

Assesing Country Risk at BBVA Research

BBVA Research

Cross Country Emerging Markets Unit - January 2012

What is Country Risk and Why is important

What is Country risk

- **Country Risk refers** to a collection of risks associated with investing in a foreign country. It includes several dimensions of vulnerability including economic, political, exchange rate, and transfer risk among others. It is a key variable for investors to choose among different destinations

How to measure Country Risk

- One of the common practice is the assessment of country risk by **rating agencies**. These analyze several vulnerability dimensions to finally score the general vulnerability of a country. Markets can be also an alternative tool to measure country risk. **The sovereign premium paid by a country relative to the safest countries** is also an indicator of the vulnerability of the countries. Both measures are not independent and normally the markets try to align sovereign risk premiums to the rating agencies scores. Ratings are generally found to be too backward looking and financial market measures are too volatile and influenced by general market developments, specially risk aversion.

Why is important?

- **Country Risk** is obviously the result of a country's conditions but it can actually affect them as well (i.e. it can generate vicious or virtuous circles depending on whether it goes up or down from a country's general trend). **Other than reflecting the economic soundness of a country, higher country risk is associated with higher borrowing costs and lower foreign investment in the country. Furthermore, households and companies can be affected by sudden changes in the sovereign risk perception.** Investors also take into account country risk in allocating capital in their portfolios. **Given its importance and the lack of good proxies of country risk, we at BBVA Research have decided to develop our own tools to measure it and to put them together in a quarterly report: BBVA Country Risk Outlook**

A snapshot of BBVA Research instruments and their benefits

The key instruments we have developed include:

- Our own **country risk models** which serves to maintain an independent assessment of current and future country risk and can be useful to differentiate market measures of Country Risk in those related to structural factors and those driven by global risk aversion and conditions in international markets
- **A wide set of indicators and tools to determine “equilibrium” CDS and Country Risk Ratings.** We include in our models several dimensions of vulnerability as **fiscal problems** (public deficits and public debt), **external vulnerabilities** (current account deficit and external debt), **liquidity management and institutional factors**. Our final assessment lies in **four different models in order to provide robustness** to the final country risk scores
- Our own **vulnerability maps and downgrade pressure maps which allow us to assess the degree of contagion in the international financial markets and short term pressures for rating agencies downgrades**
- **Spill-over models to assess the impact of alternative shocks in the different countries**



BBVA RESEARCH Country Risk outlook

These instruments are put together in what constitutes our first **country risk report**

This report **serves several purposes**

1. **Evaluating the external factors affecting country risk**, namely the extent of global risk aversion
2. Assessing **what is the “ structural” level of country risk across different regions**
3. Assessing what **the future evolution of such country risk** may be looking at the evolution of its key determinants
4. Pointing to the **concentration of vulnerabilities** in different countries
5. **Assessing the degree of contagion** that may happen in different circumstances

