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Research Note n°4-16 – April 21, 2016

Is the risk of Grexit still able to spook financial markets?

Since 2010, when the Greek debt crisis began, there has been extensive talk of a possible Greek exit from the euro zone and return to its own currency. The possible exit from the monetary union has often been referred to as 'Grexit', a combination of the phrase "Greek exit"[1]. The risk of a likely Grexit has fluctuated significantly over the last five years and during periods that it was high it rattled financial markets, as a Grexit could initiate a domino effect that could put an end to the monetary union.

A number of economists and financial analysts have cautioned that a break in the chain could lead to an abrupt termination of a highly invested project. Others, by contrast, would argue that the Greek economy is relatively marginal and that the likely repercussions from an exit would be well contained. Indeed, the direct financial consequences could be contained, but it could create a sizeable moral hazard issue and trigger other euro zone countries to tag along. It is needless to stress that a breakup of the euro zone would entail huge repercussions for the global economy and induce massive uncertainty and instability in global financial markets. That is why Greece has been a hot topic for financial markets for the last five years.

Has the risk of a Grexit disappeared after last July's deal and the approval of the 3rd successive bailout program? If someone asks the locals, the answer is certainly no, as the uncertain economic sentiment and their reluctance to return cash in the local banking system indicate, among others. At the same time, it is more than likely that foreigners are not convinced either that the probability of a Grexit has vanished. The protracted ongoing negotiations with the institutions and the continuous delay in the completion of the first assessment that will unlock much-needed funds, is definitely casting some doubt.

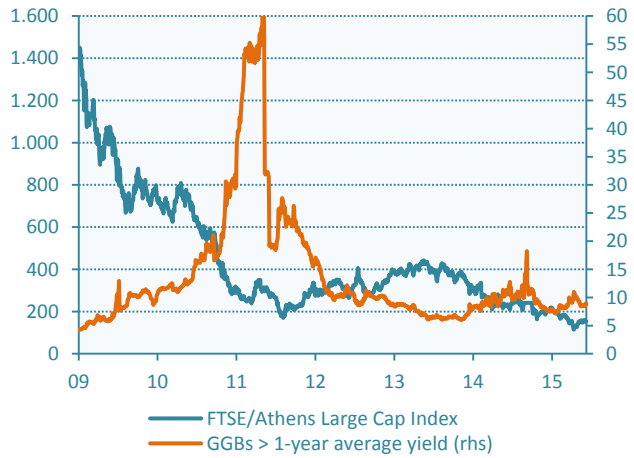
In this note we explore whether financial markets are prepared for a possible Grexit, or to put it differently, whether the risk of contagion is higher or lower than during the last five years. We show that the risk of financial contagion seems to be relatively contained, as the sensitivity of global financial markets to Greek specific risk has been decreasing lately. We highlight that global financial markets seem to be more insulated now than relative to the past and should respond to a possible rise in Grexit risk in a muter manner, i.e. with lower volatility. To measure the sensitivity of global financial markets to Grexit risk we regress a number of selected international assets on a composite Greek risk factor, during three periods-episodes during which Greek financial markets exhibited signs of extreme stress and high uncertainty as a consequence of elevated Grexit risk. Our results highlight that the impact of Grexit risk on a number of international assets has been fading over time.

Identifying and quantifying Grexit risk

The risks related to a Greek sovereign default, banking system collapse and, ultimately, euro exit are likely to manifest themselves more explicitly in Greek financial markets. More specifically, if the risk of Grexit increases, one would expect to see rising Greek government bond yields, spread widening, and declining equity prices, and bank shares in particular, as they are the most geared to a euro exit (Graph 1).

[1]The term was coined by Citigroup economists Ebrahim Rahbari and Willem H. Buiter.

