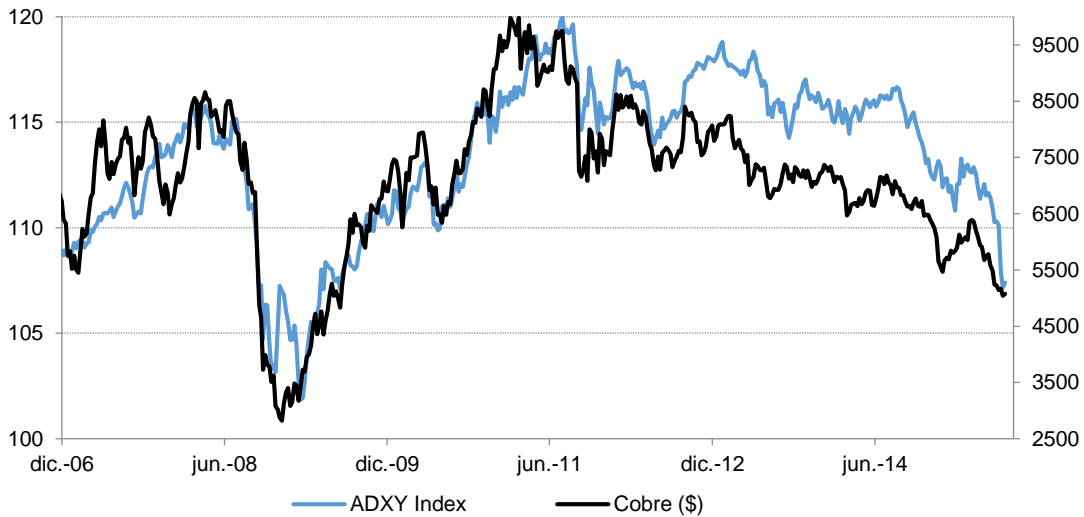
Source: Bloomberg

Chart 34. Evolución de la inflación Sub-yaciente y del Euro Yuan

Inflación Subyacente (% tri-anual) — EURCNY Curncy
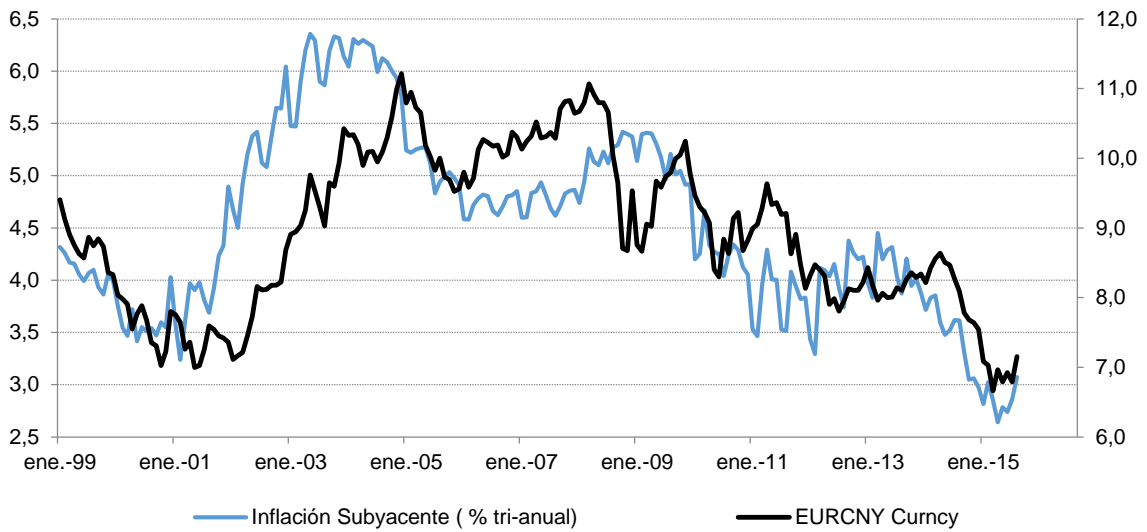
Source: Bloomberg

Equity markets in developed countries in developed countries have already discounted the flow of positive news of the evolution of business profits which are supported by the way in very favourable financial conditions. United States was the economy that responded quicker to the monetary stimulus and has showed a better behaviour and better ratios. The Eurozone has lastly started to recover after a large process of adjustment that followed the "Great Recession" of 2009, it is the main bet of the future, but financial risks persist at a global level mainly in credit and currencies, which are the pillars of the stock markets, stagger.

Chart 35. Evolución Índices Bolsas en Dólares

Nikkei — S&P 500 — Euro Stoxx 50
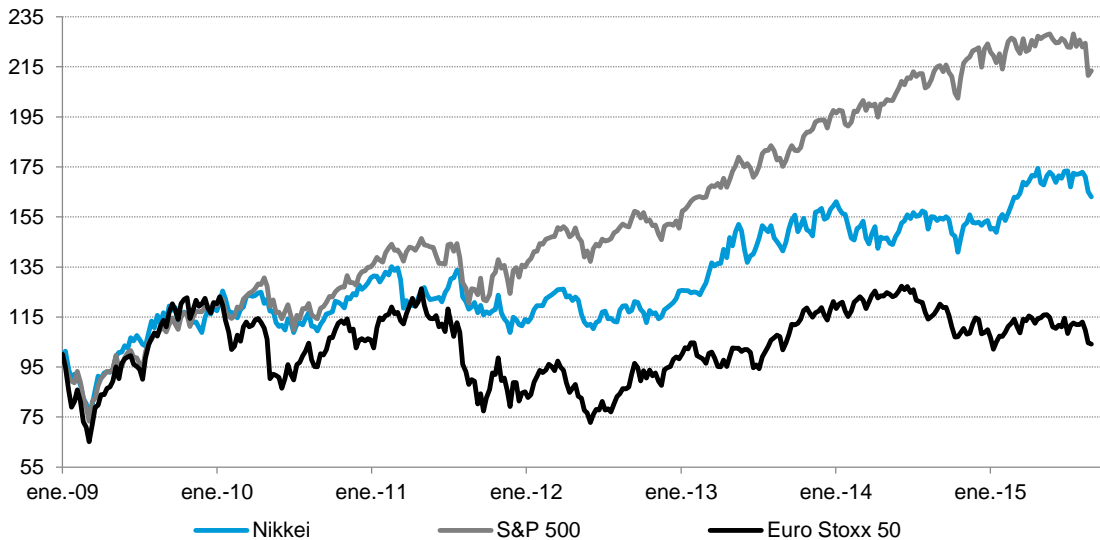
Source: Bloomberg

Chart 36. Evolución de la inflación Sub-yaciente y del Euro Yuan

Inflación Subyacente (% tri-anual) — EURCNY Curncy
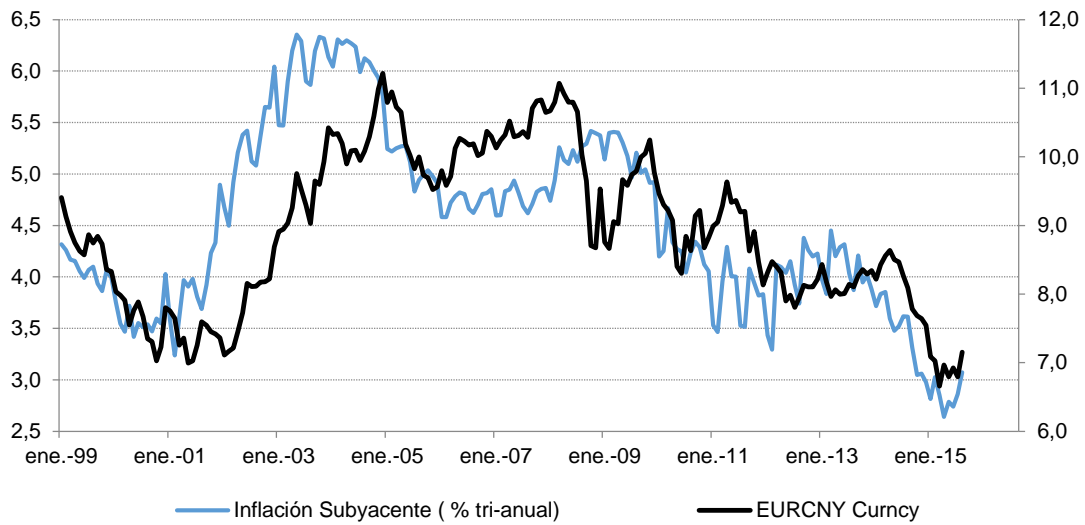
Source: Bloomberg

With respect to the stock market in United States, it holt a very positive behaviour until the month of August but made a significant correction due to the uncertainty that generated the devaluation of the Chinese yuan.

Since the announcement of the "tapering" of the Federal Reserve in the Spring of 2013 in the capital markets a process of divergence took place between the evolution of the high yield bonds and the stock markets, especially in the S&P 500. Chart signal these divergence as we can see below.

Chart 37. S&P 500 and High Yield Spread. USA.

SPX Index — US High Yied Spread
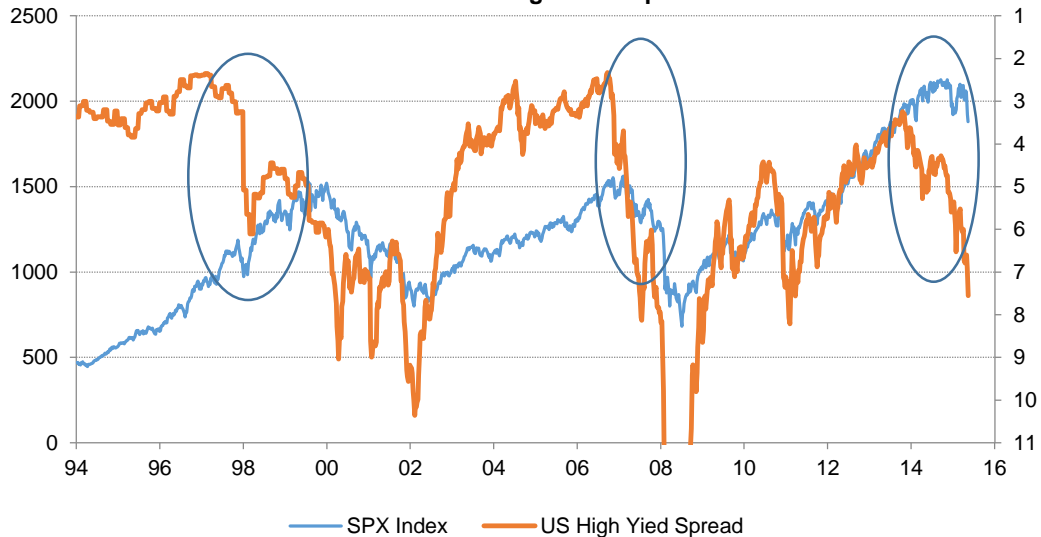
Source: Bloomberg

Chart 38. S&P 500 and Credit spread HY. USA.
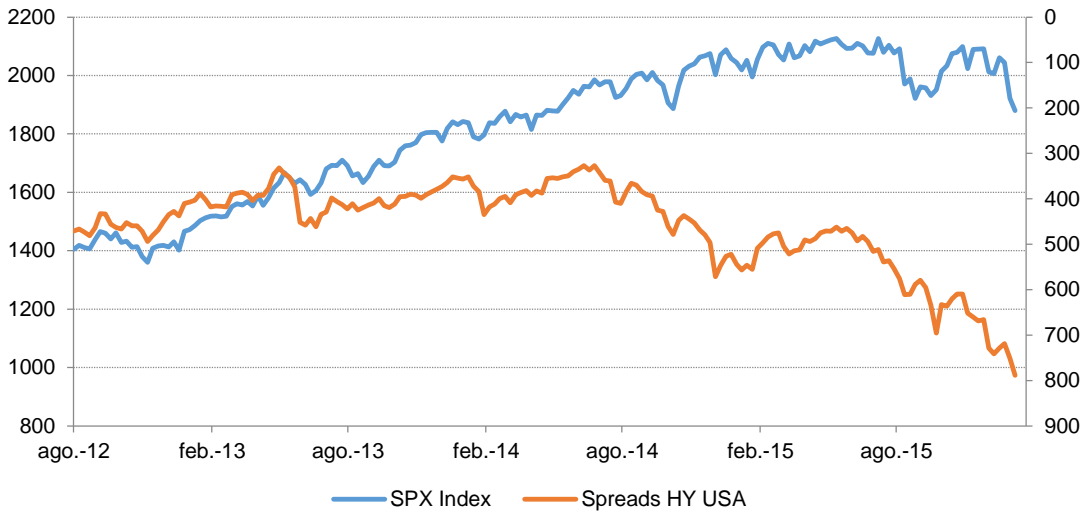
Source: Bloomberg

The problem in these financial scenario we are living is the risks real interest rate pose in the risky assets. The start of the tapering of the Federal Reserve in 2014 meant the start of a restrictive cycle also known as the "financial repression" of these short cycle by the Federal Reserve, which is an historical abnormality, which means a new era.

Chart 39. S&P 500 y Atlanta Fed Wu-Xia Shadow FF
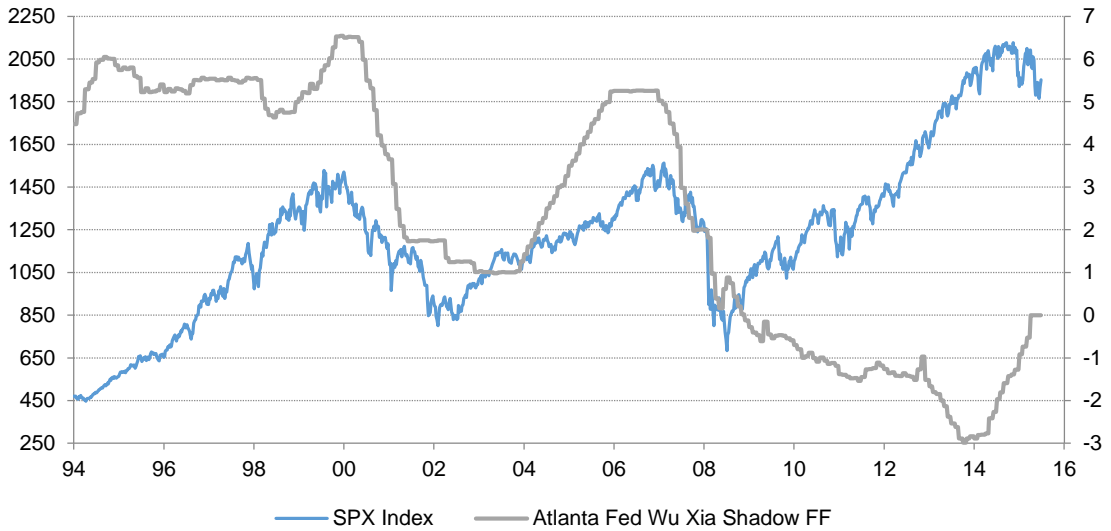
Source: Bloomberg

Chart 40. Atlanta Fed Wu-Xi Shadow FF and HY Spread. USA

Legend: Atlanta Fed Wu Xia Shadow FF — US High Yied Spread
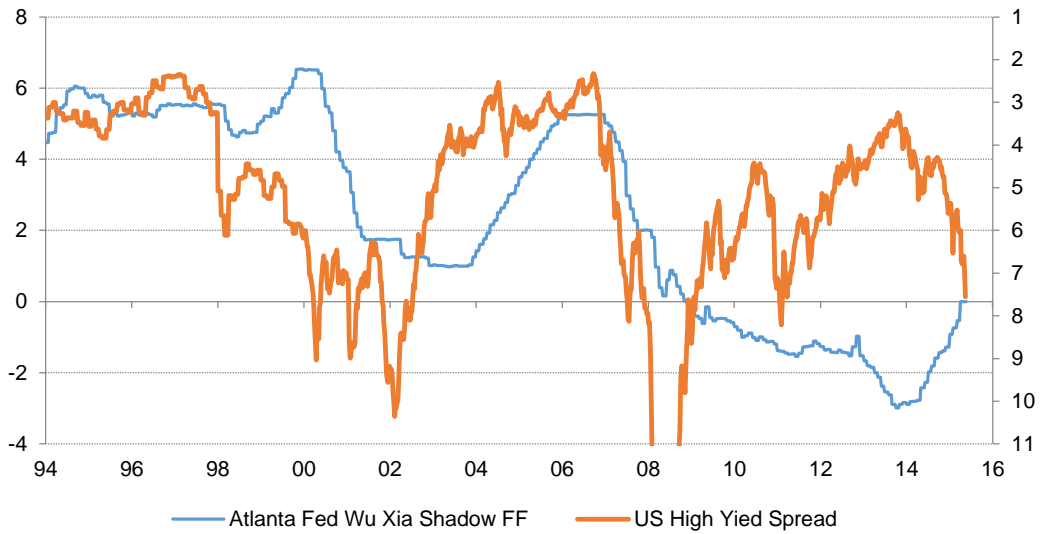
Source: Bloomberg

The recovery of currency markets is a necessary condition for risks that are posed on the equity markets specially in the American equity market doesn´t materialize in a strong plummeting of indexes that would imply an even more difficult moderate recovery of the global economy.