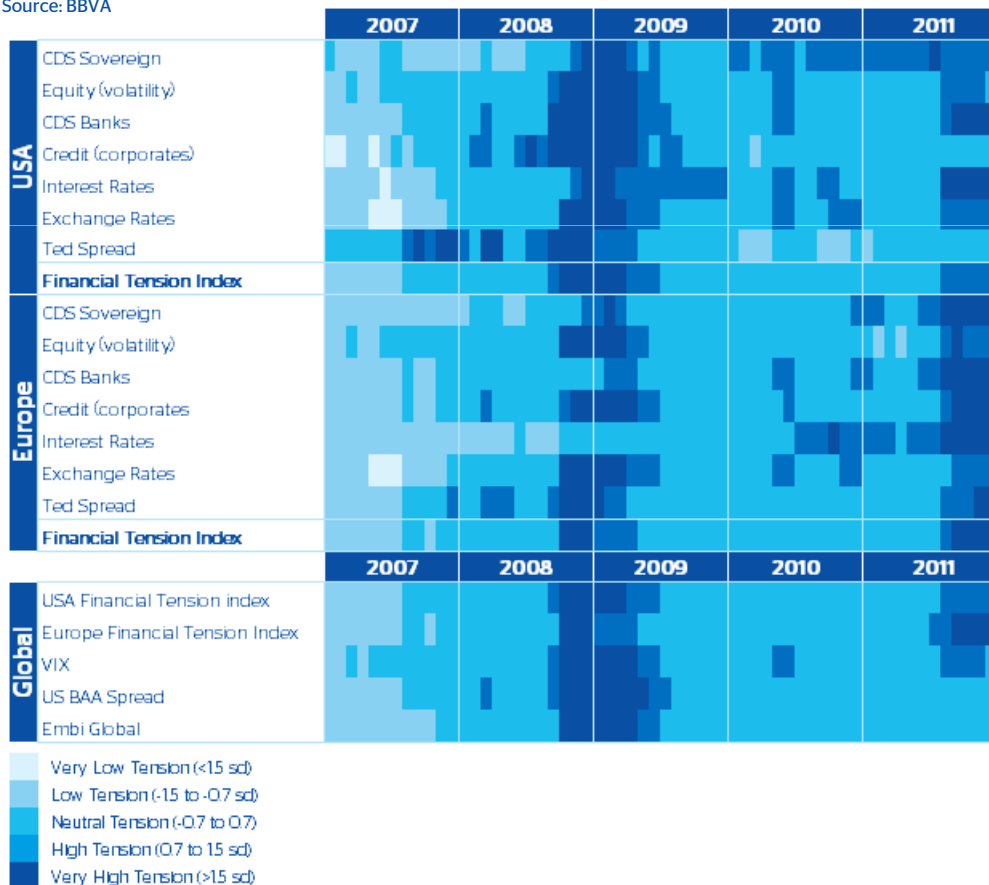
How we assess Country Risk



Fin. Markets Stress & Global Risk Aversion

Financial Stress Map

Source: BBVA



Tracking Markets & Ratings & Sustainability Indicators



Tracking Financial Stress

Visual analytical tools allow us to check markets interconnections and contagion processes

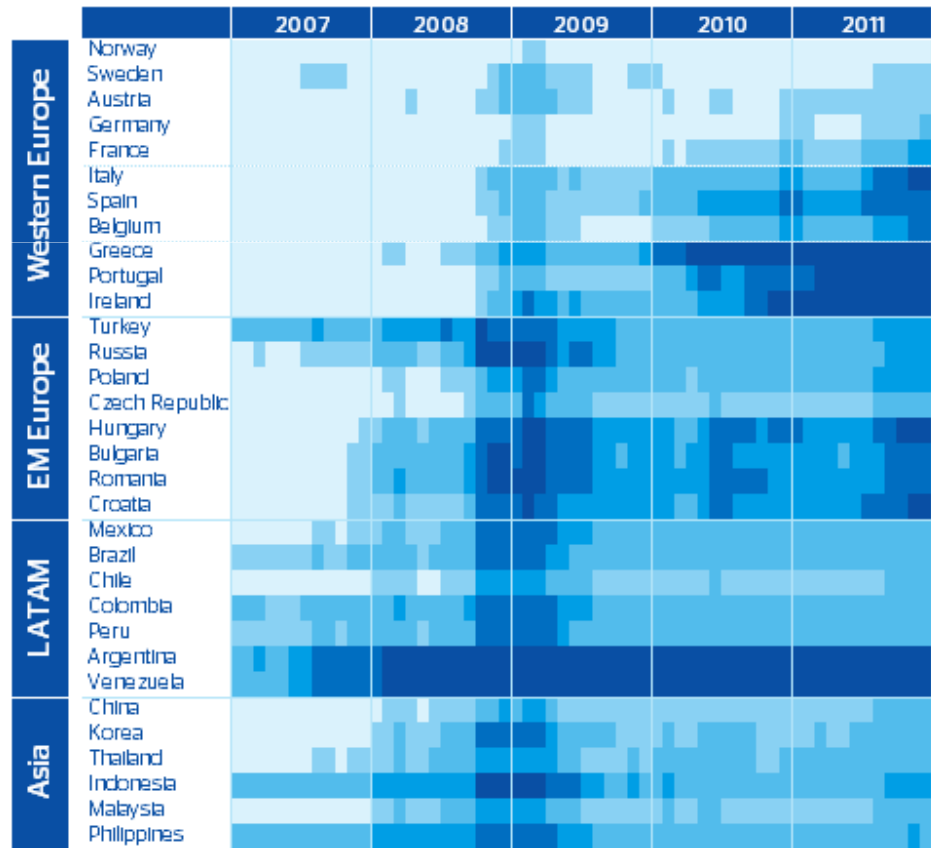
The 2008 crisis started with banking and corporate problems in USA but rapidly spread across all segments worldwide