Graph 1: Greek equities versus government bond yields



As of April 8, 2016
Source: Bloomberg, Iniohos Advisory Services

Two alternative methods are employed to capture, identify, and quantify Grexit risk. The first way to capture overall developments in Greek asset prices, equity and bonds prices is to use principal components analysis that transforms the common movement in a set of highly correlated time series into a new synthetic variable, whose 60-day normalized standard deviation we tag as the "Greek risk factor" [2]. The second one, lies exclusively on equity market performance; to construct it, the 30-day Greek equity market volatility is regressed on its U.S. counterpart, taken as a proxy for global uncertainty, and the unexplained component, i.e. the residuals, are labelled as Greek-specific shocks. Once, the residuals are normalized by their pre-debt crisis, i.e. 2000-09, average values, the "Greek related uncertainty" or "Greece uncertainty index" is computed, as the 30-day rolling moving average of the normalized residuals.

We use daily data related to four Greek asset classes to run the principal component analysis, i.e. the Greek risk factor: The large capitalization FTSE/Athex Large cap index equity index, the FTSE/Athex Banks equity index, as well as the Bloomberg/EFFAS All>1 year Greece Government Bond Index as a proxy for Greek government bonds, and the Piraeus Bank Greek Corporate Bond Index as a proxy for domestic corporate bonds (excluding financials). To construct the Greek uncertainty index, we use Athens Stock Exchange's Main index daily returns and the corresponding S&P 500 index returns.

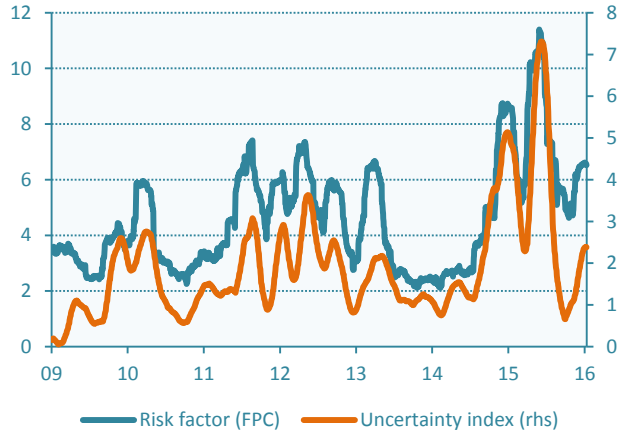
The Greek risk factor is estimated over the January 2009 to April 2016 period, while the regression for the Greek uncertainty index is conducted over the January 2000 to April 2016 period.

A practical problem related to the specific data set is that during the latest Grexit episode in the summer of 2015, Greek equity markets were closed, due to the imposition of capital controls and the bank holiday in June. Another problem is that before 2013, there was no data available for Greek corporate bonds.

For the period that the Greek equity market was closed, daily changes in the U.S. listed Global X FTSE Greece 20 ETF (GREK) adjusted for EURUSD exchange rate variation, are used. The specific security was the only ETF tracking Greek equities that was not suspended during the Athens Stock Exchange holiday[3]. Similarly, we use daily changes in the National Bank of Greece American Deposit Receipt, as a proxy for the Greek banks index. As far as the corporate bond index is concerned, we use data on a single issue for the period before the 1st of January 2013 that we consider as one of the most representative of Greek risk and is liquid as well, the 1.25 billion euro OTE Plc 5% note due 30/7/2013[4].