Chart 41. Evolution of the volatility of the Yuan, S&P 500 and DAX

Legend: USDCNYV1Y Curncy — VIX Index (dcha) — VDAX Index (dcha)
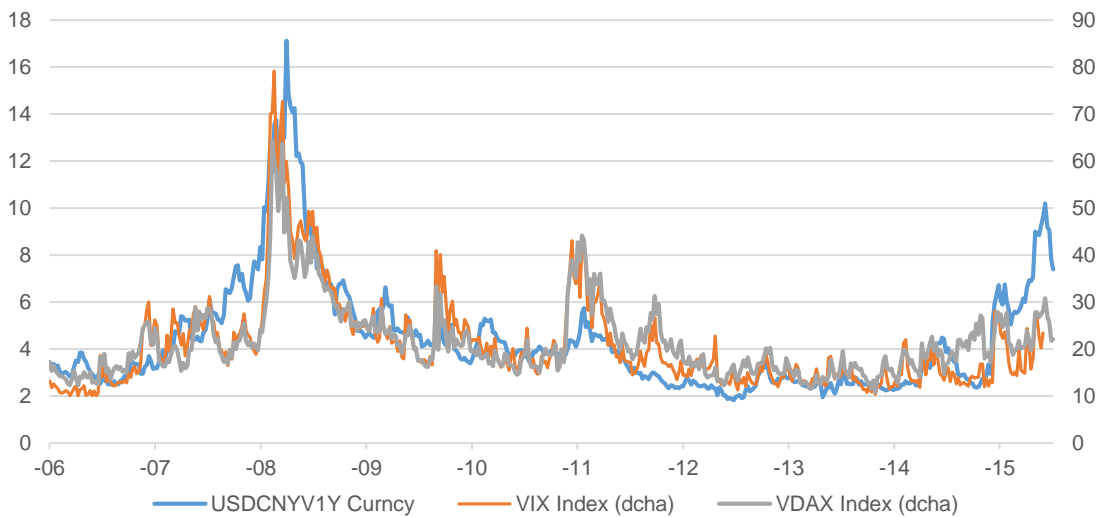
Source: Bloomberg

Investors take advantage of the context of financial stability to rise their bets on equity stocks.

Chart 42. Evolution of the S&P 500 and Margin Debt
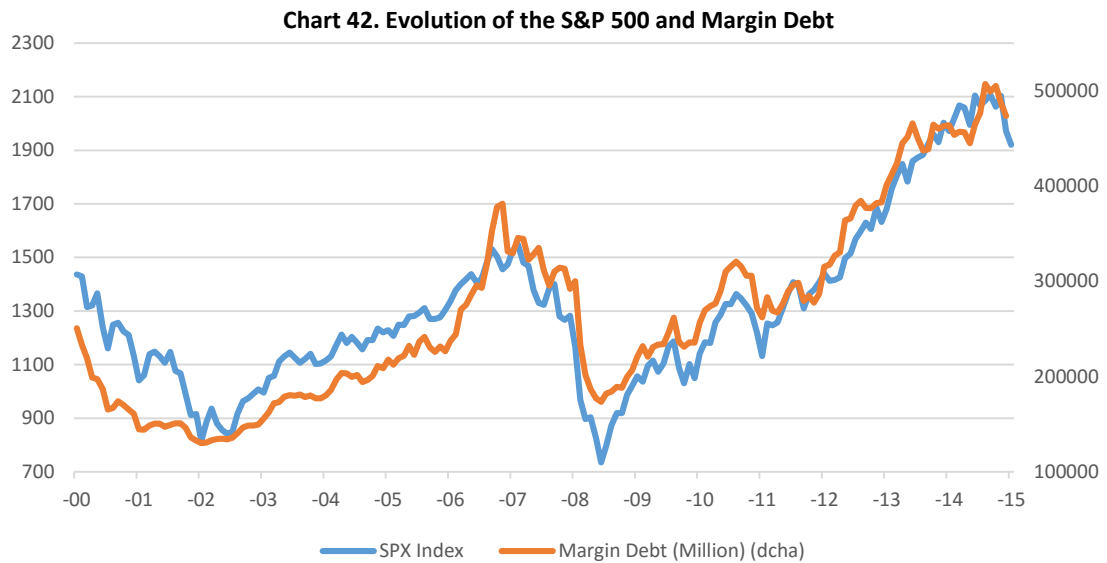
Source: Bloomberg

The sensitiveness of a lot of stock markets is due to the variation on the prices of raw materials meanwhile in the USA many companies have used their access to external financing to realize aggressive purchases of their own stocks leaving no margin for error, a fall in profits, more expensive credit or an international financial crisis can provoke a downward adjustment of the stock markets.

Chart 43. Evolution of Bovespa ($) and raw materials ($)

Source: Bloomberg

Chart 44. Evolution of Financial GAP US Corporates and relative S&P 500 BuyBacks

FOF Corp. Business Financing Gap SA (1)   US S&P Buyback Index
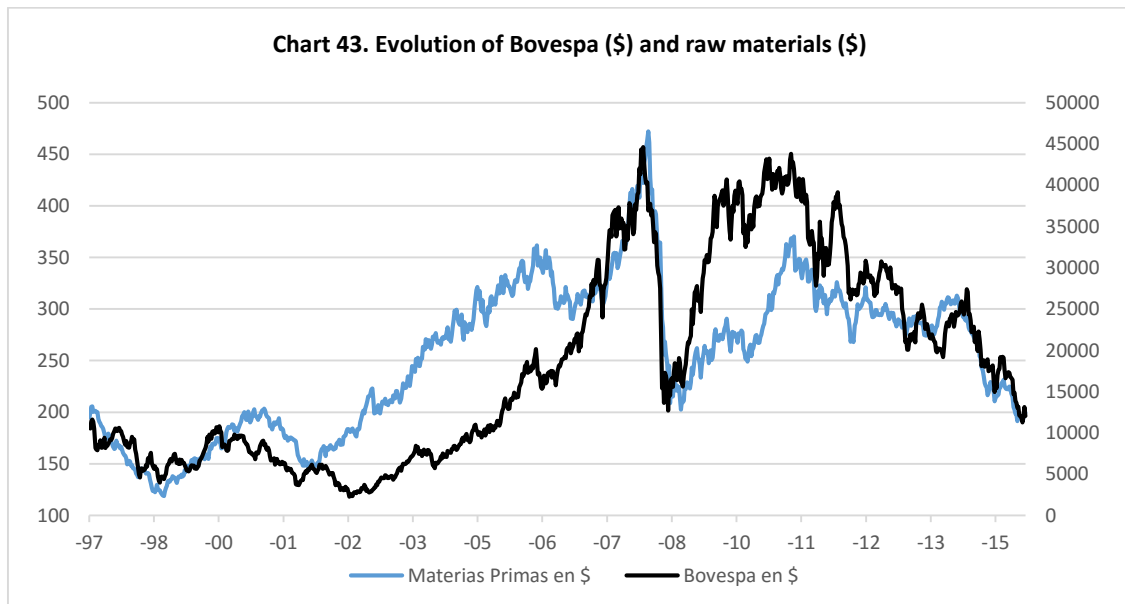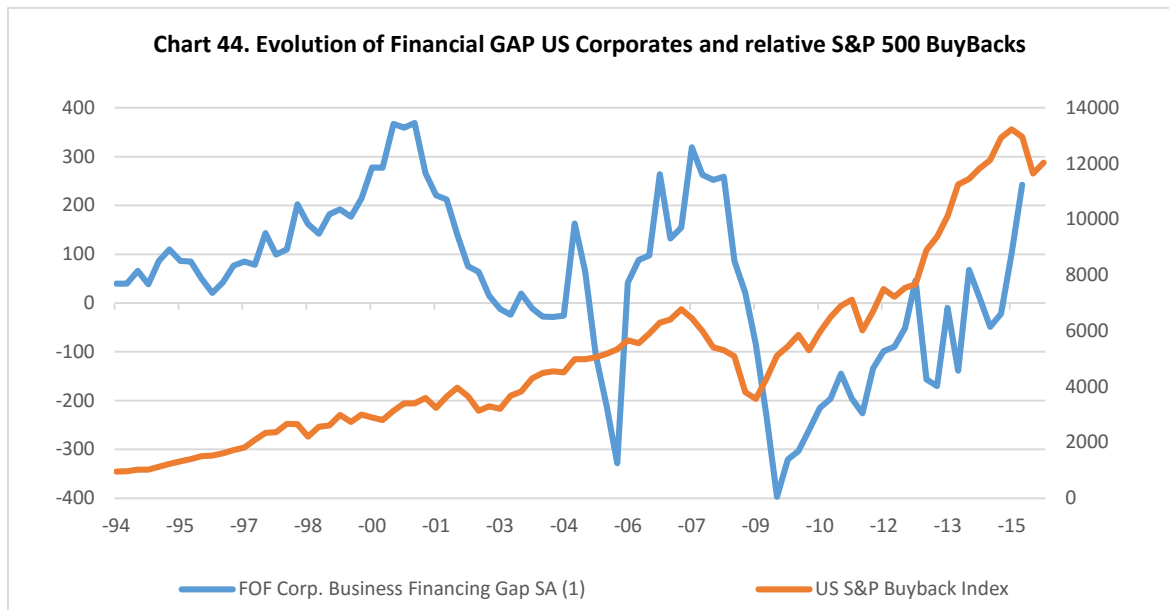
Source: Bloomberg

2. OBJECTIVE

My objective in this research work consists of detecting what are the most widely used models in financial valuation that have served to build up portfolios of equity also trying to proof that it is possible to make money with the models described and that only through experience we are able to identify better the companies that will do well (from a financial perspective), so mastery is a level that we can only reach when we have been in the markets for several decades surely and running some of the models for two different portfolios.

The first hypothesis we must assume is that in the financial industry is that for a certain amount of return we must assume a risk level, typically investors mandate portfolio managers to achieve the maximum return possible with the minimum level of risk, thus asking for portfolio optimization.

I will also take into consideration the risks, therefore performing the VAR that is the most widely used risk metric among many large financial institutions and regulators, pioneered by investment bank JP Morgan, very useful for seeing the maximum loss in a portfolio in a given period (T) given a level of confidence (%).

Other considerations and factors may be taken into account if they are reliable and help us understand the concrete situation of managing equity in an uncertain world.

3. CONCEPTUAL FRAMEWORK

Actually this work is going to focus on equity portfolio management so therefore it will be necessary the description and theoretical set up made by the fathers of the most used models in finance such as Markowitz, Sharpe, Lintner and others, it will be commented by means of Cosio et al. for example and other critics available such as Eugene Fama et al. among others.

I think that portfolio management is indeed a current interesting topic to make a research of because it is widely used for all type of investors either particulars or

institutional ones, also the recent financial crisis that spread in form of contagion to the real economy makes this an interesting topic.

In the brief paper named "New Frontiers in Portfolio Management" whose authors are Rose Mary Cosio, Executive Director, Ultra High Net-Worth Clients in UBS Wealth Management; Javier Estrada, Professor of Finance, IESE Business School and partner and financial advisor, Sport Global Consulting Investments (SGCI); and Mark Ktrizman, Founding Partner and CEO, Windham Capital Management.

This article "summarizes the main issues discussed in the panel of readers of the Journal of Applied Finance" (Cosio, Estrada, Kritzman, New Frontiers in Portfolio Management, May 2015, page 68, Journal of Applied Finance-No.1). In the talk given by Cosio, she described the way portfolios are built for these type of investors. Ultra high net worth investors are defined as individuals or families which usually have a deep understanding of the markets, have investment experience and will want to have a broad diversification.

This type of client is very typical of private banking, the role of the financial advisor is to make a tailored investment plan with a holistic approach and building a proper asset allocation to manage their wealth basically.

For building the proper asset allocation for this type of investor it is important to now their preference for investing in the real economy and in real estate, to build up this tailored portfolio we need to now: Clients investing experience, level of sophistication, risk appetite, investment horizon, liquidity needs and other considerations that we may need in order to construct the most suitable portfolio for our client or clients.

Regarding portfolio construction for this type of client/investor the weights have not been altered although they have skewed more towards equity, the change in this context is not in what assets to they invest but the type of instruments they dispose of and the way they are applied, this is common knowledge, for example for a portfolio that is invested in different regions will have different currencies to hedge this position we can use forward contracts or hedged exchange traded funds (ETF´s).

If for example investors are looking for uncorrelated assets classes which helps to reduce the volatility seen in prior periods, new instruments are the portfolios with an open architecture that can be built with funds families or with separated managed accounts the so called SMA´s. Now I will comment this new idea of sustainable investing which it´s defined in the article "as any investment that has three pillars: Positive environmental impact, positive social impact, and good governance" (Cosio, Estrada, Kritzman, New Frontiers in Portfolio Management, May 2015, page 69, Journal of Applied Finance-No.1).

The first is exclusion which is basically keep out of the portfolio companies that deal with activities that are contrary to the ethics or moral values our investor may have, the second has to do with integration related to the combination of sustainability and financial analysis, the third element is impact investing which has to do with generating a positive social impact as well as financial return.

Javier Estrada focused more on the changes in the market and the so called "smart beta", Estrada summarizes the changes in the market in three: the early passively-

managed instruments meant for broad exposures, early passively-managed instruments introduced long after indices and early smart beta instruments exploited only the size and value factors.

Estrada points out the most innovative theory in new portfolio management practice which is smart beta, which is in the middle between a passive management or an active one pointing out some of the most important characteristics which are that they feature a transparent active strategy, lower fees than actively-managed instruments and that they track indexes not weighted by market cap.

Morningstar prefers to refer to this type of beta as strategic beta, other professionals as Rob Arnott from research Affiliates, points out that there is nothing dumb or with lack of rigor about cap-weighted indexes, as e.g. if an investor wants to own the broad market it is the most intelligent option as you pay little or nothing for the exposure and don´t try to beat the market, this is the second article which recommends investors and the investment community in general to be more passive than active in managing portfolios, thus empirical evidence shows out that is difficult doing the contrary.

The next point is the discussion that relates to the performance of smart beta products assessing the reasons where the outperformance stems from, the solution may be different for each individual, some point out alpha or the well-known risk exposures, but over time it has become more accepted that the smartest beta products have a clear value tilt and in a less influent way a size tilt.

Current advocates of this type of products admit that these products obtain their outperformance by loading on the value and size factors, other good reasons why they argue to consider these funds are the low-cost exposure to a value oriented approach.

This section on Kriztman summarized talk on his recent research on the scaling of volatility and correlation across different time frequencies is based on two papers (William Kinlaw, Mark Kritzman and David Turkington, "The divergence of High and Low-Frequency Estimation: Causes and Consequences, "Journal of Portfolio Management, Fall, 2014; and William Kinlaw, Mark Kritzman, and David Turkington, "The Divergence of High- and Low Frequency Estimation: Implications for Performance Measurement,"Journal of Portfolio Management, Spring, 2015.

The next part related to the consideration of common errors made by analysts and the implications they have for portfolio construction and performance measurement. They basically comment on the extrapolation of risk measures to longer intervals of time and that are not necessary stationary across samples but evidence does not support this view.

KKT consider the practical implications of the distortions caused by lagged correlations, they find that optimal portfolio weights based on higher-frequency risk. KKT[7] also discuss the implications for hedging a portfolio´s currency exposure. Finally, they discuss the implications for measuring performance, another conclusion is that auto-correlation of hedge fund returns produce significant distortions to Sharpe ratios.

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[7] KKT stands for the authors William Kinlaw, Mark Kritzman and David Turkington.

Moreover, KKT find out the same pattern for mutual fund information ratios, that are distorted by three different sources which are: The auto-correlation of the mutual funds returns, the autocorrelation of the benchmarks returns and the lagged cross-correlations of the mutual fund and benchmark returns.

"The panel on "New Frontiers in Portfolio Management" in the 2015 Applied Finance conference dealt with ultimate topics on portfolio management" (Cosio, Estrada, Kritzman, New Frontiers in Portfolio Management, May 2015, page 71, Journal of Applied Finance-No.1).

In the case of measuring the performance of portfolio management some ideas must be commented, for this a brief research paper in the "Spanish Journal of Finance and Accounting" this current research lies its foundations in Sharpe's ideas and it's a research area that has been developed and made more sophisticated in the 90's decade.

The research focuses on the Spanish investment funds performance in relation to the reference index, in this case the IBEX-35, in the Spanish cases the relevant works in all what has to do with the building and composition of portfolios in order to evaluate the efficiency in the management are those of Freixas, Marín, Martínez and Rubio (1997).

Another important idea is that the establishment an index of reference or benchmark and the corresponding comparison with the investment funds measures the level of success or not of the asset management.

In the field of portfolio management there are mainly two different types or manners to manage portfolios: active management which means trying to beat the benchmark over a specific time period or the passive or indexed management which involves just replying or being the nearest possible to the return and risk of the benchmark, it tries to minimize the tracking error.

Active management involves the possibility that the market is inefficient and therefore can be beaten, the paper mentions an author Reinganum (1991) which gathers a series of effects which are not compatible with the idea of market efficiency, so a limitation for market efficiency advocates.

Active management which beats the market is really difficult and is precisely by means of realizing the difficult of beating the market where the other school of thought arises which raises the idea of replicating the index or benchmark. This idea is defended by Bogle (1991), the chairman of Vanguard and by Malkiel (2003).

Also Lamothe (1999) that advocates for passive or indexed management arguing that it involves less operating costs and costs that derivate of the stock picking selection, Martin (1993) gives a concrete figure for this of 1,34%.

The focus of this research paper is on the Spanish funds that are invested in domestic equity to afterwards compare it with the Spanish reference index, the IBEX-35 in terms of return and risk and seeing if the index or benchmark is or not beaten by the analysed funds we can defend or at least raise the idea if it isn't more suitable for the investors and the fund managers to replicate the index or benchmark getting at least the return the index gives, making life easier so the fund managers don´t need to

implement strategies or actively change the composition of the fund. The benchmark of reference for comparing purposes is the total index of the stock market of Madrid, the IGBM[8].

In their analysis they realize it is easier for fund managers to replicate IBEX-35 rather than replicating the IGBM which implies more stocks and varieties, but as the IBEX-35 is a price index which doesn´t include other sources of return as the payment of dividends made by the companies that integrate the index, they repeat the empirical analysis with the IGBM[9].

In determining their results, they compare the net return of the funds (after expenses and commissions) and the gross return (before expenses and commissions). They use the classical efficiency ratios used in finance literature which are the following: The Sharpe ratio, the Treynor ratio, the Alpha of Jensen and the contribution of the authors modified Sharpe ratio corrected to include negative premiums.