The current crisis centered in Europe but spread to the US excepts credit and banking. Global Risk aversion is increasing but still below the Lehman's episode levels

Sovereign Markets Update

Sovereign CDS spreads

Source: Haver and BBVA Research



Sovereign CD Swaps Map: It shows a color map with 6 different ranges of CD Swaps quotes (darker >500, 300 to 500, 200 to 300, 100 to 200, 50 to 100 and the lighter below 50 bp)

Tracking Markets & Ratings & Sustainability Indicators



Sovereign CD Swaps Color Map

Visual analytical tools allow us to check markets interconnections and contagion processes

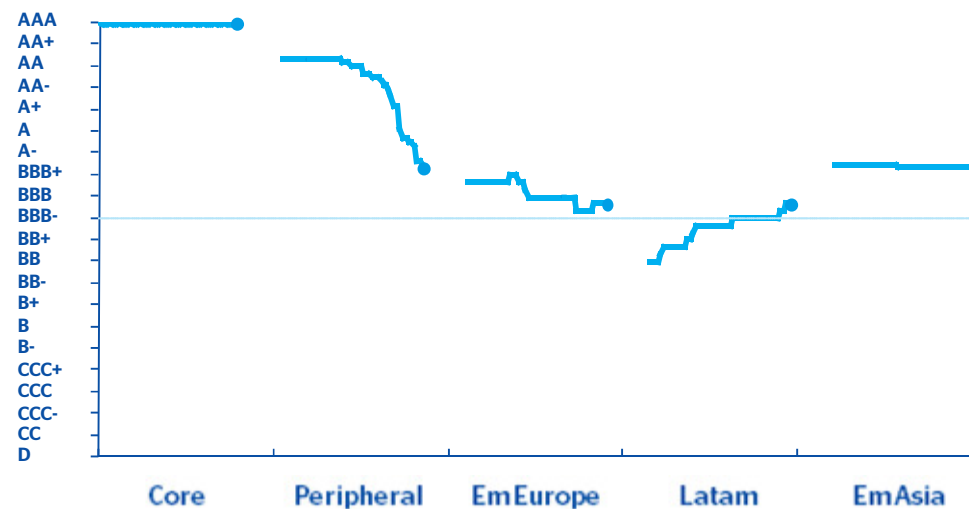
Actually high risk levels remain in Bailed-Out countries but contagion reached Italy and Spain and higher risk levels are being observed in safest countries as France.

Among the Emerging Countries tensions are arising in Emerging Europe. The rest of the emerging markets remain safe but some tensions are spreading in Latam and Asia

Sovereign Credit Ratings Update

Sovereign Rating Index

Source: BBVA Research by using S&P, Moodys and Fitch Data



- Developed Europe:** Sovereign Debt Crisis continued to triggered downgrades by credit agencies with Italy now joining the previous downgrades by other periphery countries. Core Europe countries remains at AAA levels but pressures for downgrades increased as rating agencies moved the outlook to negative.
- EM Markets:** Global risk aversion and economic uncertainties, amplified by domestic vulnerabilities, have triggered downgrades in some countries in Emerging Europe, such as Russia and Hungary and may stop recent improvements in other regions. Remarkable upgrades have been recorded in Brazil, China and Indonesia, with general positive mood on Asia and Latam in contrast with negative-biased sentiment in Emerging Europe.