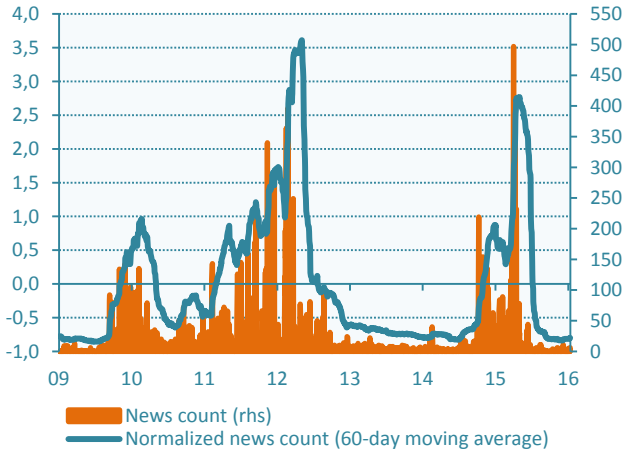
[2]For an overview of principal component analysis, please refer to Principal component analysis.
[3]Global X Funds, the New York based provider of exchange traded funds (ETFs), has announced that at the open of trading on March 1, 2016, the Global X FTSE Greece 20 ETF will begin tracking the MSCI All Greece Select 25/50 Index. The fund will change its name to the Global X MSCI Greece ETF.
[4]OTE plc borrows and raises funds from the market for financing Hellenic Telecommunications Organisation S.A. (OTE) and other subsidiaries of OTE. The company was incorporated in 1999 and is based in London, the United Kingdom. OTE plc operates as a subsidiary of OTE and the bonds issued are guaranteed by the parent company.

Graph 2: Greek related stress has been on the rise since the onset of the Greek debt crisis



As of April 8, 2016
Source: Bloomberg, Iniohos Advisory Services

Graph 3: News related to Grexit



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Source: Bloomberg, Iniohos Advisory Services

The two proxies for Greek related risk are plotted in Graph 2[5]. It is evident that both factors exhibit similar behavior. Since the onset of the crisis, the economy has been hit by a series of shocks and periods of high financial stress. This climate of general uncertainty is portrayed by sharp rises in the both risk indicators around periods of major political, economic and financial turbulence.

One can clearly distinguish three main periods of elevated stress and, thus, rising Grexit risk.

The first one runs from the end of October 2009 to May 2010; beginning with the irregularities related to the Greek public sector accounts and upward revision of the public deficit, and ending with the signing of the 1st Greek Economic Adjustment Program ("bailout"); the second extends from June 2011 to June 2012; beginning with the announcement of a possible debt restructuring program (PSI), and ending with the formation of a coalition government after the double Greek general elections in May and June. The last one runs from December 2014 to July 2015; it starts with the Presidential election, and ends with the agreement on the 3rd bailout program[6].

Graph 3 reveals that periods of elevated volatility captured by both measures of Greek stress largely coincide with news flow related to Grexit; the news count presented in Graph 3 has been constructed by adding the number of articles available in Bloomberg that contain the following keywords related to Grexit: [Greece or Greek] and [Euro] and [Leave or Exit or Grexit or Drahma or Default or Downgrade]. It is more than clear that periods of particular elevated Greek stress correspond to periods of high Grexit related news flow.

To get a better insight on the political and economic developments of the last six years, and the three specified periods of elevated volatility, as well as a better grasp on the analysis that will follow, we provide a short time line of events.

[5]As far as the Greek risk factor is concerned, the first principal component is retained, as it accounts for more than 57% of the total variation. The linear combination of the four Greek asset classes is 0.461 GGBs + 0.341 Credits + 0.564 Bank shares + 0.594 Large capitalization equities.

[6]Two specific high uncertainty episodes have been excluded from the second period, the possibility of a Greek debt buyback in November 2012 and the Cypriot bank bail in at the end of the first quarter in 2013, as they did not correspond to rising Grexit risk.

Greek debt crisis timeline

As previously mentioned since the beginning of October 2009, when PASOK the centre-left party won the general elections, it has been a bumpy road for Greece. The turbulence began during the same month, when the Greek finance minster, George Papakonstantinou, disclosed that the public deficit was expected to reach close to 12.5% of GDP, considerably higher than previous projections and the 3% threshold set out by the euro zone's Stability and Growth pact. A barrage of credit rating cuts followed till the end of the year. During February and March of 2010, the Greek parliament passed two austerity packages and towards the end of April the Greek Prime Minister, George Papandreou, formally requested an international bailout for Greece. More credit downgrades followed and at the end of April the 10-year Greek government Bond yield spread versus German Bunds surpassed the 1000 basis point threshold. At the beginning of May Greece and international creditors agree to the first bailout package with the participation of the European Union, the European Central Bank and the International Monetary Fund. During the first six months of 2011, credit rating agencies continued to downgrade Greek debt; at the end of October 2011, euro one leaders agreed to a new bailout package and the outline of the so-called Private Sector Involvement (PSI), the conversion of existing bonds to new loans with a 50% haircut. Faced with criticism over his referendum plan, Mr Papandreou withdraws it and shortly after announces his resignation. Lucas Papademos, former head of the Bank of Greece, becomes interim prime minister of a New Democracy/PASOK coalition with the task of getting the country back on track in time for elections scheduled provisionally for the spring of 2012.