Let´s first explain the meaning of each ratio and expression and put the corresponding formula the authors applied.

Sharpe ratio

The Sharpe ratio means the excess of return the investor in a portfolio p obtains over the return of only risk-free assets in relation with the total risk of the portfolio measured by the standard deviation of the portfolio, the ratio is the following:

$$S_p = \frac{E(R_p) - R_f}{\sigma_p}$$

Treynor ratio

The Treynor ratio means the excess of return the investor in a portfolio p obtains over the return of only risk-free assets in relation with the systemic risk or non-diversifiable of the portfolio measured by the beta component of the portfolio, the ratio is the following:

$$T_p = \frac{E(R_p) - R_f}{\beta_p}$$

Jensen index

The Jensen index expresses the premium of return of a portfolio with respect to a risk-free asset minus the premium of the market return with the risk-free return, multiplying this premium by the beta parameter representative of the systemic risk of the portfolio, the expression is the following:

$$J_p = [E(R_p) - R_f] - [E(R_M) - R_f] * \beta_p$$

---

[8] index of the Stock market of Madrid in Spanish

The authors not satisfied only with these ratios, propose their own ratio which is a modification of Sharpe´s ratio which is to put it in the context of the utility theory in presence of risk, so trying to solve possible inconsistencies Ferruz and Sarto (2003, 2004) propose the following modification:

$$S'_p = \frac{E\,R_p/R_f}{\sigma_p}$$

This measured eliminates the inconsistency of having portfolios with premiums of returns negative so that valuation applies in all possible financial scenarios. The last thing they consider is to take as reference for the Spanish T-bill (risk-free asset) associated with the repos for 1 month, this will be the R_f.

The last part of the research paper has to with the conclusions of it, they compute the returns for the funds considered before the commissions and after and all the ratios mentioned above. One observation states that only three out of a hundred and sixty possible funds beat the market obtaining a higher return than the benchmark and if we consider efficiency only 45 funds beat the benchmark.

In terms of efficiency the results obtained are significantly affected by the charging of commissions, only twelve funds from the sample of a hundred and sixty remunerate their investors better than the total index would do.

Finally, the commissions charged on the funds deposited by investors are not justified in terms of efficiency managed by the fund managers that in some case reduces the net efficiency to levels below the IBEX-35 or the total index fund.

There is a paper by Pablo Fernandez et al. that must be analysed because not all investors consider the same risk-free rate so market premiums vary a lot.

My next aim is to understand the differences between the Fama approach of market efficiency and rational investors that have all the information necessary for understanding asset pricing and the theory that Shiller defends of markets being sometimes inefficient and investors are sometimes irrational, he has predicted real estate bubble in the USA, Shiller is a very prestigious author in finance. I will confront these two theories that are in the core of the evolution of portfolio management. Shiller starts of by putting the MPT into question and starts it´s paper defining a broader concept in this field of study that is called behavioural finance.

Let´s start analysing the research paper by "Eugene Fama" published in the Journal of finance in 1969, it is called "Efficient Capital Markets: A Review of Theory and Empirical Work". In the introduction "E. Fama" states that: "the primary role of capital markets is the allocation of the economy´s capital stock" (Fama, Eugene (1970), Efficient Capital Markets: A Review of Theory and Empirical Work, Journal of Finance, Vol. 25, pp. 383-417).

Hence, I will summarize this article with the main practical applications and new ideas. The empirical research on the theory of efficient markets considers whether prices fully reflect particular available information. In analysing and studying the performance of mutual funds, "Fama" answers to the following questions:

a.) If in general fund managers have access to special information which allows them to generate "abnormal" expected returns and,

b.) If some fund managers are better at uncovering such special information that others.

One of the basic assumptions we make in financial economics is that investors are generally risk averse and so on average must be compensated for any risks undertaken. So we have the problem of finding the appropriate definition of risk and then evaluating each fund relative to a norm with its chosen level of risk.

The empirical results conducted by "Fama" are using the Standard and Poor Index of 500 as the proxy for the market portfolio, the key question here is whether mutual fund managers have special insights related to information that allows them to earn returns that are above the norm, which I understand as higher returns than the norm for the market.

Jensen on the contrary puts into question that the funds do well enough to compensate investors for loading charges, fees that correspond to the management of the investment and other costs associated, he states this can be avoided by choosing the combination of riskless assets f and the market portfolio with a risk that is more or less as the fund´s actual portfolio. "Jensen" tests the efficient market theory (EMT).

The stronger form test of the EMT tries to answer if despite the expenses the management of the funds charge investors, does these fund managers have the ability of picking securities that outperformed the average return, Jensen argues that this question remains without an answer for individual funds when at the time the brokerage commissions were not published regularly.

The final or conclusion statement of Jensen about fund managers of mutual funds doing better than the average fund of the market by accessing information which is not fully reflected on prices doesn´t hold, besides the fact that there are individual funds which consistently do better than the average fund which is at least a strong evidence against the efficient market model (EMM).

Summarizing the basic ideas of E. Fama we can say that based in the empirical work that can be bases in three sections depending on the nature of the information subset of interest, described as follows:

I.   Strong-form tests which are the ones that searches for individual investors or groups that could have monopolistic access to any information which is relevant for price formation (best viewed as a benchmark to observe the importance deviations from market efficiency). There are no insiders.

II. Semi-strong form tests the information subset of interest which includes all obviously publicly available information. Fundamental analysis doesn't work

III. Weak form tests the information subset is just historical price or return sequences. Technical analysis doesn´t work.

However, there is explicit evidence of positive dependence in the day-to-day price changes and returns on common stocks, and this dependence can be used as the basis of marginally profitable trading rules. Fama, Fisher, Jensen and Roll discovered that the

information in stock splits concerning the firm's future dividend payment is fully reflected in the price of a split share at the time of the split.

Ball and Brown and Sholes come to similar outcomes in:

    i.   Annual earnings announcements by firms and
    ii.   New issues and large block secondary issues of common stock.

So the strong-form efficient market model is best is probably best viewed as a benchmark against which deviations from market efficiency can be judged.

Niederhoffer and Osborne rise the question of having another system which didn´t imply the monopolistic access to information because they found out that specialists on the major security exchanges indeed had this monopolistic access to information on unexecuted limit orders and that they used this information to their own benefit.

Finally, for the goals of the majority of investors the efficient markets model seems a good first approximation to reality. The last academic paper I will comment is "From Efficient Markets Theory to Behavioral Finance", Journal of Economic Perspectives, vol 17, nº 1, pp. 83-104 from Robert Shiller (2003), in this research paper Shiller brings to us a new concept in modern finance literature which is behavioural finance which relates to a social science but including in its perspective psychology and sociology.

This new concept or perhaps the implications questions what until that moment were not questioned, this is, the market efficiency, the idea of assets incorporating all the available information on the price. Shiller founds that whether stocks show, for example excess volatility relative to what the efficient markets model would predict. Shiller finds inconsistent this theory he points out that this could imply that if most of the volatility of the stock market wasn´t explained it would question the model itself.

Shiller (1981) as Stephen LeRoy and Richard Porter (1981) in an academic paper questions that the stock price represents the optimal forecast of the present value, the price responding only to objective information about it. The basic idea is the stationarity of dividend and stock prices.

Shiller in the early 1980´s following the tradition assumes that dividends fluctuate around a known trend, contrary to what for example Mash and Merton (1986) state which is that due to the effects of share repurchases and repurchase of stocks dividends may depart from a trend indefinitely.

In the 1980´s the basic idea of Shiller and others was to build a cointegrated model of real prices and real dividends as Merton (1973) and Lucas (1978) using marginal rates of substitution of consumption, but the trend in academic discussion shifted away from econometric analysis of time series in the 1990´s towards models of human psychology related to financial markets this is how behavioural finance is born. This new field produced some books and many literature, Shiller summarizes the field of study in two:

1) Feedback models which has to more with emotions
2) Obstacles to smart money

The feedback models implies for example that if prices of a specific stock goes up this will eventually produce enthusiasm in other investor which would be attracted, the stock is demanded each time more because the news is spread through a great number of investors, then after several rounds it produces a speculative bubble supporting very high current prices, the same can happen with downward price movements at last not related to news stories about fundamentals, so this is an irrational behaviour.

The first bubble is described in a book of Charles Mackay called "Memoirs of Extraordinary Popular Delusions" and was the "tulipmania" in Holland in the 1630´s. Marimon, Spear and Sunder (1993) showed when conducting an experiment that people tend to repeat bubbles if they are preconditioned by past experience to form expectation of bubbles, this is also supported by research in cognitive psychology.

Ponzi schemes is based on a feedback model as the investors in a positive market scenario achieve high returns the story seems convincing until stopped by law but there are other examples as dotcom bubble Shiller (2000) commented in his book "Irrational exuberance" transmitted word-of-mouth as well as the media.

In this sense also psychologists Daniel, Hirscheleifer and Subramanyam (1999) have shown that the psychological principle of "biased self-attribution" can also promote feedback. In obstacles to smart money Shiller breaks the theory I describe after of investors being rational optimizers.

The efficient markets theory eliminates the effect of the irrational traders on market price. Shiller comments that "speculative bubbles appear to be common to investments of a certain style, and the bubbles may not include many other investments" (Shiller, Robert (2003), "From Efficient Markets Theory to Behavioral Finance", Journal of Economic Perspectives, vol. 17, nº 1, pp. 83-104). He puts as examples the tech bubble.

Goetzmann and Massa (1999) provided evidence about two different classes of investors, feedback traders who follow the trend and those who don´t namely the smart money. As a conclusion I must say that the collaboration between finance and other social sciences will lead us to a more in depth knowledge of financial markets. It is logical to observe that the efficient markets theory leads us to incorrect interpretations of events such as major stock markets bubbles, frequent in financial markets history.

Important to be conscious of the weakness of efficient markets theory which will be explained in this paper on the corresponding sections were I describe the main weakness of each model of asset valuation and the criticism made to these models, although they are widespread taught among the majority of business schools in the world.

4. METHODOLOGY

Given that the main objective of this work consists on determining the theoretical framework of the main methods used in the valuation of financial assets, particularly in the stock market, it allows us to once we have stablished the main principles, apply them to concrete real life situations in which the fund manager manages a portfolio facing market and credit risk therefore the need to perform risk metrics such as VAR which as mentioned before was pioneered by JP Morgan and is widely used in many banks and financial institutions, giving therefore a practical approach to MPT.

The explanations are done performing the demonstrations and the mathematics behind all the models i will explain which shows the current complex financial industry we face giving concrete examples with the construction and asset allocation of two funds.

The models I will comment are the mean-variance optimizer approach (Markowitz´s approach) CAPM model, Sharpe model, APT, commenting the criticisms made to them by other academic peers.

I will obtain the data for its further treatment from databases such as GTREL, STATA, and BLOOMBERG AND REUTERS among others such as EXCEL depending on the availability of them.

4.1.   Financial asset definition

But first as a very brief introduction we must define what a financial asset is, which can be defined as any asset that is cash, we have a contractual right to receive cash or another financial asset from another third party, or any equity instrument issued by an entity. In the case of equity in normal economic conditions or positive economic and financial outlook shareholders (equity investors) receive dividends.

4.2. Markowitz´s model

Let´s start by introducing the pioneer research work done by PhD. by Chicago´s University and professor of finance at Baruch College of the City University of New York Harry Markowitz, this economist considered the father of modern finance that considered the relationship in the binomial of return and risk, basically what he tried to answer was the main problem that arises in the portfolio selection, his research paper was published by the Journal of finance in 1952.

An underlying assumption that is not considered in the model is that there is a diversified portfolio which is preferable to all-non-diversified portfolios, which can be observed as a limitation of the model.

His model is based on the assumption that investors are risk averse (but as we have previously seen this could be very simplistic), but the investor tries to obtain the highest possible return with the lowest possible risk. Markowitz´s model lies the foundation of modern portfolio theory.

At the beginning the birth of this theory had little acceptance in the financial industry which gradually changed along the years. The Markowitz formulation of the portfolio optimization problem is a brilliant quantification of the two basic objectives of investing: maximizing expected return and minimizing risk.

4.3. Hypothesis of the Markowitz´s model

- The return of assets alone or from the portfolio jointly are random variables with a known probability. The mean or mathematical "expectation" is μ_i which is the measurement of the return.
- As we have seen in financial risk management risk is understood as the deviation of the return from the mean and it is computed as the variance of the return itself, we will denominate: σ_p^2 .
- All financial assets are divisible.
- There are no taxes and transaction costs
- For simplicity investors are risk averse, this implies that they will choose that portfolios that give the highest possible return for a given level of risk. For this it is worth mentioning that the utility function the hypothesis assume is concave. Starting from the typical utility function, we compute the first derivative which has a positive value and the second derivative with negative one, as follows:
- $\frac{\partial u}{\partial \mu_i} > 0$ and $\frac{\partial u}{\partial \sigma_p} < 0$, this assures concavity of the utility function.
- Short selling is permitted.
- An investor is rational by nature.
- The investor understands there are no transactions costs, no taxes, stocks are traded continuously and that the market is efficient (which not all Academia members agree on).

4.4. Steps in theoretical resolution of Markowitz´s model

The first thing is to set up the set of efficient investments, so we need the first two basics statistics which are the return and risk of each individual stock so we can have the set of portfolios which are efficient (we seek this goal in our asset allocation).

What do we understand for an efficient portfolio?

An efficient portfolio is "The calculation for a portfolio of optimum returns for each level of risk, and minimum risk for each potential level of return. If expected returns are not met for a particular level of risk, or the risk required for a specific level of return turns out to be too high, the portfolio is said to be inefficient". (Financial Times website, http://lexicon.ft.com/Term?term=efficient-portfolio accessed March 2016).

4.4.1. Determination of the set of efficient portfolios

Establishing the statistical parameters (return and risk) and analysis of each stock to know their estimated return and risk, we have to repeat this operation for different levels of return so we identify the set of efficient portfolios.

There exists a portfolio for each level of expected return. In the case of those portfolios with the minimum risk for each level of return they are in a horizontal line

called the frontier of efficient portfolios or SEP, this frontier stablishes the feasible set, this is of course, the set of portfolios that comply with the model exposed. The following illustration shows it.

Figura 3. Conjunto de mínimo riesgo: subconjunto ineficiente y frontera eficiente.
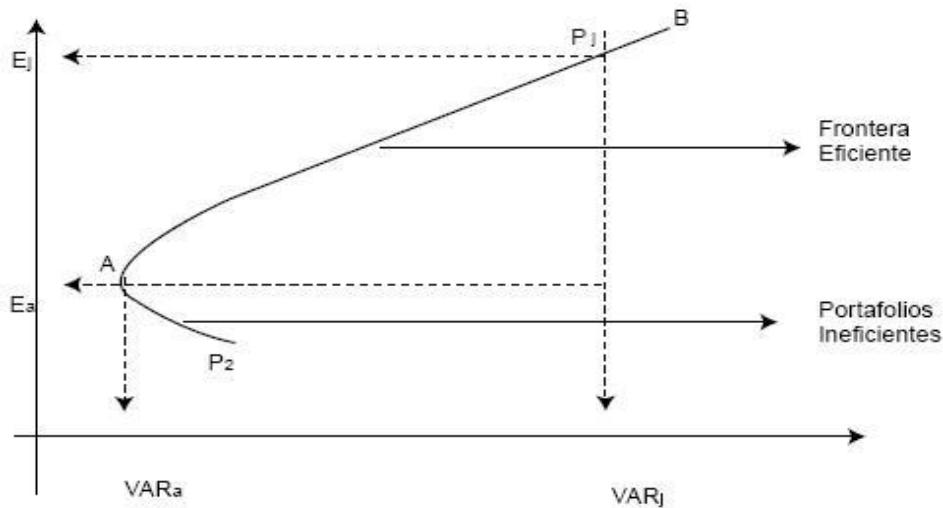

Fuente: Elaboración de los autores, a manera de ejemplo.

4.4.2. Investors attitude against risk

Investors decide the level of risk he or she wants to assume as by her or his utility function, so inside the set of efficient portfolios, they will select the one that's adapts more to their preferences. In the case of Markowitz, the utility function is quadratic because the two relevant parameters are: risk and return.

As they must specify the indifference curves in this binomial of return-risk, which depend of the utility function. The indifference curve is that curve that shows all the set of portfolios in which the investor is indifferent, so the portfolios that are in the same indifference curve will have the same utility for the investor. The following illustration shows this definition.

Gráfico 1
Selección de una cartera óptima de Markowitz
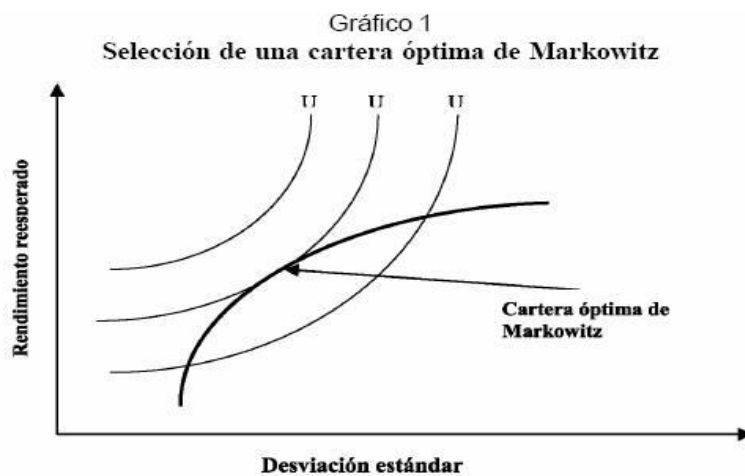
Fuente: teoría de Markowitz.

4.4.3. Determination of the optimal portfolio

The optimal portfolio of each individual investors is the one that considers simultaneously the indifference curves at the highest level and the frontier of efficient portfolios or FEP, this is the portfolio that offers the investor the highest utility and will be in the tangency point of both.