Tracking Markets & Ratings & Sustainability Indicators



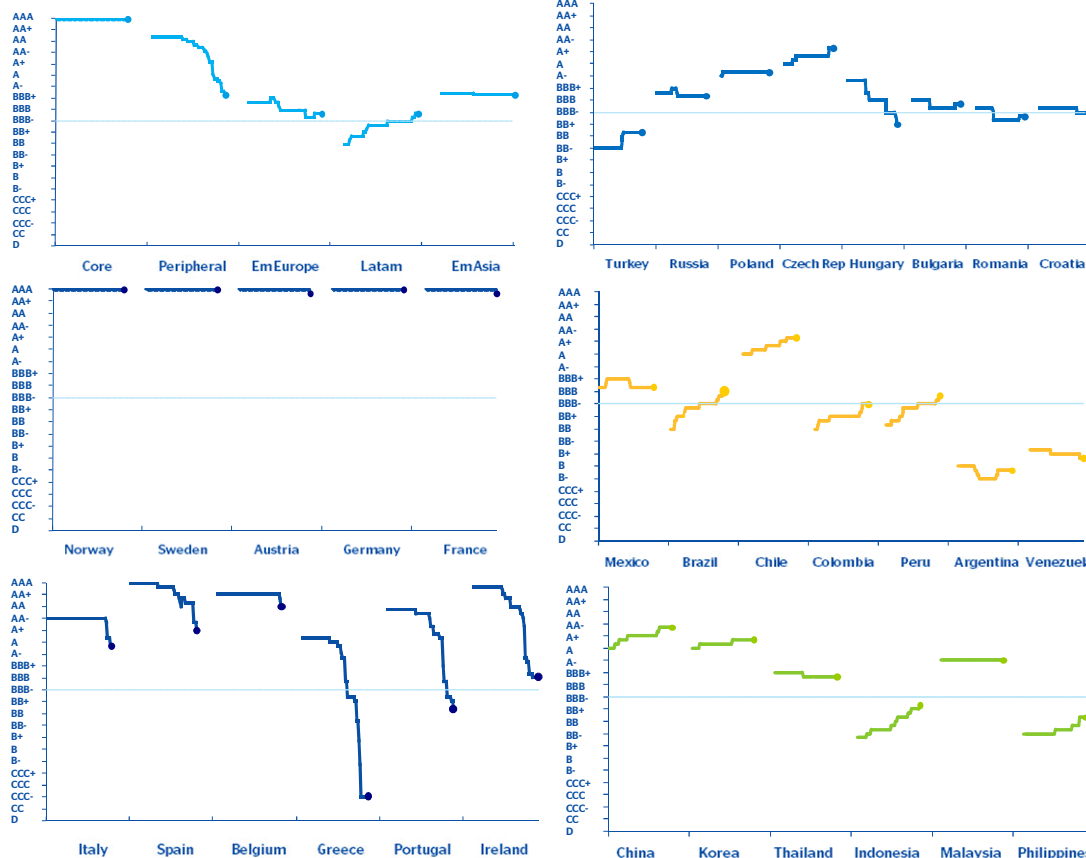
		Fitch	Moody's	S&P	BBVA Research	numerical
Investment Grade	Prime Grade	AAA	Aaa	AAA	A1	1
	High Grade	AA+	Aa1	AA+	A2	2
		AA	Aa2	AA	A3	3
		AA-	Aa3	AA-	A4	4
Upper Medium Grade	A+	A1	A+	A5	5	
	A	A2	A	A6	6	
	A-	A3	A-	A7	7	
Medium Grade	BBB+	Baa1	BBB+	B1	8	
	BBB	Baa2	BBB	B2	9	
	BBB-	Baa3	BBB-	B3	10	
Speculative Grade	Speculative	BB+	Ba1	BB+	B4	11
		BB	Ba2	BB	B5	12
		BB-	Ba3	BB-	B6	13
	Distictly Speculative	B+	B1	B+	B7	14
		B	B2	B	B8	15
		B-	B3	B-	B9	16
Highly Speculative	CCC	Caa1	CCC+	C1	17	
	CC	Caa2	CCC+	C2	18	
	C	Caa3	CCC-	C3	19	
Default	Default	DDD	Ca	CC	C4	20
		D	C	SD		

Sovereign Rating Index: An index that translates the three important rating agencies ratings letters codes (Moody's, Standard & Poor's and Fitch) to numerical positions from 20 (AAA) to default (D). The index shows the average of the three rescaled numerical ratings.