In February 2012, the sixth austerity package is passed by the Greek parliament and later in the month the second bailout package is finalized. During the following month the 'debt swap' deal is reached. At the general election in May, no party came out with a majority and fresh elections are called for June. The leading New Democracy party manages to form a coalition government and New Democracy leader Antonis Samaras becomes the Prime Minister. In October the government passes a new set of austerity measures in order to secure needed funds from the European Union and the IMF. 2013 was a relatively quiet year and in November Moody's upgraded the country's credit rating.

2014 was a year of intense political developments. In May, anti-austerity, radical leftist Syriza coalition wins European election with 26.6% of the vote, and in December the Greek parliament's failure to elect a new president sparks a political crisis and prompts early elections. In April Greece had returned to the financial markets with the issue of €3 billion Eurobonds at a yield below 6%.

In January 2015, Alexis Tsipras of Syriza becomes prime minister after winning parliamentary elections, and forms a coalition government with the nationalist Independent Greeks party. The next month the government negotiated a four-month extension to Greece's bailout program in return for dropping key anti-austerity measures and undertaking a euro zone approved reform program.

In June, European Central Bank ends emergency funding towards the Greek banking sector. The government closes banks, and imposes capital controls. A referendum is called for the beginning of July. Voters overwhelmingly reject EU bailout terms. Eventually, Greece and its creditors agree to a third bailout, imposing further spending cuts on the country to avoid bankruptcy and exit from the euro zone[7].

[7]For a more detailed and comprehensive overview of the Greek public debt crisis timeline, please refer to the Greek Debt Crisis Timeline and/or the Greek Debt Crisis History Channel, respectively.

Measuring international asset sensitivity to the fear of Grexit

There are numerous ways to determine and quantify the sensitivity of international asset prices to changes in the underlying Grexit risk. One way is to regress international asset returns on the returns of a Greek asset portfolio and track the changes in the slope coefficients in the three pre-specified periods of elevated Greek risk[8]. Declining beta coefficients would indicate that the impact of Grexit has declined through time, while statistically insignificant coefficients would show that financial markets are indifferent to the probability of a Grexit.

An alternative way is to calculate a rolling window of the international assets' standard deviations and regress them on the Greek risk factor. That is, 60-day rolling international asset price standard deviations normalized regressed on the 60-day rolling standard deviation of the Greek asset factor, normalized[9]. The normalization allows us to have comparable results across different samples.

The Greek risk factor will be used as the independent variable in the regressions, as it is more complete and diversified versus the uncertainty index that includes only equities in its construction.

Moreover, the results will focus mainly on the second methodology, as it makes their interpretation more straightforward. The estimated coefficients represent the sensitivity, in standard deviations, of the corresponding assets to a one standard deviation event in the Greek risk factor.

Table 1 presents selected results from the first set of regressions; International asset returns are regressed on the returns of the Greek asset portfolio. On the equity side, the estimated beta coefficients are statistically significant in all sample periods and, most importantly, their magnitude becomes smaller through time. For example, the estimated coefficients regarding the Eurostoxx index are more than halved in the 2014-2015-stress period relative to respective 2009-2010 period. The same is true for our composite Euro periphery equity index, the magnitude of the estimated beta coefficient declines to 0.292 in the latter period versus 0.599 in the first sample period. Moreover, the beta coefficient related to EURUSD returns does not only exhibit significant decay, but is statistically insignificant during the last sample period.