4.4.   Markowitz´s model resolution

The model of Markowitz is a standard optimization problem, where our goal is to optimize the risk of the portfolio subject to an expected return and taking into account the weights of each stock in the portfolio, it is defined as follows:

$$\min \sigma_c^2 \ = \ \sum_{i=1}^{n}\sum_{j=1}^{n} x_i * x_j * \sigma_{ij}$$

$$\text{subject to: } \sum_{j=1}^{n} x_i * \mu_j = \mu_p^*$$

$$\sum_{j=1}^{n} x_j = 1$$

$$\forall x_j \geq 0 \qquad \text{j=1, 2, 3,…, n}$$

Minimizing the objective function, we select the portfolio with the minimum risk subject to the restrictions of expected return and feasible values for the stocks, the risk is calculated as the sum of the variances and covariance's of the stocks.

4.5. Criticism and limitations of Markowitz´s model

For example, in the words of Mark Rubinstein:

"Markowitz's approach is now commonplace among institutional portfolio managers who use it both to structure their portfolios and measure their performance. It has been generalized and refined in innumerable ways, and is even being used to manage the portfolios of ordinary investors." (Rubinstein, 2002, pp. 1041-1045)

One of the most common critics initially to Markowitz´s model was the number of calculations needed in the case we increase the number of stocks in our portfolio. This is an obvious consequence, for example mathematically we will need the matrix of variances and covariance's of the returns. Another problem of Markowitz´s model is that actually this model is not used in practice by fund managers, so little impact for the investment and asset manager's community.

But this that was as commented above an initial problem due to the time consuming of the math's behind it, which is now easily computed thanks technological advances as computer programs.

5.   Sharpe model

After seeing that one of the problems of Markowitz´s model is the great number of calculations to do, Sharpe tries to simplify that model in 1963 making some significant changes which simplifies the calculations to do, one of his mains contributions is the introduction of two different and differentiated risks, the systemic risk and the unsystematic risk.

In this case, the unique external exogenous indicator of the market, an index, in this case the stocks market, is more precise from the practical point of view. For this is necessary to establish a series of equations that represent a linear and simple econometric relation between each individual stock and the market portfolio, as the following:

$$r_{it} = \alpha_i + \beta_i * r_{mt} + \varepsilon_{it}$$

As we can observe in the formula it is composed by two relevant parameters which are α_i and β_i and also the random error ε_{it}. The last variable implies a series of hipotehsis as Suarez (2005) explains, which are the following:

➢ Null random variable because if we include many factors that considered individually are irrelevant.
➢ Homoscedasticity. This is an econometric concept which means that the error follows an independent distribution of the asset and of the time period, so its variance is constant during all the time period that the investment lasts.
➢ No autocorrelation, this is because their errors are independent between them and therefore it doesn't exist correlation among them.
➢ Normality, as many times in finance, we assume it follows a normal distribution.

The relevant or important idea in this model is that the concept of risk is related to the market portfolio, therefore the variance of each asset can be expressed in the following manner:

$$\sigma_i^2 = \beta_i^2 * \sigma_m^2 + \sigma_{\varepsilon i} = \text{SR} + \text{SR}$$

In the following paragraphs both components which are the systematic risk and the specific risk are explained.

Systematic risk is as seen in "valuation of financial instruments" class the risk that has to do with the slope of the equation of each asset and is a direct function of the market variance, it represents the volatility of the stock that is the same for all stocks in the same financial market.

Specific risk is the variability that has to do obviously with the individual characteristics of each stock or asset, assuming the diversifying principle which is basic when we are talking about investments we tend to neutralize and also reduce the risk and talking it to the limit is eliminated, so $\sigma_{\varepsilon i} = 0$.

Therefore, each investor, supposing rationality on them will invest in that portfolio or that investment that is diversified, so they assure they are without the specific risk of each stock or asset in their investment. It is worth finally in this section commenting

the behavior of beta depending of its value, this systemic risk known as beta guides investors on their investments as it indicates the fluctuation of the return of the stock.

A beta of 0 tells us the stock is totally uncorrelated with the market, independent form the conditions that exist in the market, a beta of 1 says that it moves exactly in the same magnitude and direction of the market, a beta between 0 and 1 (the majority of stocks) indicates there are more stable than the market, less volatile and a beta higher than 1 says the stock is more volatile, more aggressive than the market. This has to with the return of the stocks as a function of beta (volatility).

5.1.   Sharpe's model resolution

This model is as in the case of Markowitz optimizing the risk of the portfolio, minimizing the risk subject to restrictions over the coefficients the model specifies (similar to Markowitz model).

$$\min \sigma_c^2 = \sum \sigma_{\varepsilon i}^2 * x_i^2 + \sigma_m^2 * x_{n+1}^2$$

$$\text{subject to: } \sum_{i=1}^{N} \alpha_i * x_i + \mu_m * x_{n+1} = \mu_p^*$$

$$\sum \beta_i * x_i - x_{n+1} = 0$$

$$\sum x_i = 1$$

$$\forall x_j \geq 0 \qquad \text{j=1, 2, 3,..., n}$$

In the same manner that Markowitz, the process is to minimize the objective function we select the portfolio which return is μ_c^*, this is the return for which the risk is the minimum, subject to the restriction of expected return and feasible set of values for the stocks.

6.   CAPM model

The models I have described previously had in common was the relationship between return and risk from a theoretical point of view, but the asset valuation model of CAPM goes more into depth in this relationship between risk and return and its analytical equation specifies the price of risk.

CAMP, developed by Sharpe (1961, 1964), Treynor (1961), then amplified by Lintner (1965, 1969), Fama (1968,2004), Black, Jensen, and Scholes (1972), is based in the framework of the theory of portfolio management which lies in the on the base of efficient capital markets or ECM which was developed by Eugene Fama in 1970 and 1991 in an academic paper previously commented.

As I have commented before the efficient market theory says that all the information available of the stocks is assumed in the price of every financial asset, therefore having a fair value for each asset, Fama as others defended this theory if the price of stocks always gathers all the information and therefore are valued correctly.

Three grades of efficiency as previously commented, described as follows:

I. Strong-form tests which are the ones that searches for individual investors or groups that could have monopolistic access to any information which is relevant for price formation (best viewed as a benchmark to observe the importance deviations from market efficiency). There are no insiders.

II. Semi-strong form tests the information subset of interest which includes all obviously publicly available information. This is private information. Fundamental analysis doesn't work.

III. Weak form tests the information subset is just historical price or return sequences. Technical analysis doesn't work.

This model has been widely used mainly due to its simplicity because of the linear relationship between the expected return and the risk supported by the investor to obtain the return.

6.1. Hypothesis of CAPM model

The assumptions of the model are in these case the following:

a) It is a static model. It only exists a unique period of time in which the assets are traded or negotiated at the beginning of the period and the consumption takes place at the end of the period when the assets generate a payment or return.
b) The supply of financial assets is given and are perfectly divisible.
c) The existence of supply of a risk-free asset with net supply equal to cero and with a return, r, that can be lend or borrow an unlimited quantity of resources[10].
d) All the investors choose their portfolios exclusively on the basis of the expected return and variance (volatility) of the portfolios. This assumption implies that the distribution of probabilities of the returns specifies completely by their mean and variance. In particular, the model supposes that the returns of the assets are distributed like a Normal variable.
e) The beliefs or expectative of all the investors about the expected returns, volatilities, and covariance's between the assets are the same. In other words, all individuals have homogeneous expectative of the set of investment opportunities which they face.
f) Financial markets are competitive. Any investor is sufficiently important as to influence in the asset prices (are price acceptant).
g) Transaction costs doesn´t exist, neither taxes or any other friction in financial markets.
h) There are no arbitrage opportunities[11]

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[10] The net supply of the risk-free asset must be equal to cero this implies that the demanded quantity of funds of the borrowers must be equal to the funds supplied by the moneylender.

[11] The CAPM is, in fact, an equilibrium model. Therefore, this assumption, is a necessary condition to obtain the equilibrium, formally excesses.

With regard to the investors, at this point in the paper is worth to mention some aspects to consider in the models I have previously described. Three aspects must be considered:

- ✓ Investors are risk averse, up to all the models explain until now.
- ✓ The expectations of investors of the returns they expect to get from their assets in the portfolios are homogeneous.
- ✓ The time period considered by investors is the same and its duration is of one period.

6.2. CAPM model resolution

The analytical formula for the CAPM is the following:

CAPM formula

$$E(R_i) = R_f + \beta_i[E(R_M) - R_f]$$

$E(R_i)$ = expected return on an asset i
R_f = risk-free rate
β_i = beta of asset I; a measure of systematic risk
$E(R_M)$ = expected return on the market portfolio that contains all assets
$E(R_M) - R_f$
= Market risk premium, a measure of the excess return of the market portfolio over the risk-free rate

Source: http://images.slideplayer.com/29/9441885/slides/slide_3.jpg

6.3. Forming a new portfolio called P

This model makes two basic assumptions:

- ✓ The market portfolio, called M, doesn´t suffer relevant qualitative changes and it is observable.
- ✓ There exists a risk-free asset, but this statement is incorrect it is a risk-free interest rate that it is possible lend and borrow a loan without limitations. We can call this asset as F (from free).

For my purpose if we combine F with M we will obtain portfolio A and will have the following return and risk as we have seen in class:

$$\mu_p = x_m * \mu_m + x_f * \mu_f = x_m * \mu_m + (1 - x_m) * \mu_f$$

$\sigma_p^2 = x_m^2 * \sigma_m^2 + x_f^2 * \sigma_f^2 + 2 * \sigma_{fm} * x_m * x_f$, as we know that f is the risk-free we have that $\sigma_f^2 = 0$, the second and third component is 0. So we have the following:

$$\sigma_c^2 = x_m^2 * \sigma_m^2 = \beta_i^2 * \sigma_m^2 + \sigma_{\varepsilon i}^2$$ so the risk of the market portfolio is based only in σ_m^2.

6.4. Capital market line (CML)

The model CAPM stablishes the framework were the M portfolio of before will be combined with F that must be the market portfolio, the expression is as follows as seen in class:

$$\mu_p = \mu_f + \frac{(\mu_m - \mu_f)}{\sigma_m} * \sigma_c,$$ where $\frac{(\mu_m - \mu_f)}{\sigma_m}$ is the slope of the straight line

and this slope is Sharpe´s index, used as the Treynor index in portfolio management.

6.5. Security market line (SML)

Normally investors invest in a limited number of stocks, but not in the set of market portfolio (we do not contemplate ETF´s) is necessary a new equation modifying the CML expression to adapt the relation between the return and the risk of the portfolios and assets to those that are not efficient because they don´t replicate the market portfolio.

The equation of the SML is the following as we have seen in class:

$$\mu_p = \mu_f + \left(\mu_m - \mu_f\right) * \frac{\sigma_{im}}{\sigma_m^2} * = \mu_f + \left(\mu_m - \mu_f\right) * \beta_i$$

$$\mu_p = \mu_f + \left(\mu_m - \mu_f\right) * \beta_i$$

6.6. Critics and limitations of the CAPM model

- ✖ The mean return hasn´t depend of beta, indeed, after the technological boom of the last 1990´s decade.
- ✖ Investors don´t have, really homogenous expectations because the level of information each investor has is not the same, which conditions the selection of asset when creating the portfolio.
- ✖ Stocks of small companies have higher betas, but the difference in betas is not sufficient to explain their higher returns.
- ✖ Roll (1977) doesn´t say that CAPM is an invalid theory but that is necessary to consider the results of CAPM must be interpreted with precaution, the problem consists in the selection of the market portfolio. Moreover, in this sense, I recall that if the portfolio is efficient CAPM works.
- ✖ The existence of a risk-free asset is questionable.

7. Arbitrage pricing theory (APT)

This model was developed by Ross (1976) as an alternative to the pricing of CAPM, this model is a more generic model than CAPM, the innovation in this model is that it allows to incorporate multiple risk factors, and the advantage is that we don´t need to identify the market portfolio. Me must assume that in the economy exist multiple factors of systemic risk that we cannot internalize in an exclusive way by means of the market portfolio.

The aggregate M as a linear discount factor in the return of the market portfolios the following:

$M = \delta_{0m} + \delta_{1m} R_m$, where the constants δ_{0m} and δ_{1m} comes from another expression supposing the existence of a risk-free asset. Those expressions are the following:

$$\delta_{0m} = \frac{1}{1+r} + \frac{\gamma_{1m} \; E\,(R_m)}{(1+r)\sigma_m^2}$$

$$\delta_{1m} = -\frac{\gamma_{1m} \; E\,(R_m)}{(1+r)\sigma_m^2}$$

This risk factors will affect all the assets that exist in the economy because attaining to their proper definition they represent risk factors systemic or non-diversifiable and making an extension of the previous formula we have the following:

$$M = \delta_{0F} + \; \delta_{1F}F_1 \; \delta_{2F}F_2 + \; .... + \delta_{KF}F_K$$

7.1. Hypothesis of APT

- ✓ Competitive markets with homogeneous information for all investor. The market is formed by a significantly big alternative investment. Market supposed to be in equilibrium.
- ✓ Null transaction costs if not very little as to not distort investment and financing decisions.
- ✓ All securities have finite expected value (return) and variances (risk)
- ✓ Some agents can form well diversified portfolios
- ✓ There are no taxes
- ✓ There are no transaction costs
- ✓ Existence of a rate risk-free which allows to borrow and lend money without limitation.
- ✓ The return of the stocks is determined by various factors that have a linear relationship between them and the return.

The aggregate M as a linear discount factor in the return of the market portfolios the following:

$M = \delta_{0m} + \delta_{1m} R_m$, where the constants δ_{0m} and δ_{1m} comes from another expression supposing the existence of a risk-free asset. Those expressions are the following:

$$\delta_{0m} = \frac{1}{1+r} + \frac{\gamma_{1m} \; E\,(R_m)}{(1+r)\sigma_m^2}$$

$$\delta_{1m} = -\frac{\gamma_{1m} \; E\,(R_m)}{(1+r)\sigma_m^2}$$

This risk factors will affect all the assets that exist in the economy because attaining to their proper definition they represent risk factors systemic or non-diversifiable and making an extension of the previous formula we have the following:

$$M = \delta_{0F} + \; \delta_{1F}F_1 \; \delta_{2F}F_2 + \; .... + \delta_{KF}F_K, \text{ where } \delta_{0F}, \delta_{1F}, ..., \delta_{KF} \text{ are as in}$$

the previous case some constants and $F_1, F_2,..., F_K$ systematic risk factors in the economy, so the expected return of all he assets satisfy the next version of the fundamental equation of valuation:

$$E\left[\tilde{R}_j(\delta_{0F}+\delta_{1F}F_1\ \delta_{2F}F_2\ +\ ....+\delta_{KF}F_K)\right] = 1;\ j= 1, ..., N.$$

7.2. Arbitrage pricing theory (APT) resolution model

We can express the model, analytically as the following:

$$R_j = E(R_j) + \beta_{j1}F_1 + \beta_{j2}F_2 + ...+\beta_{jK}F_K \qquad + \qquad \varepsilon_j$$

Systematic innovation	Idiosyncratic innovation
(aggregated sources of risk)	(proper sources of risk)

And in general we will write the model as the following:

$$R_j = a_j\ +\ \beta_{j1}F_1 + \beta_{j2}F_2 + ...+\beta_{jK}F_K \qquad + \qquad \varepsilon_j,$$

where

- ✓ $F_1, F_2,..., F_K$ are the systemic risk factors or common aggregated to all the assets that exist expressed as innovations by which there expected values are equal to cero and there covariance between two whatever factors are also cero.
- ✓ $\beta_{j1}, \beta_{j2},... \beta_{jK}$ are the sensitivities of the returns of the asset j to the divers (K) factors of systemic risk of the economy. They are called betas of the factors.
- ✓ $E(F_K) = E(\varepsilon_j F_K) = 0, \forall j, k$ the systematic factors of risk are innovations and they are not correlated with the idiosyncratic component.
- ✓ $E(\varepsilon_j) = E(\varepsilon_j \varepsilon_h) = 0, \forall j$ and $\forall j \neq h$ so the idiosyncratic component is also an innovation and those components are not correlated between them for the diverse companies.
- ✓ $a_j = E(R_j), \forall j$ the systematic factors of risk and the idiosyncratic component are innovations which expected value is cero.

The main feature is the possibility of arbitrage, in this type of operations arbitrage without risk because the investor in this operation takes positions that neutralizes risk as we've seen in class, as well this operation implies a margin of secure profit, this situation takes place when the market is not in equilibrium.

7.3. Critics to APT

It is important to correctly identify the repressors of the expression, APT is considered a better and more solid model than CAPM due to the possibility we don't have in CAPM of extending the model, it is not dependant as the previous ones in the market portfolio, risk averse investors are also an assumption in this model.

8. CONSTRUCTION OF THE PORTFOLIOS

Now we know the models I apply them to a two concrete portfolios. The of Euro-Iberian Fund consists of three assets which are: Iberdrola, Red Electrica and Marriot International Inc. For all the computations we are taking the adjusted prices.

8.1. Initial calculus

Table 1. Descriptive statistics of the Euro-Iberian fund

EURO-IBERIAN FUND	Iberdrola	Red Electrica	Marriot International, Inc.	Benchmark
Mean	-0,0002531	0,00021902	-0,000305359	3,36592E-05
Tipical error	0,0008945	0,00068356	0,047818999	0,000657119
Median	-0,0007561	0	-0,000614705	0,000229035
Mode	0	0	#N/A	0
Standard deviation	0,01541552	0,01178029	0,824097711	0,01132458
Variance of the sample	0,00023764	0,00013878	0,679137038	0,000128246
kurtosis	1,75302173	3,12696272	10,00164095	8,189295554
Skewness	0,25572964	-0,6142941	0,006402888	-1,311365568
Range	0,1140811	0,09038162	9,231214155	0,110444047
Minimum	-0,0596553	-0,0505104	-4,602200002	-0,076998012
Maximum	0,0544258	0,03987117	4,629014153	0,033446036
Sum	-0,0751629	0,06504761	-0,090691521	0,009996771
Account	297	297	297	297
Confidence level(95,0%)	0,00176038	0,00134526	0,094108304	0,001293217

Source: Own elaboration

The second fund, the "American fund" consists of Goldcorp, IBM and Chevron, as in the previous fund: all the computations we are taking the adjusted prices.