Sovereign Credit Ratings Update

Sovereign Rating Index

Source: BBVA Research by using S&P, Moodys and Fitch Data



Sovereign Rating Index: An index that translates the three important rating agencies ratings letters codes (Moody's, Standard & Poor's and Fitch) to numerical positions from 20 (AAA) to default (0). The index shows the average of the three rescaled numerical ratings.

Tracking Markets & Ratings & Sustainability Indicators

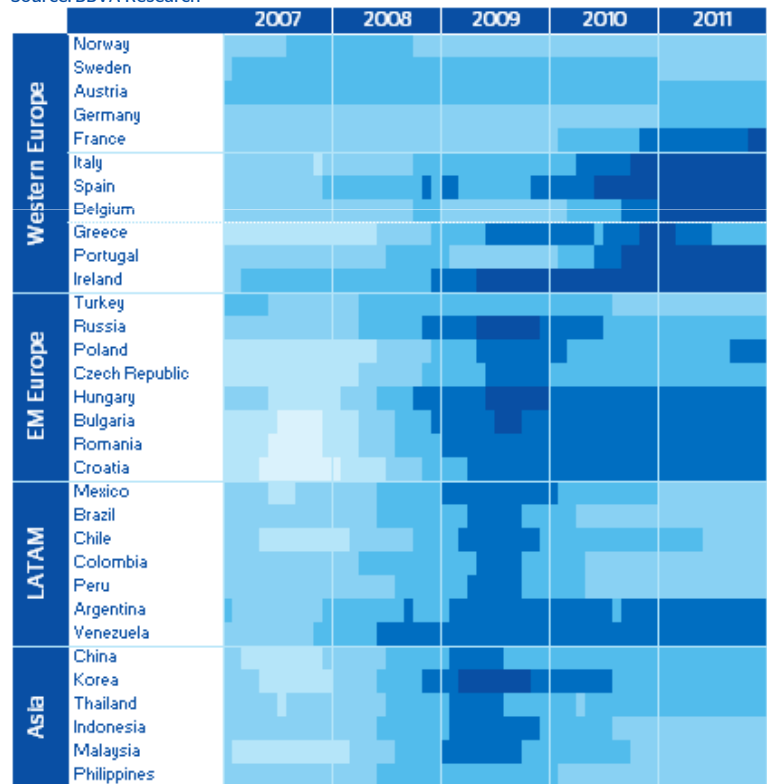


- **Developed Europe:** Sovereign Debt Crisis continued to triggered downgrades by credit agencies with some of the Europe Core countries now joining the list of the downgrade Cycle after the downgrade by Standard and Poor's.
- **The EM Markets downgrade cycle is being asymmetric with Emerging Europe under downgrade pressure and some of the Asian and Latam markets receiving sovereign ratings upgrades (Brazil and Indonesia).** The possibility of a revival of downgrade pressure for Emerging Europe can not be ruled out as spill-overs from western Europe are more obvious and vulnerability stays at higher levels. Trade and Bank dependence with West Europe and FX denominated liabilities could increase the downgrade pressure in the coming months.

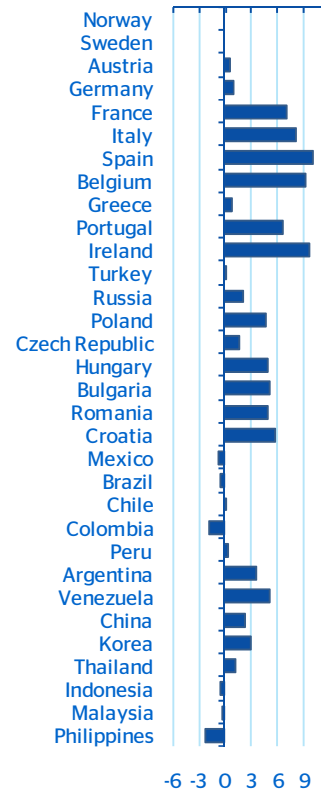
Rating Downgrade Pressures Map

Rating Agencies Downgrade Pressure Map

(actual minus CDS-implied sovereign rating, in notches)
Source: BBVA Research



January 2012



Tracking Markets & Ratings & Sustainability Indicators



Rating Agencies Downgrade Pressure Maps

To check immediate downgrade pressures for Rating Agencies

Downgrade pressures remain important in Western Europe Countries. This is not only true for Spain and Italy, France's vulnerability to a downgrade is already high