Table 1

Equity		β	t-statistic
S&P 500	20/10/2009 - 08/05/2010	0,310	4,256***
	20/06/2011 - 30/06/2012	0,277	4,252***
	08/12/2014 - 16/07/2015	0,144	5,615***
Eurostoxx 50	20/10/2009 - 08/05/2010	0,576	6,609***
	20/06/2011 - 30/06/2012	0,339	4,672***
	08/12/2014 - 16/07/2015	0,213	6,559***
EZ Periphery	20/10/2009 - 08/05/2010	0,600	8,192***
	20/06/2011 - 30/06/2012	0,380	5,049***
	08/12/2014 - 16/07/2015	0,292	9,321***
Foreign exchange		**β**	**t-statistic**
EURUSD	20/10/2009 - 08/05/2010	0,387	5,916***
	20/06/2011 - 30/06/2012	0,245	4,256***
	08/12/2014 - 16/07/2015	0,007	0,131

Note: *, ** and * significant at the 1%, 5% and 10% level, respectively. Standard errors have been estimated by a heteroskedasticity and autocorrelation consistent covariance matrix.**

Source: Iniohos Advisory Services

[8] $r_i = \alpha_i + \beta r_{ga} + \varepsilon_i$, where r_i is the return of asset i and r_{ga} is the return of the Greek asset factor-portfolio.

[9] $\sigma_i = \alpha_i + \beta_i \sigma_{GRF} + \varepsilon_i$, where σ_i is the normalized 60-day rolling standard deviation of asset i and σ_{GRF} is the normalized 60-day rolling standard deviation of the Greek risk factor.

From the first set of results, it is evident that the impact of Grexit risk and the probability of contagion in global financial markets has been gradually fading over the last six years. Or, to put it in a different way, financial markets have been assigning higher idiosyncratic risk to Greek assets at the expense of systematic risk. The second set of results, related to the regression of international assets on the Greek risk factor, shed more light on this topic.

As this set of regressions involves measures of volatility, our expectation is that the results will show that international assets exhibited the highest sensitivity during the 2011-2012 Euro debt crisis, as financial markets came under considerable pressure out of fear of a possible euro zone break up, due to the elevated risk of contagion from the periphery to the core; And that the sensitivity has declined over the last three years.

Table 2 presents the results of the regressions involving the normalized standard deviations. The general conclusion is that the impact of a likely Grexit was highest during the 2011-2012-sample period, i.e. during the unravelling of the euro debt crisis, and that more recently financial markets have become less sensitive to the specific event.

On the equity side, broad U.S. and European equity indices exhibit the highest estimated coefficients during the 2011-2012 period. Interestingly, during the beginning of the crisis (2009-2010), major equity markets were not pricing in the possibility of a Grexit, most likely because of the belief that Greece was an isolated case. By contrast, euro periphery markets, both on a composite and individual basis, showed significant sensitivity with respect to developments in Greece. Both the IBEX and the PSI 20 index related coefficients are positive and statistically significant during both the first and the second sample periods, indicating that periphery was feeling the pressure from the onset of the Greek crisis.

The same is true with respect to periphery bond yields[10]. Our composite index of 10-year bond yields has positive and statistically significant estimated coefficients during the first two sample periods. Interestingly, 10-year bund yields exhibit sensitivity mainly during the Euro debt crisis period.

Foreign exchange markets seem to have been one of the most forward-looking, as the EURUSD related coefficients show statistical significance during the beginning of the crisis, and not during the volatile 2011-2012 period. The EURUSD rate also responded during the latest Greek crisis. Gold was also impacted by Greek risk during the first two sample periods.

Last but not least, we explore the impact of Grexit risk on a number of implied U.S. and European equity volatility indices (VIX, VDAX, VSTOXX). The results are according to our expectations, with the most significant impact observed during the euro debt crisis (2011-2012), and declining influence in the latest episode.