Table 2. Descriptive statistics of the "American fund"

AMERICAN FUND	GoldCorp	IBM	CHEVRON	NYSE
Mean	-0,007471905	0,00015273	-5,15023E-05	0,00024314
Tipical error	0,030083903	0,08173363	0,063051547	0,11084821
Median	0,002436074	-0,0003303	0,000444404	-2,121E-05
Mode	0	0	#N/A	#N/A
Standard deviation	0,518456604	1,40619846	1,086610691	1,9103235
Variance of the sample	0,26879725	1,9773941	1,180722794	3,64933587
kurtosis	16,88420323	5,07003589	3,211949441	7,94867854
Skewness	-0,225141575	0,00346007	0,007674661	0,11234578
Range	4,662378777	13,8056776	9,208359689	16,1261557
Minimum	-2,336921054	-6,8970932	-4,604906211	-6,9158478
Maximum	2,325457723	6,90858441	4,603453478	9,21030788
Sum	-2,219155637	0,04520846	-0,015296169	0,07221212
Account	297	296	297	297
Confidence level(95,0%)	0,059205445	0,16085489	0,124086122	0,21815047

Source: Own elaboration

Table 3. Return and variance of the "Euro-Iberian fund"

	Iberdrola	Red Electrica	Marriot Int. Inc.
Return	-0,03%	0,02%	-0,02%
Variance	0,02%	0,03%	0,01%

Source: Own elaboration

Table 4. Matrix of variances and covariance's of the "Euro-Iberian Fund"

	Iberdrola	Red Electrica	Marriot Int. Inc.	IBEX-35
Iberdrola	0,000237638	-0,00002036	-0,00000023	0,00000122
Red Electrica	-0,00002036	0,00029463	-0,00000225	-0,00000225
Marriot Int. Inc.	-0,00000023	-0,00000225	0,00012825	0,00000170
IBEX-35	0,00000122	-0,00000225	0,00000170	0,000127814

Source: Own elaboration

Table 5. Return, standard deviation, variance, covariance and correlation coefficient of the "Euro-Iberian Fund".

	IBERDROLA	RED ELECTRICA	Marriot International Inc.
μ	-0,03%	0,02%	-0,03%
σ	1,37%	1,18%	1,72%
σ^2	0,02%	0,01%	0,03%
σ_{12}	-2,03615E-05	-6,78891E-06	-2,25876E-07
ρ_{12}	-0,112502275	-0,112502275	-0,000856527

Source: Own elaboration

Table 6. Return, variance and standard deviation of "Euro-Iberian Fund"

μ	**-4,79%**
σ	**0,95%**
σ^2	**0,01%**

Source: Own elaboration

Table 7. Return and variance of the "American fund"

	GOLDCORP	IBM	CHEVRON	NYSE
Return	0,03%	0,02%	-0,01%	0,02%
Variance	0,15%	0,02%	0,03%	0,01%

Source: Own elaboration

Table 8. Matrix of variances and covariance's of "American fund"

	GOLDCORP	IBM	CHEVRON	NYSE
GOLDCORP	0,00154514	-0,00005359	-0,00003543	0,00006161
IBM	-0,00005359	0,00020362	0,00002669	0,00002669
CHEVRON	-0,00003543	0,00002669	0,00033884	-0,00000483
NYSE	0,00006161	0,00000000	-0,00000483	0,00010125

Source: Own elaboration

Table 9. Return, standard deviation, variance, covariance and correlation coefficient.

	GC	IBM	CHEVRON
μ	0,03%	0,02%	-0,01%
σ	3,93%	1,43%	1,84%
σ^2	0,15%	0,02%	0,03%
σ_{12}	-0,0000536	-0,0000354	0,0000267
ρ_{12}	-0,095860674	-0,04913083	0,10193815

Source: Own elaboration

Table 10. Return, variance and standard deviation of "American Fund"

μ	2,89%
σ	1,36%
σ^2	0,02%

Source: Own elaboration

8.2. Applying financial theory to concrete portfolios. Markowitz model

For the "Euro-Iberian fund" the return of the index, of the IBEX-35 is the following:

$$\mu_p^* = \mu_{IBEX-35} = 0,00003366$$

8.2.1. Euro-Iberian fund

$$\min \sigma_p^2 = x_{IBER}^2 * \sigma_{IBER}^2 + x_{REDELEC}^2 * \sigma_{REDELEC}^2 + x_{Marriot}^2 * \sigma_{Marriot}^2 + x_{IBER} * \sigma_{IBERREDELEC} + x_{REDELEC} * \sigma_{REDELECMarriot} + x_{Marriot} * \sigma_{IBERMarriot}$$

Subject to: $x_{IBER} * \sigma_{IBER} + x_{REDELEC} * \sigma_{REDELEC} + x_{Marriot} * \sigma_{Marriot} = \mu_{IBEX-35}$

$$x_{IBER} + x_{REDELEC} + x_{Marriot} \geq 0$$

Applying the previous data, we have:

$$\min \sigma_p^2 = 0{,}000237638 * x_{IBER}^2 + 0{,}00029463 * x_{REDELEC}^2 + 0{,}00012825 * x_{Marriot}^2 +-$$
$$0{,}00002036 * x_{IBER} * x_{REDELEC} + (-0{,}00000225) * x_{REDELEC} * x_{Marriot} + (-0{,}00000023)$$
$$* x_{IBER} * x_{Marriot}$$

Subject to: $0{,}00023764 * x_{IBER} + 0{,}00029463 * x_{REDELEC} + 0{,}00012825 * x_{Marriot}$

$$x_{IBER} + x_{REDELEC} + x_{Marriot} = 1$$

$$x_{IBER} \geq 0 \quad x_{REDELEC} \geq 0 \quad x_{Marriot} \geq 0$$

Then applying SOLVER, we have:

$$\sigma_p^2 = 0{,}00005550$$

$$x_{IBER} = 35{,}14\% \qquad x_{REDELEC} = 45{,}18\% \qquad x_{Marriot} = 19{,}68\%$$

Graph 45. Allocation of the assets in the Euro-Iberian Fund according to Markowitz
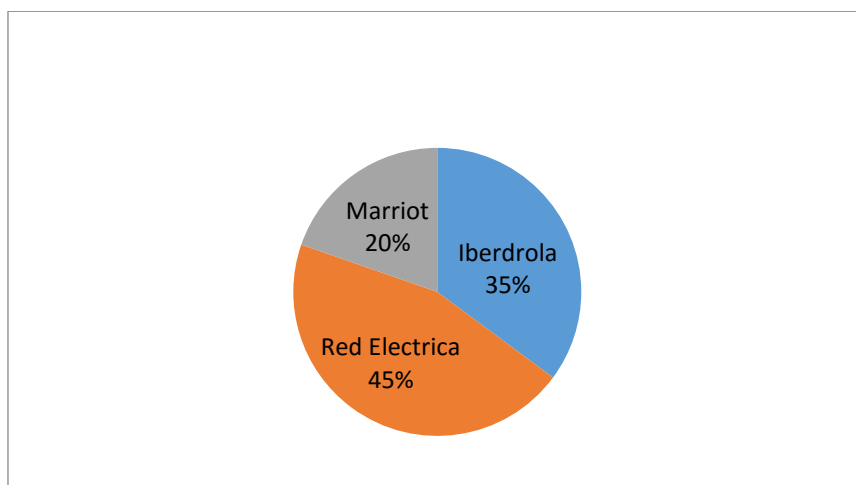
Source: Own elaboration

8.2.2. American fund

For the "American fund" the return of the index, of the NYSE is the following:

$$\mu_p^* = \mu_{NYSE} = 0{,}07221212$$

$$\min \sigma_p^2 = x_{Goldcorp}^2 * \sigma_{Goldcorp}^2 + x_{IBM}^2 * \sigma_{IBM}^2 + x_{Chevron}^2 * \sigma_{Chevron}^2 + x_{Goldcorp} *$$
$$\sigma_{GoldcorpIBM} + x_{IBM} * \sigma_{IBMChevron} + x_{Chevron} * \sigma_{GoldcorpChevron}$$

Subject to: $x_{Goldcorp} * \sigma_{GoldcorpIBM} + x_{IBM} * \sigma_{IBMChevron} + x_{Chevron} * \sigma_{GoldcorpChevron} = \mu_{NYSE}$

$$x_{Goldcorp} + x_{IBM} + x_{Chevron} \geq 0$$

Applying the previous data, we have:

$\min \sigma_p^2 = 0{,}00154514*x_{Goldcorp}^2 +*0{,}00020362*x_{IBM}^2 +0{,}00033884* x_{Chevron}^2 + (-0{,}00005359)* x_{Goldcorp} + 0{,}00002669* x_{IBM} + (-0{,}00003543) * x_{Chevron}$

$$x_{Goldcorp} + x_{IBM} + x_{Chevron} = 1$$

$$x_{Goldcorp} \geq 0 \quad x_{IBM} \geq 0 \quad x_{Chevron} \geq 0$$

Then applying SOLVER, we have:

$$\sigma_p^2 = 0{,}00041040$$

This fund only invests in two assets.

$x_{Goldcorp} = 50\%$ $\qquad\qquad$ $x_{IBM} = 50\%$ $\qquad\qquad$ $x_{Marriot} = 0\%$

Graph 46. Allocation of the assets in the American Fund according to Markowitz.
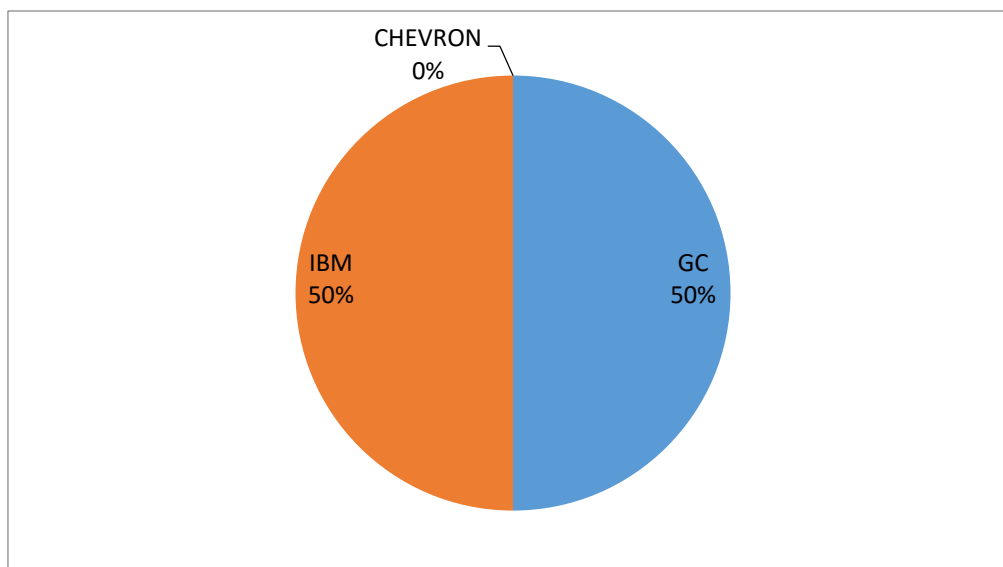
Source: Own elaboration

8.3. Applying financial theory to concrete portfolios. Sharpe model

For the "Euro-Iberian fund" the return of the index, of the IBEX-35 is the following:

$$\mu_m^* = \mu_{IBEX-35} = 0,00003366$$

8.3.1. Euro-Iberian fund

In this case is also necessary to know the following parameters:

$$\sigma_m^2 = \sigma_{IBEX-35}^2 \qquad \mu_m = \mu_{IBEX-35}$$

Table 11. Regressions alpha and beta of Euro-Iberian fund

	β	α
Iberdrola	0,005147529	0,000034962
Red Electrica	-0,016247584	0,000037218
Marriot Int. Inc.	0,005785338	0,000035426

Source: Own elaboration

Risk equation for every asset to then identify the variance of the errors:

$$\sigma_{Iber}^2 = \beta_{Iber}^2 * \sigma_m^2 + \sigma_{\varepsilon Iber}^2 = SR_{Iber} + SR_{Iber}$$

$$\sigma_{REE}^2 = \beta_{REE}^2 * \sigma_m^2 + \sigma_{\varepsilon REE}^2 = SR_{REE} + SR_{REE}$$

$$\sigma_{Marriot}^2 = \beta_{Marriot}^2 * \sigma_m^2 + \sigma_{\varepsilon Marriot}^2 = SR_{Marriot} + SR_{Marriot}$$

$$SR_{Iber} = 1,15893E\text{-}08 \qquad SR_{REE} = -2,24717E\text{-}06 \qquad SR_{Marriot} = 0,00012655$$

$$SR_{Iber} = \sigma_{\varepsilon IBER}^2 = 0,0001 \; SR_{REE} = \sigma_{\varepsilon REE}^2 = 0,0001 \; SR_{Marriot} = \sigma_{\varepsilon Marriot}^2 = 0,0001$$

Now as in the case of Markowitz we need to apply SOLVER and calculate the weights of the different assets in this portfolio.

$$\min \sigma_p^2 = x_{IBER}^2 * \sigma_{IBER}^2 + x_{REDELEC}^2 * \sigma_{REDELEC}^2 + x_{Marriot}^2 * \sigma_{Marriot}^2 + \sigma_{IBEX-35}^2 * X_{n+1}^2$$

$$S.\, t: \alpha_{IBER} * X_{IBER} + \alpha_{REE} * X_{REE} + \alpha_{Marriot} * X_{Marriot} + \mu_{IBEX-35} * X_{n+1}^2 = \mu_{IBEX-35}$$

$$\beta_{IBER}*X_{IBER} + \beta_{REE}*X_{REE} + \beta_{Marriot}*X_{Marriot} - X_{n+1} = 0$$

$$x_{IBER} + x_{REDELEC} + x_{Marriot} = 1$$

$$x_{IBER} \geq 0 \quad x_{REDELEC} \geq 0 \quad x_{Marriot} \geq 0$$

Applying the previous data, we have:

$$\min \sigma_p^2 = x_{IBER}^2 * \sigma_{IBER}^2 + x_{REDELEC}^2 * \sigma_{REDELEC}^2 + x_{Marriot}^2 * \sigma_{Marriot}^2 + 0{,}0001282 * X_{n+1}^2$$

S.t:

$$0{,}00003496 * X_{IBER} + 0{,}00003722 * X_{REE}[12] + 0{,}00003543 * X_{Marriot} + (-0{,}0148704) * X_{n+1}^2 = -0{,}0148704$$

$$0{,}00514753 *X_{IBER} + (-0{,}01624758) *X_{REE} + 0{,}00578534 * X_{Marriot} - X_{n+1} = 0$$

$$x_{IBER} + x_{REDELEC} + x_{Marriot} = 1$$

$$x_{IBER} \geq 0 \quad x_{REDELEC} \geq 0 \quad x_{Marriot} \geq 0$$

$$x_{IBER} = 30\% \quad x_{REDELEC} = 0\% \quad x_{Marriot} = 70\%$$

$$X_{n+1} = 0{,}005594$$

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[12] REE= Red Eléctrica española y REDELEC are the same

Graph 47. Allocation of the assets in the Euro-Iberian Fund according to Sharpe.
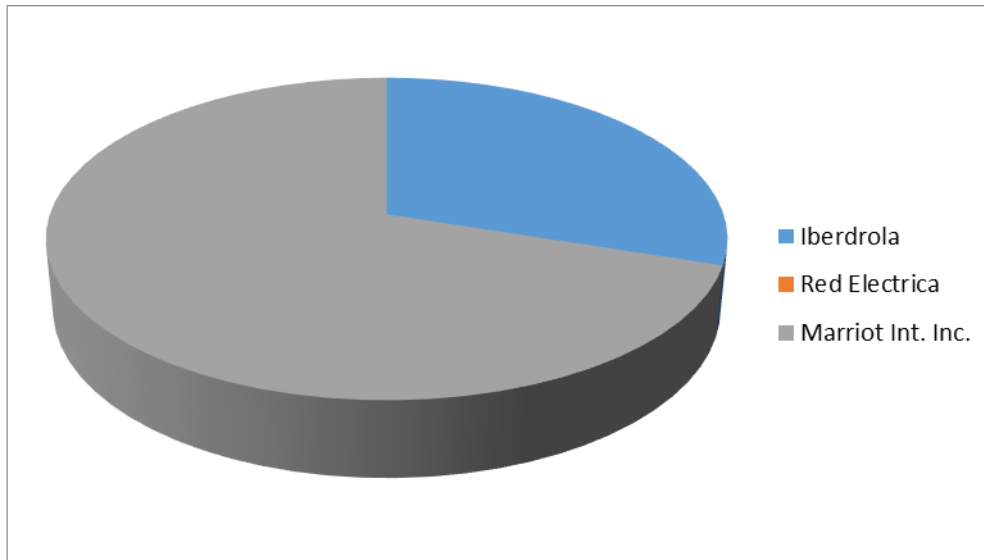
Source: Own elaboration