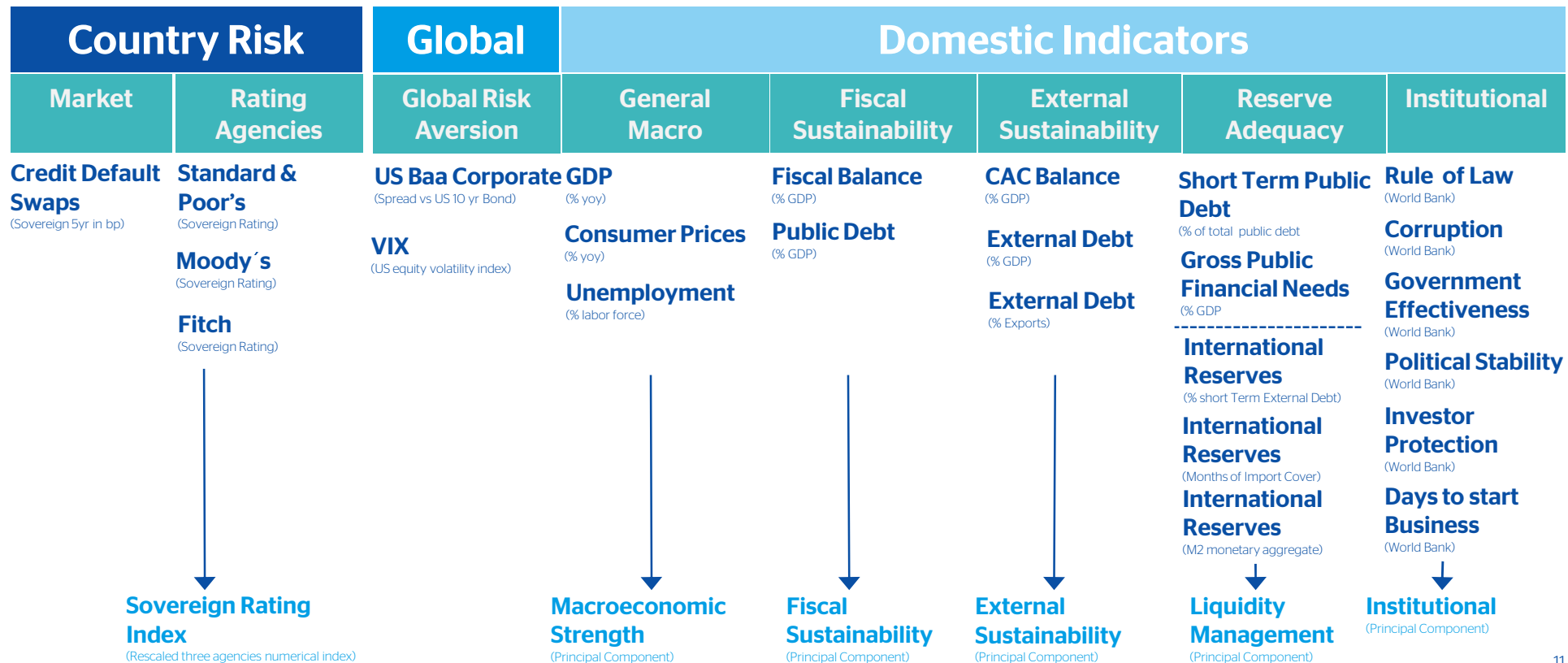
EM pressures for downgrade started to increase in EM Europe but also in some of the Asian countries

Downgrade Pressure Map: The map shows the difference of the current ratings index (numerically scaled from default (0) to AAA (20)) and the implicit ratings according to the Credit Default Swaps. We calculate implicit probabilities of default (PDs) from the observed CDS and the estimated equilibrium spread. For the computation of these PDs we follow a standard methodology as the described in Chan-Lau (2006) and we assume a constant Loss Given Default of 0.6 (Recovery Rate equal to 0.4) for all the countries in the sample. We use the resulting PDs in a cluster analysis to classify each country at every point in time in one of 20 different categories (ratings) to emulate the same 20 categories used by the Rating Agencies.