[10]Euro zone periphery includes Italy, Portugal and Spain. Individual country returns and 10-year yields are weighted by their respective annual IMF Gross Domestic Product based on purchasing-power-parity (PPP) in USD.

Table 2			
Equity		**β**	**t-statistic**
S&P 500	20/10/2009 - 08/05/2010	-0,506	-7,307***
	20/06/2011 - 30/06/2012	0,984	3,964***
	08/12/2014 - 16/07/2015	0,027	0,621
Eurostoxx 50	20/10/2009 - 08/05/2010	-0,318	-3,782***
	20/06/2011 - 30/06/2012	1,280	6,164***
	08/12/2014 - 16/07/2015	-0,152	-1,910*
EU Periphery	20/10/2009 - 08/05/2010	0,179	2,456**
	20/06/2011 - 30/06/2012	1,170	6,351***
	08/12/2014 - 16/07/2015	-0,130	-1,146
IBEX	20/10/2009 - 08/05/2010	0,310	3,386***
	20/06/2011 - 30/06/2012	1,103	7,471***
	08/12/2014 - 16/07/2015	-0,101	-1,058
PSI 20	20/10/2009 - 08/05/2010	0,685	3,332***
	20/06/2011 - 30/06/2012	0,931	4,301***
	08/12/2014 - 16/07/2015	-0,069	-0,598
Fixed income		**β**	**t-statistic**
Bund yields (10-year)	20/10/2009 - 08/05/2010	-0,742	-6,972***
	20/06/2011 - 30/06/2012	0,986	4,517***
	08/12/2014 - 16/07/2015	0,285	1,777*
EZ Periphery yields (10-year)	20/10/2009 - 08/05/2010	0,281	7,491***
	20/06/2011 - 30/06/2012	0,514	2,261**
	08/12/2014 - 16/07/2015	-0,014	-0,119
Foreign exchange		**β**	**t-statistic**
EURUSD	20/10/2009 - 08/05/2010	0,387	5,916***
	20/06/2011 - 30/06/2012	0,245	4,256***
	08/12/2014 - 16/07/2015	0,007	0,131
Volatility Indices		**β**	**t-statistic**
VIX	20/10/2009 - 08/05/2010	0,369	4,557***
	20/06/2011 - 30/06/2012	0,610	2,105**
	08/12/2014 - 16/07/2015	-0,105	-1,100
VSTOXX	20/10/2009 - 08/05/2010	0,643	6,284***
	20/06/2011 - 30/06/2012	0,690	2,282**
	08/12/2014 - 16/07/2015	0,129	1,894*
VDAX	20/10/2009 - 08/05/2010	0,431	4,511***
	20/06/2011 - 30/06/2012	1,157	3,195***
	08/12/2014 - 16/07/2015	0,032	0,903

Note: *, ** and * significant at the 1%, 5% and 10% level, respectively. Standard errors have been estimated by a heteroskedasticity and autocorrelation consistent covariance matrix.**
Source: Iniohos Advisory Services

Markets seem to be more and more immune to the risk of a Grexit… but does that mean that we are out of the woods?

In this report we explored whether global financial markets are prepared for a possible Grexit, or, whether the risk of contagion is higher or lower now than during the last five years. **Our findings clearly indicate that a number of global financial markets have reacted to the variation of Greek asset prices during episodes of Grexit fear and is consistent with previous empirical research on the topic[11]. They suggest, however, that the magnitude of the reaction has diminished in a nonlinear manner over the last couple of years. Moreover, our results highlight that the sensitivity of financial markets to Grexit risk has decreased not only in the core but also in the euro zone periphery.**

The lower impact could reflect the markets' assessment that monetary and other policy implementation has strengthened the euro zone and has minimized the risk of serious contagion. Having said that, one cannot preclude the probability that a renewed Greek crisis will not be disruptive, our results suggest that it might be more muted. Everything, of course, will depend on the prevailing market conditions.

[11] https://bankunderground.co.uk/2016/03/18/the-declining-sensitivity-of-asset-prices-to-events-in-greece/.

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