8.3.2. American fund

In this case is also necessary to know the following parameters:

$$\sigma_m^2 = \sigma_{NYSE}^2 \qquad \mu_m = \mu_{NYSE} = 0{,}07221212$$

Table 12. Regressions alpha and beta of the American fund

	β	α
GC	0,61057524	0,00023190
IBM	-0,00290869	0,00024375
CHEVRON	-0,01431429	0,00024240

Source: Own elaboration

Risk equation for every asset to then identify the variance of the errors:

$$\sigma_{GC}^2 = \beta_{GC}^2 * \sigma_m^2 + \sigma_{\varepsilon GC}^2 = SR_{GC} + SR_{\,GC}$$

$$\sigma_{IBM}^2 = \beta_{IBM}^2 * \sigma_m^2 + \sigma_{\varepsilon IBM}^2 = SR_{\,IBM} + SR_{\,IBM}$$

$$\sigma_{Chevron}^2 = \beta_{Chevron}^2 * \sigma_m^2 + \sigma_{\varepsilon Chevron}^2 = SR_{Chevron} + SR_{Chevron}$$

$SR_{GC} = 6{,}1613E\text{-}05$ $\qquad SR_{IBM} = \text{-}5{,}90271E\text{-}07$ $\qquad SR_{Chevron} = \text{-}4{,}83396E\text{-}06$

$SR_{GC} = \sigma_{\varepsilon GC}^2 = 0{,}00003964$ $\qquad\qquad SR_{IBM} = \sigma_{\varepsilon IBM}^2 = 0{,}00010184$

$SR_{Chevron} = \sigma^2_{\varepsilon Chevron} = 0,00010608$

Now as in the case of Markowitz we need to apply SOLVER and calculate the weights of the different assets in this portfolio.

$$\min \sigma^2_p = x^2_{GC} * \sigma^2_{GC} + x^2_{IBM} * \sigma^2_{IBM} + x^2_{Chevron} * \sigma^2_{Chevron} + 0,0001282 * X^2_{n+1}$$

S. t: $\alpha_{GC} * X_{GC} + \alpha_{IBM} * X_{IBM} + \alpha_{Chevron} * X_{Chevron} + 0,07221212 * X^2_{n+1} = 0,07221212$

$0,61057524 * X_{GC} + -0,00290869 * X_{IBM} + (-0,01431429) * X_{Chevron} - X_{n+1} = 0$

$$x_{GC} + x_{IBM} + x_{Chevron} = 1$$

$$x_{GC} \geq 0 \quad x_{IBM} \geq 0 \quad x_{Chevron} \geq 0$$

Applying the previous data, we have:

$$\min \sigma^2_p = x^2_{GC} * \sigma^2_{GC} + x^2_{IBM} * \sigma^2_{IBM} + x^2_{Chevron} * \sigma^2_{Chevron} + 0,0001282 * X^2_{n+1}$$

S. t: $0,00023190 * X_{GC} + 0,00024375 * X_{IBM} + 0,00024240 * X_{Chevron} + 0,07221212 * X^2_{n+1} = 0,07221212$

$0,61057524 * X_{GC} + -0,00290869 * X_{IBM} + (-0,01431429) * X_{Chevron} - X_{n+1} = 0$

$$x_{GC} + x_{IBM} + x_{Chevron} = 1$$

$$x_{GC} \geq 0 \quad x_{IBM} \geq 0 \quad x_{Chevron} \geq 0$$

$$x_{GC} = 25\% \qquad x_{IBM} = 25\% \qquad x_{Chevron} = 50\%$$

$$X_{n+1} = 0,144759491$$

Graph 48. Allocation of the assets in the American Fund according to Sharpe.
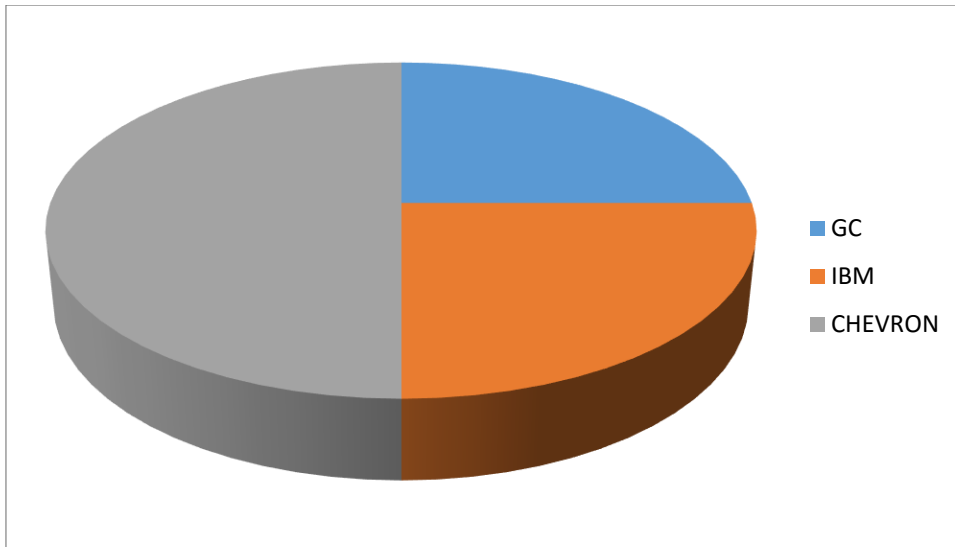
Source: Own elaboration

8.4. Applying financial theory to concrete portfolios. CAPM model
8.4.1. Euro-Iberian Fund

Table 13. Returns of each asset of the fund.

Return of Iberdrola	**0,078%**
Return of REE	**0,121%**
Return of Marriot	**-1,482%**

Source: Own elaboration

The sum of the fund in terms of return is of -1,283%, we are losing money less than the index Spanish stock market return for 2015.

8.4.2. American Fund

Table 14. Returns of each asset of the fund.

Return of GC	5,07%
Return of IBM	1,69%
Return of Chevron	1,46%

The sum of the fund in terms of return is of 8,21%, compensating the loss of the other fund. A client investing in the two funds will have a return 6,93% on their investment.

9. Future lines of research

Finance evolution but more particularly valuation of financial assets, valuation models has suffered a deep evolution in terms of adding variables to each model, making a new branch of finance theory called quantitative finance, the most known professionals are quants, this are normally mathematicians, physics or PhD.

In this fields that develop their career in the financial industry normally in the most technically departments such as risk and internal models valuation. Some models as Fama-French, multifactorial models have developed in the sense I have commented. Also an employee at Goldman Sachs developed the Black-Litterman model.

10. CONCLUSSIONS

Although the limitations of the models seen in this paper and the evolution of the financial theory to more quantitative models are just good approximations for observing the pattern of behaviour (in normal circumstances) of the assets that quote in the stock market.

In reality other factors more psychological or emotional guide determined moments of special stress in financial markets as for example panic or the irrational exuberance (Shiller) in the main stock markets of the world.

It is obvious that the asset manager so he or she must adapt and adjust the portfolio to that moments in the market that due to the economic context, financial events or changes in regulated markets as energy or financial markets, the weights in the portfolio have been altered and do not comply with the fund policy.

The fund manager as I have exposed here must have and be aware of the economic context, so the first step is to have a broad macroeconomic analysis as I have exposed here related to the main economic areas, supported in this case by data obtained from Bloomberg, so the more precise of the current economic context the best, this economic context and the macroeconomic data affects financial markets and in particular the wide range of asset classes. They must also be updated with the taxation schemes applied to them as well as a major player in finance as are the tax and monetary authorities and their policy implications and how this affect the portfolios of their clients.

In this globalized world the fund manager must if implemented and allowed by their clients and active and dynamic management of their portfolio as well as a good and precise analysis of the economy and of the behaviour (in terms of performance) of financial markets. This will help him, also have a bit of prediction about the near future to comply with the fund policy and justify his management in front of his clients. This skill normally develops with the experience in markets and will also depend on the particular skills of each fund manager, but trying to beat the market is quite difficult as some researchers have shown.

11. References

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12. Annex I

Evolution of Chinese private debt and debt service. China
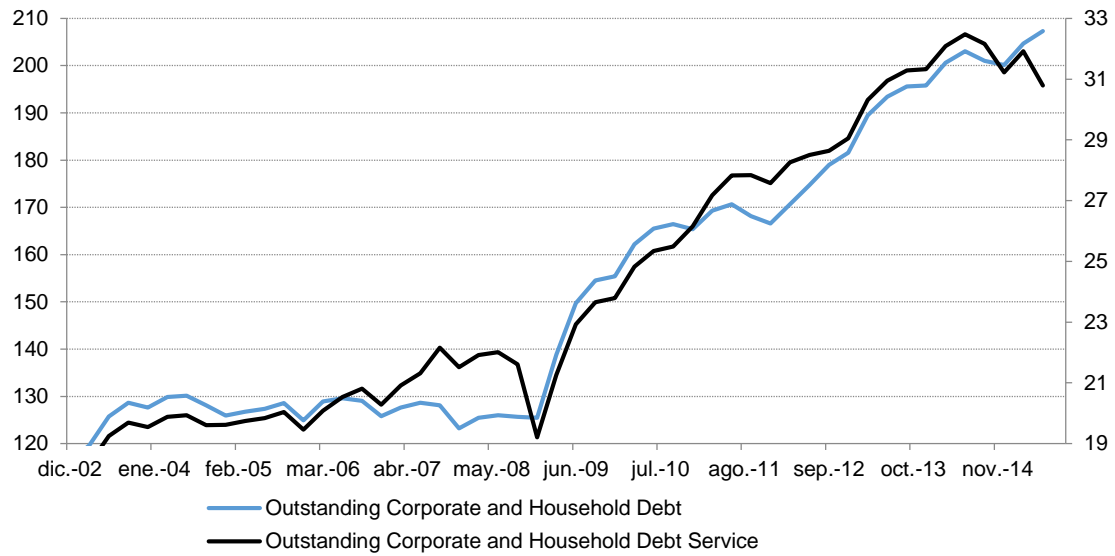
Source: Bloomberg

Evolution of the investments of non residents in China and the issuance of Chinese institutions in the capital markets. Miles mns.$.
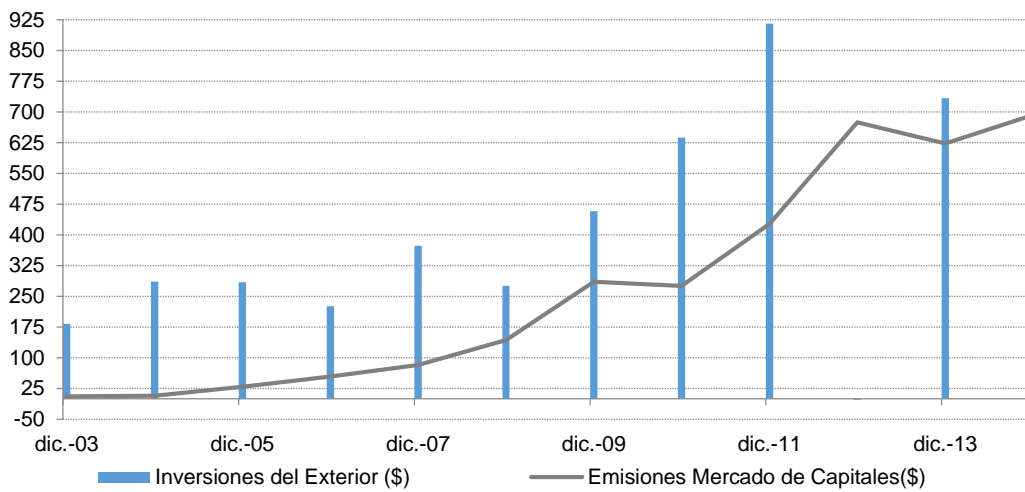
Source: Bloomberg

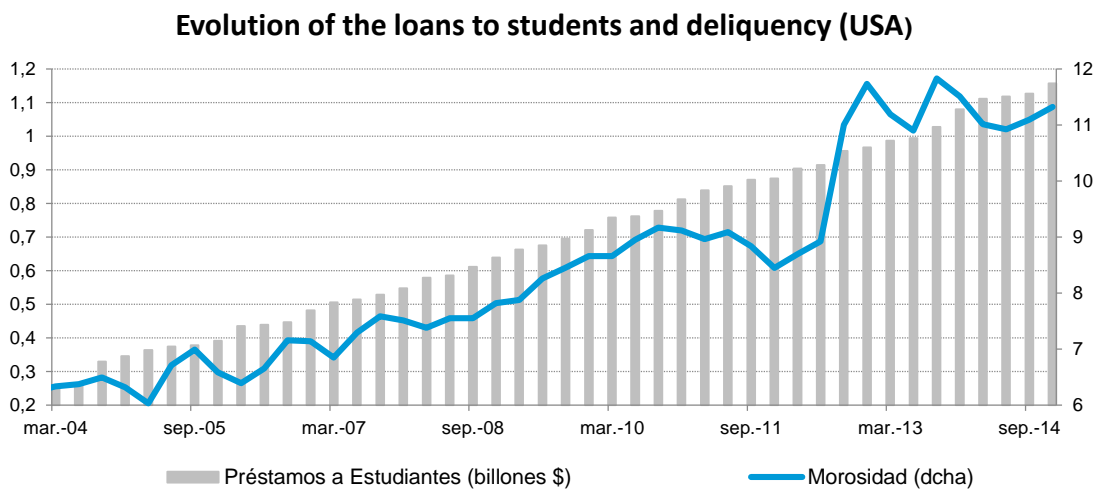## Evolution of the finance to companies and the chinese index CSI 300. China

Legend: Financiación vía Stock Market — CSI 300
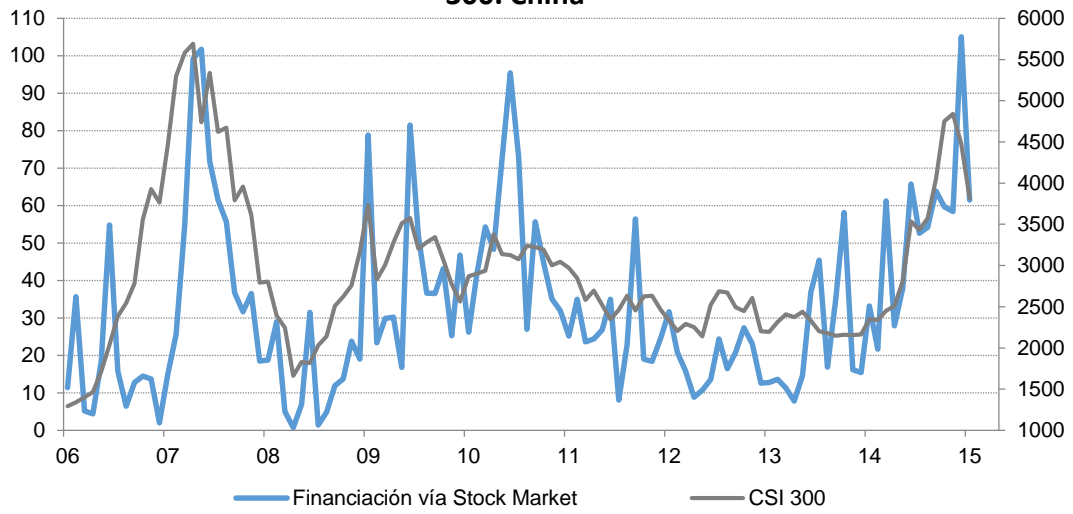
Source: Bloomberg

Evolution of the private debt and dollar-Yuan. China

Legend: China Outstanding Corp. And Social Debt Sobre GDP (izda) — CNY Curncy

Source: Bloomberg

Evolution of wages and profits over GDP. Spain

Legend: — Salarios sobre PIB — Beneficios sobre PIB

Source: Bloomberg

Evolution of the loans to students and deliquency (USA)

Legend: ▮ Préstamos a Estudiantes (billones $) — Morosidad (dcha)