Indicators

Sample period: lifespan of CDS (2004 to 2011)
Number of countries: determined by data availability
 (Credit Default Swaps and Country Risk Determinants)

Tracking Markets & Ratings & Sustainability Indicators

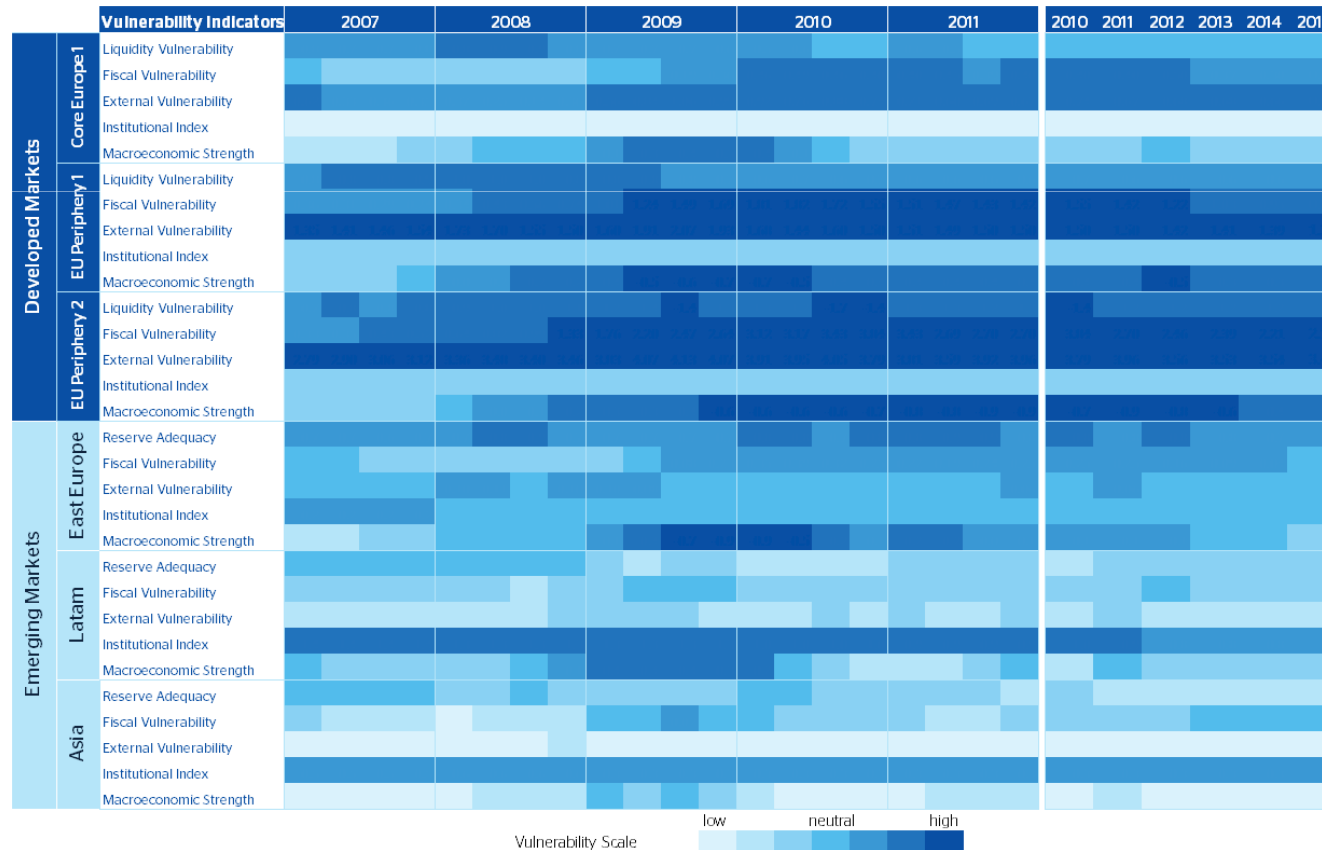



Macroeconomic Vulnerability Map

Macroeconomic Vulnerability Map

(scaled through principal components of several vulnerability variables.)