Source: Bloomberg

Profits evolution and employment. Spain

Legend: — Empleo — Beneficios Empresariales. Dcha.
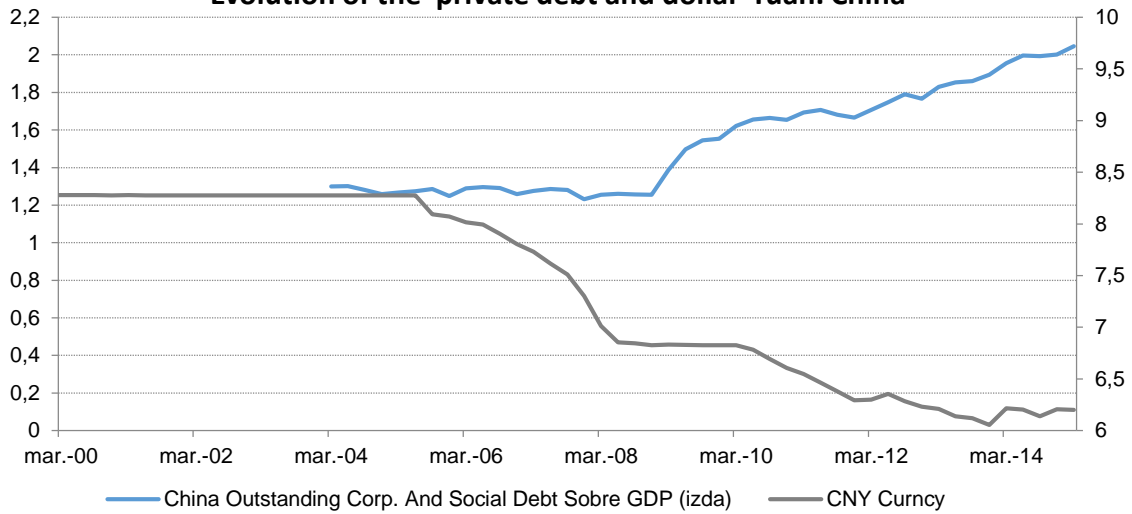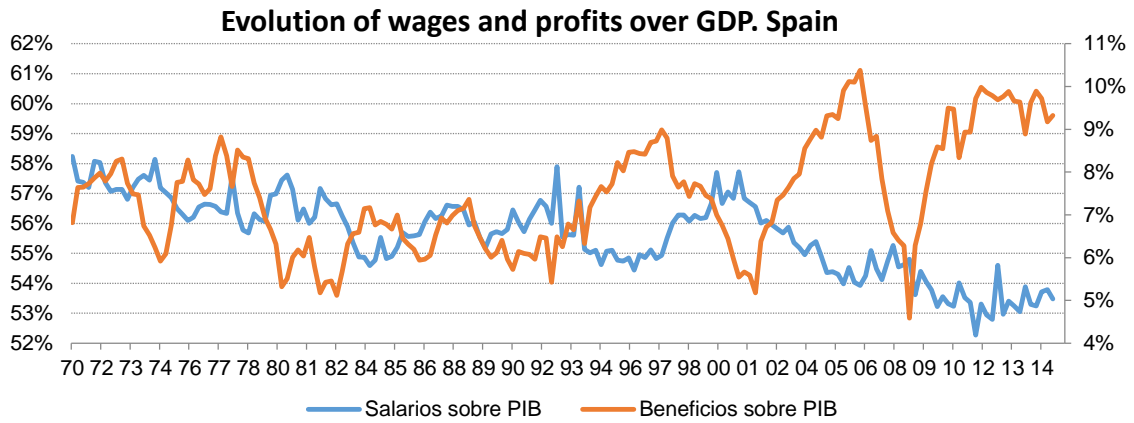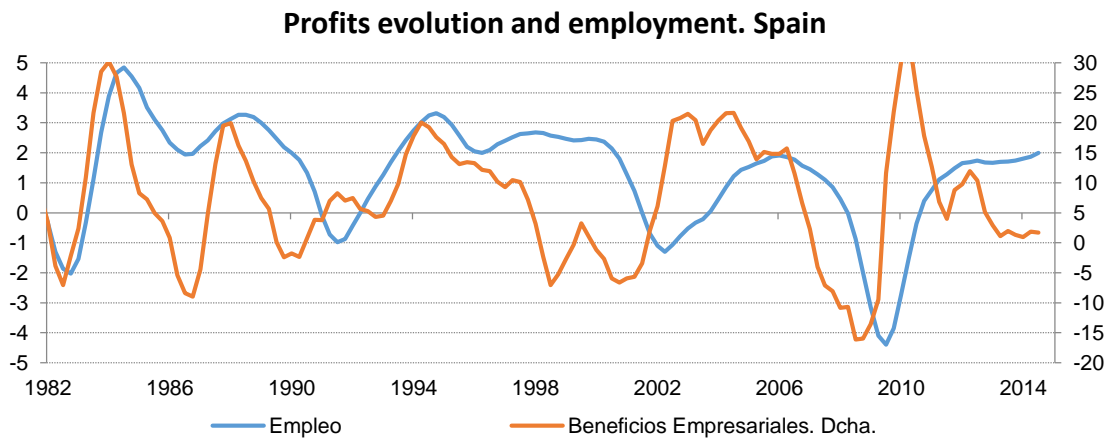
Source: Bloomberg

Evolution of consumption in different recoveries. Spain

Legend: 1970, 1975, 1980, 1982, 1991, 2001, 2009
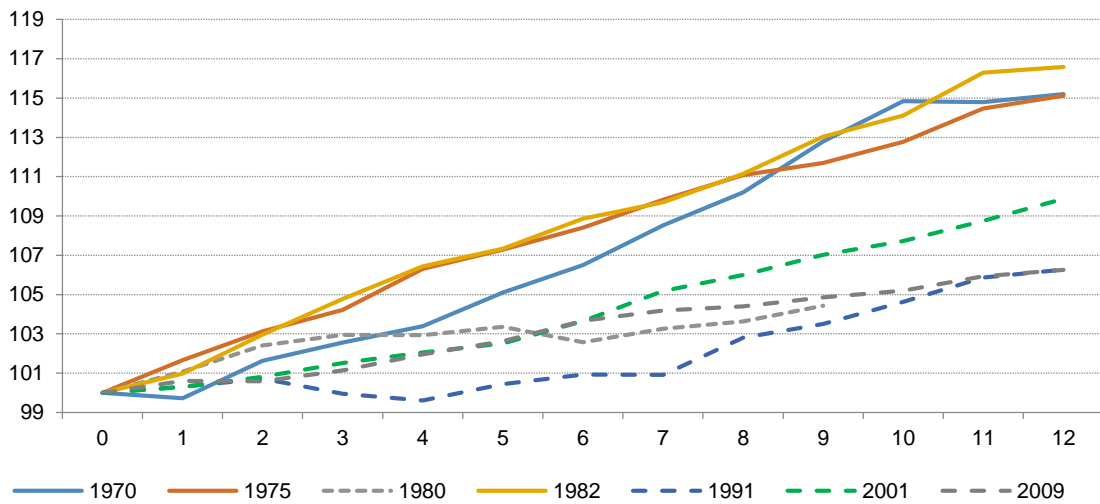
Source: Bloomberg

Evolution of the public debt and wages over GDP. Spain

Salarios sobre PIB. Base 100=enero 1971 — Deuda Pública sobre PIB
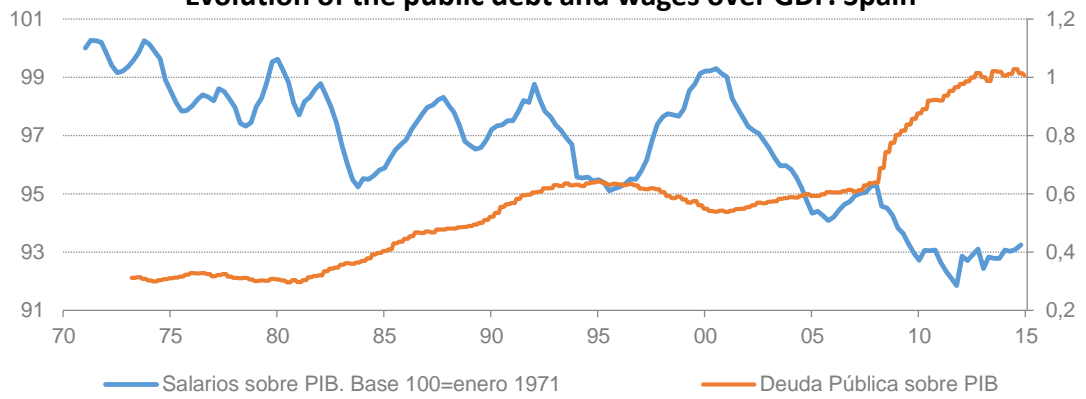
Source: Bloomberg

Unemployment and food stamps in USA

Tasa de Desempleo (izda)

Personas Participes del Plan de Suplemento de Alimentación (millones de americanos)
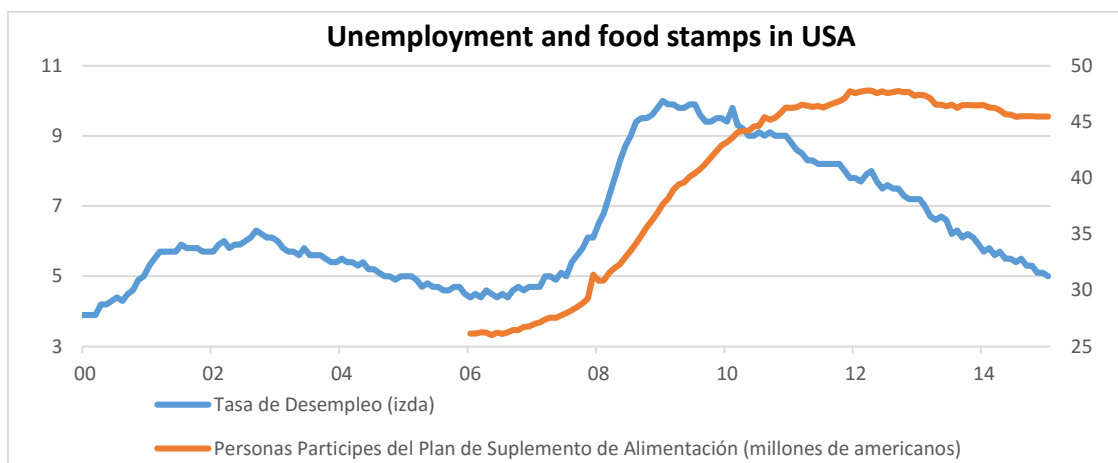
Source: Bloomberg

Evolution of the oil prices and current account. Eurozone

Cuenta Corriente sobre PIB · Precios del Crudo en Euros
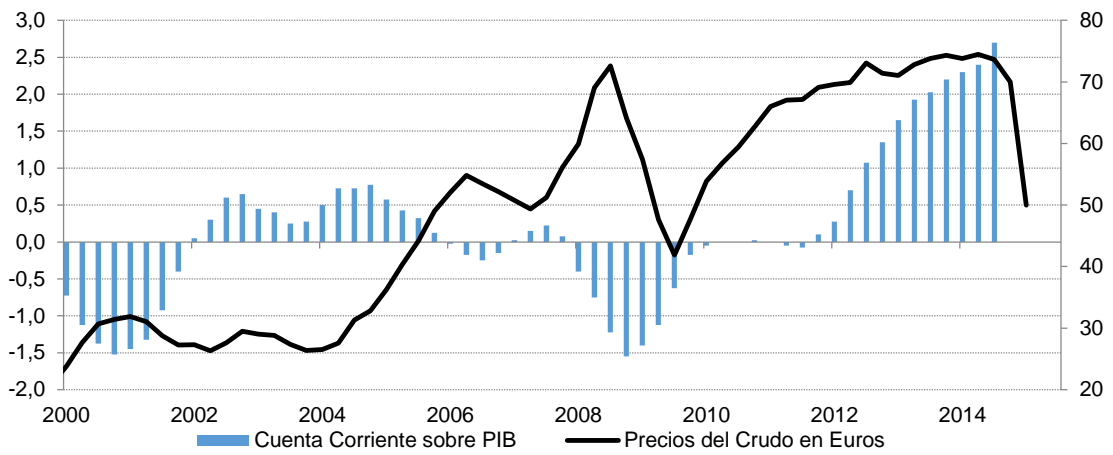
Source: Bloomberg

Unemployment evolution in Spain and credit risks in the Eurozone

Desempleo en España · Diferencial de Crédito España-Alemania
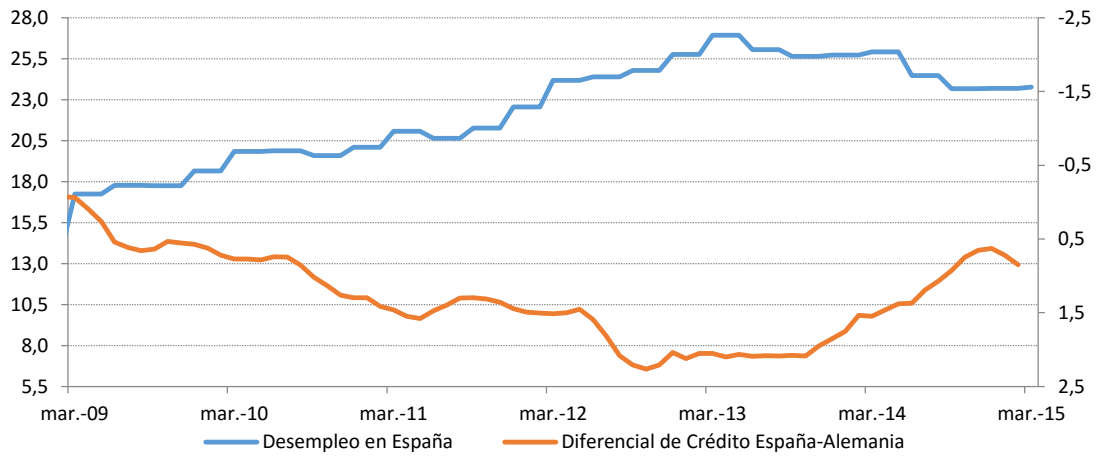
Source: Bloomberg

Evolution of Exp. in relation of the Total EU 18.

Legend: Germany (dcho), Spain, France, Italy, United Kingdom
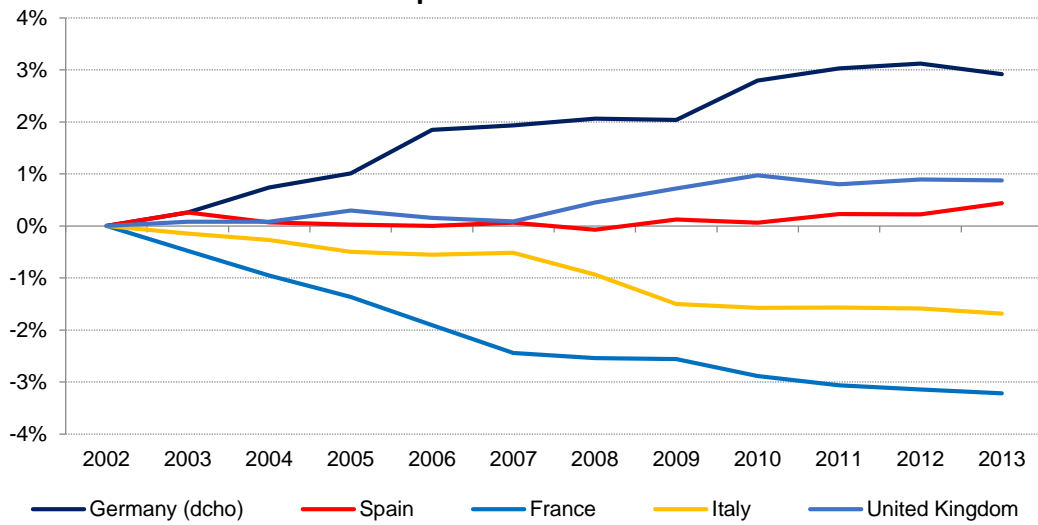
Evolution of the index of currencies of the Asia South-Eastern and expectativas of inflation of the Eurozone.

Legend: ADXY Curncy, .EUIL5Y5Y Index
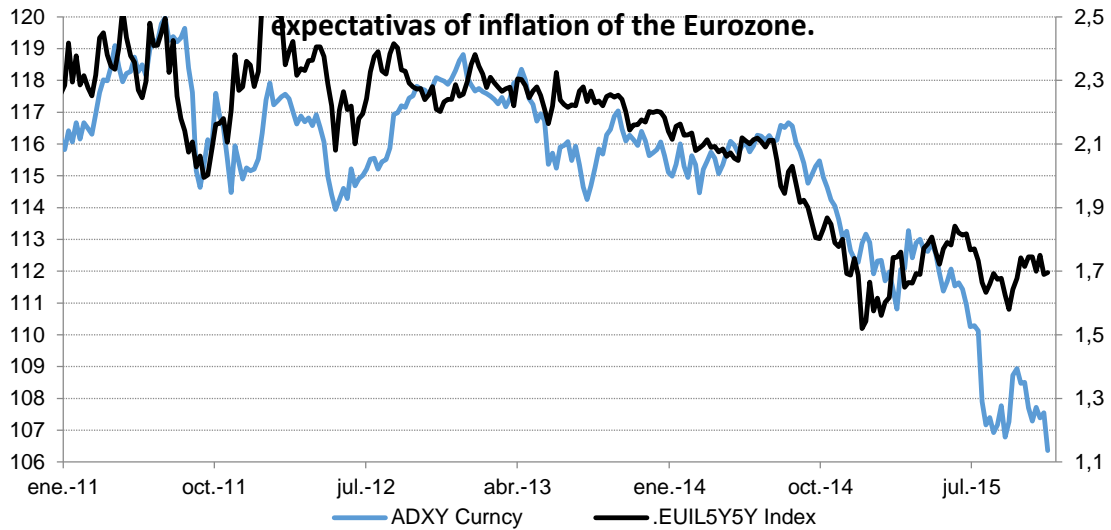
Current reserves as % over the total world
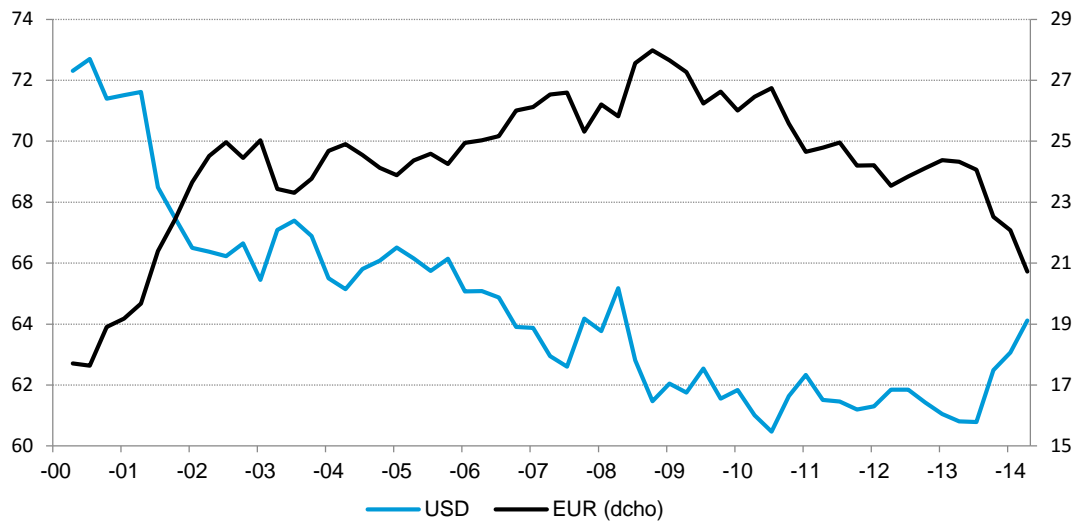
Source: Bloomberg

## Public debt and contingent liabilities over the GDP

Source: Bloomberg

World prices of the gas

Legend: Gas Henry Hub — Gas LNG. Japón — Gas. Holanda

Source: Bloomberg

Evolution of prices of the crude (Brent) and premium of the crude of Saudi Arabia

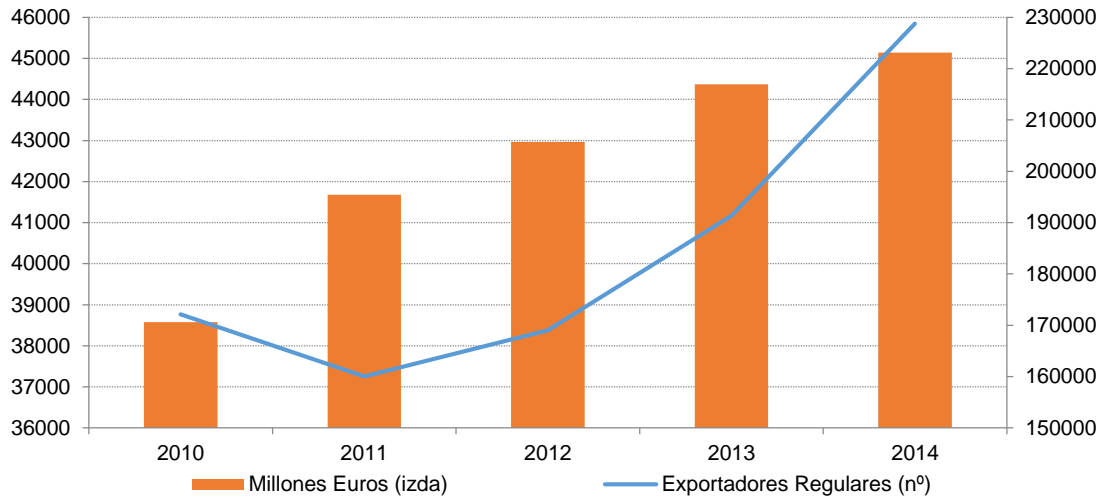Legend: Prcios Crudo Arabia Saudí. Diferencial vs Platts Oman/Dubais — Brent (dcho)
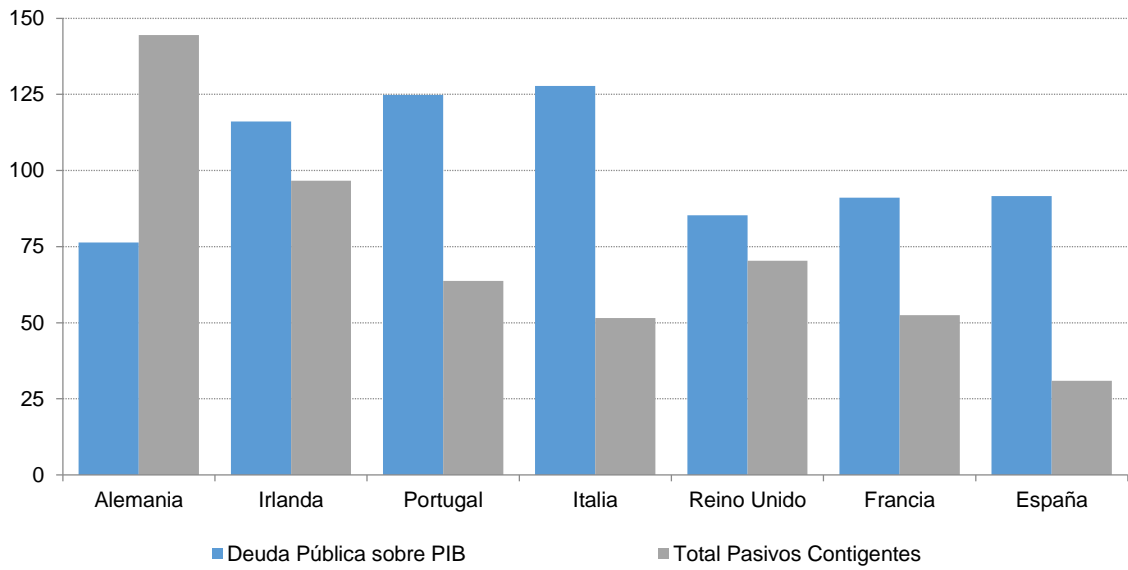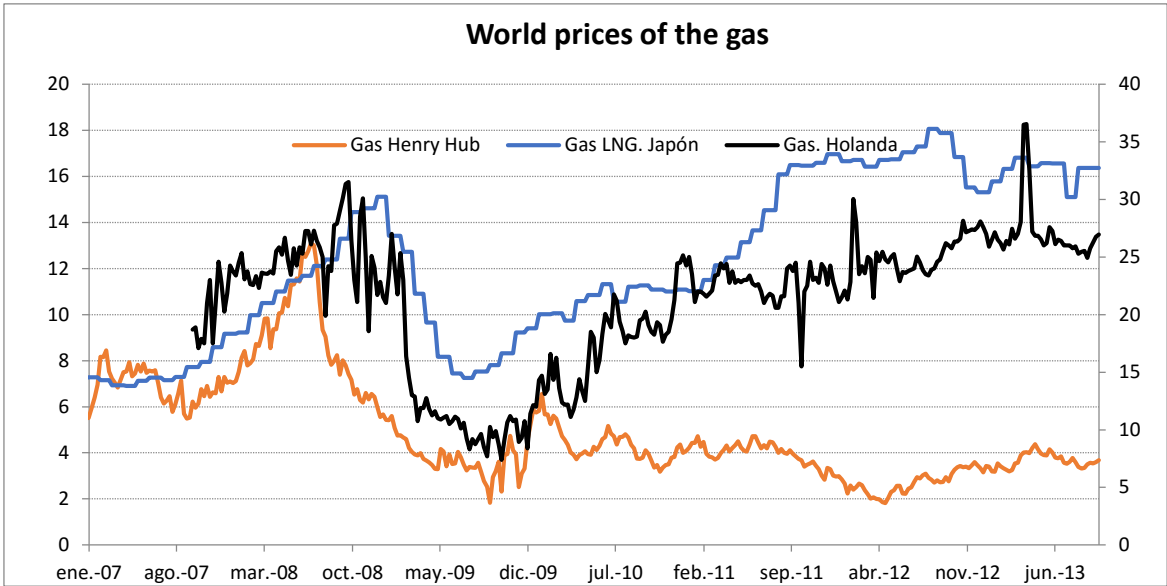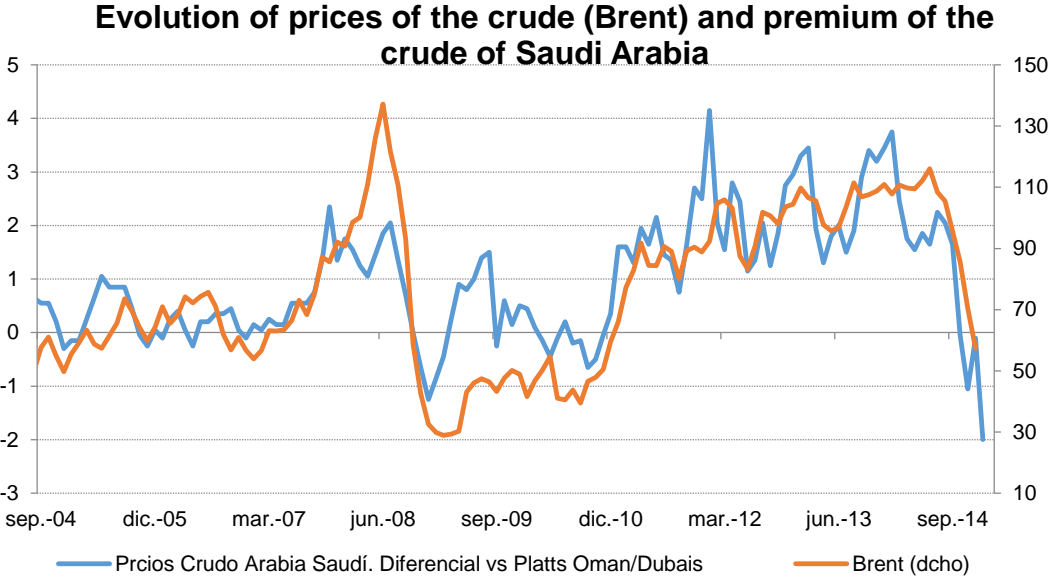
Source: Bloomberg

Energy Intensity. Total Primary Energy Consumption per Dollar of GDP (Btu per Year 2005 U.S. Dollars. USA
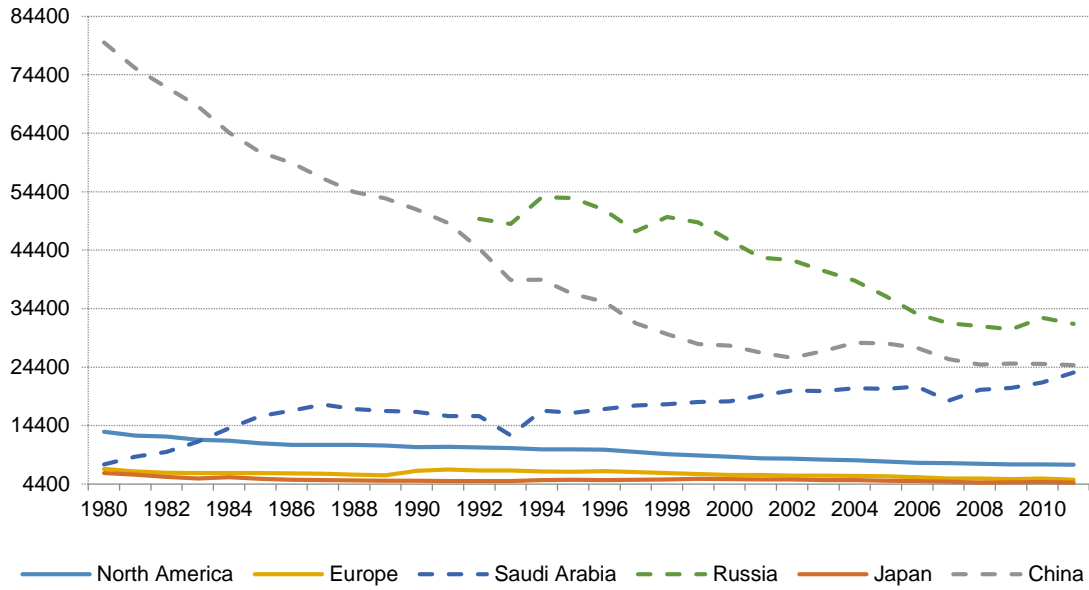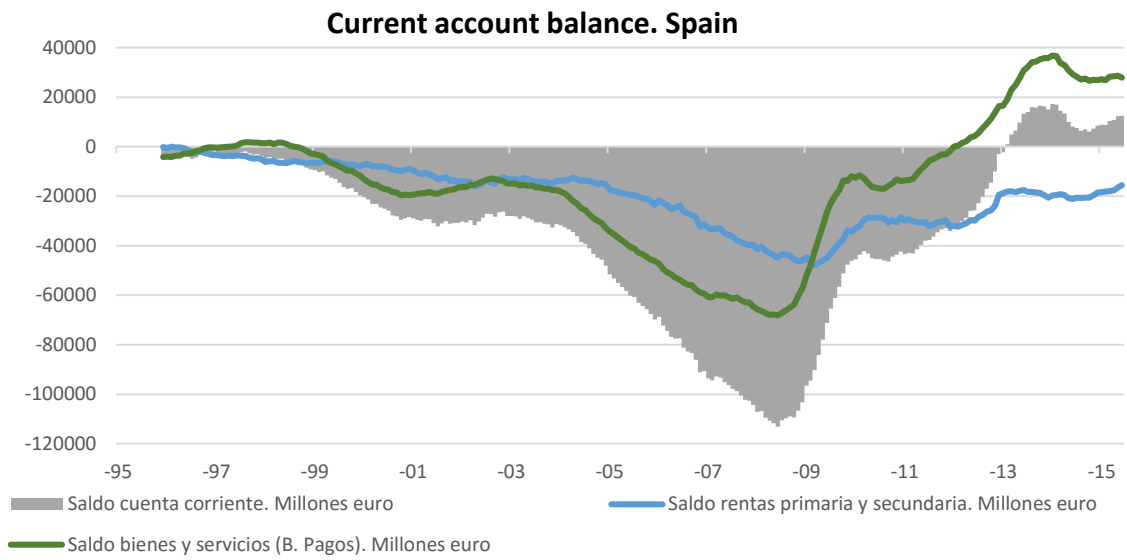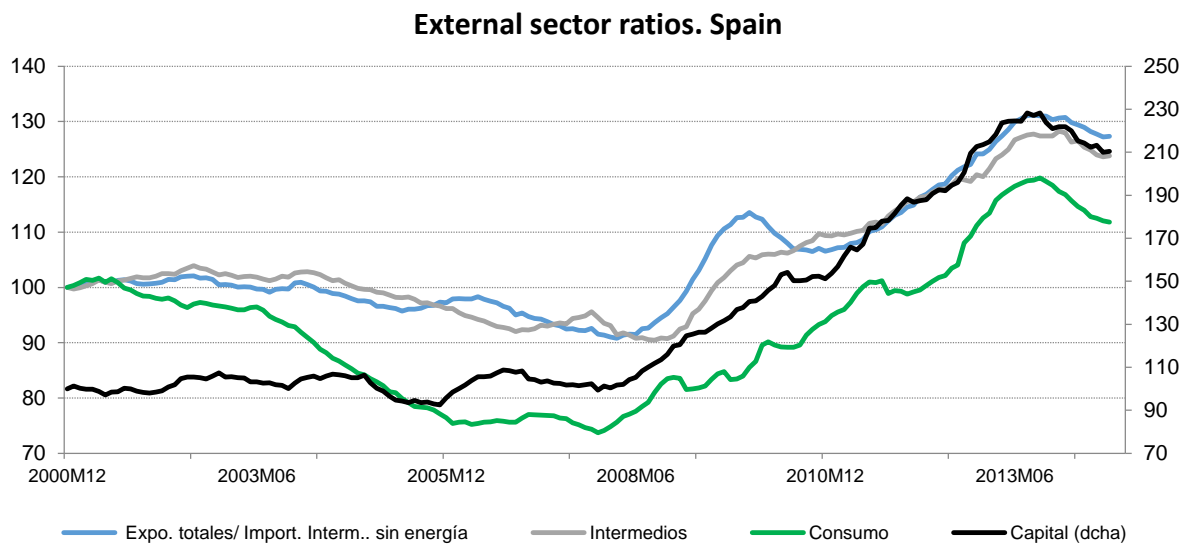

Source: Bloomberg

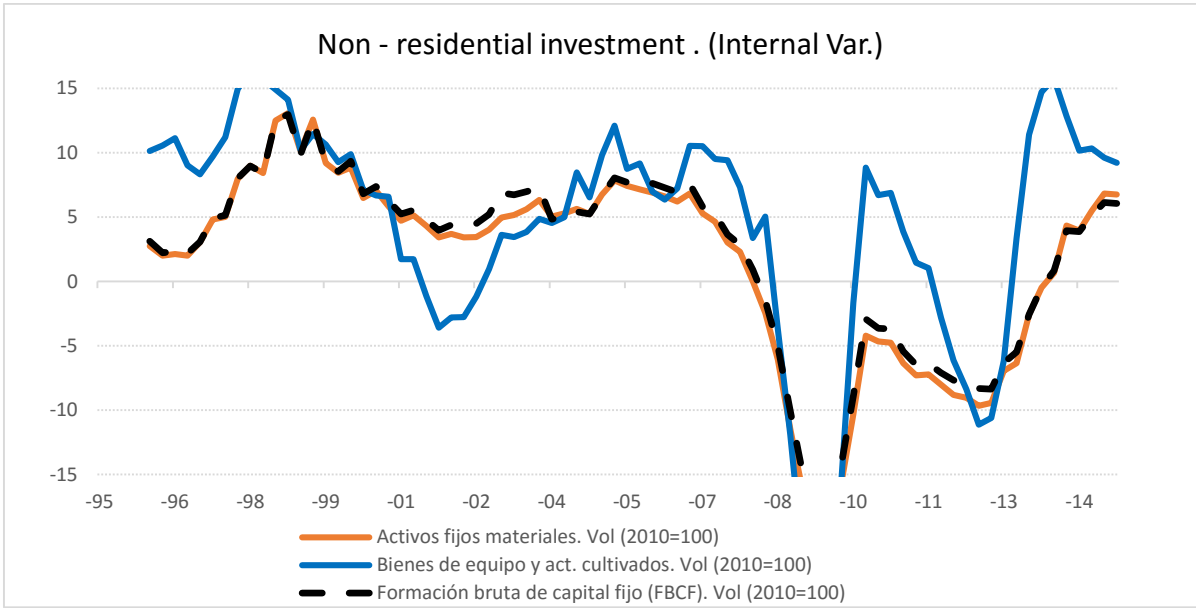## Evolution of Exports and exports companies. Spain

Source: Bloomberg

Current account balance. Spain

Source: Bloomberg

External sector ratios. Spain

Source: Bloomberg

Non - residential investment . (Internal Var.)

Activos fijos materiales. Vol (2010=100)
Bienes de equipo y act. cultivados. Vol (2010=100)
Formación bruta de capital fijo (FBCF). Vol (2010=100)

Source: Office of Economy and Competiveness

Evolution of the GDP and worked hours (private sector)

Producto Interior Bruto. % anual   Horas Trabajadas. % anual

Source: INE. National Institute of Statistics

Evolución de los Sectores en % sobre PIB a p.m.

Legend:
- VABpb Industria manufacturera
- VABpb Construcción
- VABpb Agricultura
- VABpb Servicios (dcha)
- VABpb Agricultura

Source: INE. National Institute of Statistics

Actividad General e Industrial

- CBT Resultado Económico Bruto. %.
- CBT Rentabilidad coste financiero.%. (dcha)

Source: "Central de balances". Bank of Spain