Source: BBVA Research



Tracking Markets & Ratings & Sustainability Indicators



Macroeconomic Vulnerability Maps

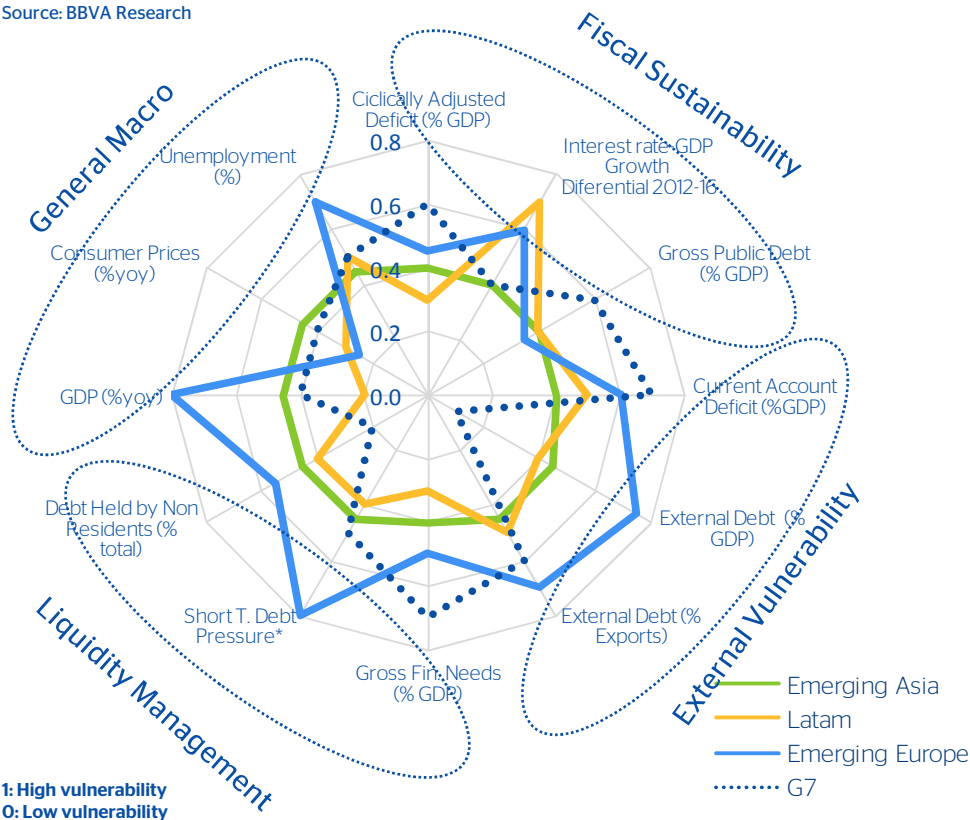
To rapidly analyze cross section, inter-temporal and multi dimension vulnerability

Section 1

Vulnerability Radars

G7 & EM Markets: Vulnerability Radar 2011

Source: BBVA Research



1: High vulnerability
0: Low vulnerability

Vulnerability Radar: Shows a static and comparative vulnerability for different countries. For this we assigned several solvency, liquidity and macro variables and we reorder in percentiles from 0 (lower ratio among the countries to 1 maximum vulnerabilities.) Furthermore inner positions in the radar shows lower vulnerability meanwhile outer positions stands for higher vulnerability.

Tracking Markets & Ratings & Sustainability Indicators



Vulnerability Radars

To analyze fiscal, external, reserve adequacy and macro static performance in just one view

We re-scale vulnerability indicators in terms of relative position to the corresponding group (Developed or Emerging) of all the countries included in our sample (from 0 or minimum vulnerability to 1 or maximum vulnerability) according to alternative vulnerability dimensions (Fiscal, External, Liquidity Management and General Macro)

This allow to check easily the vulnerability bias of the countries

Section 1

Vulnerability Radars: Inside Europe

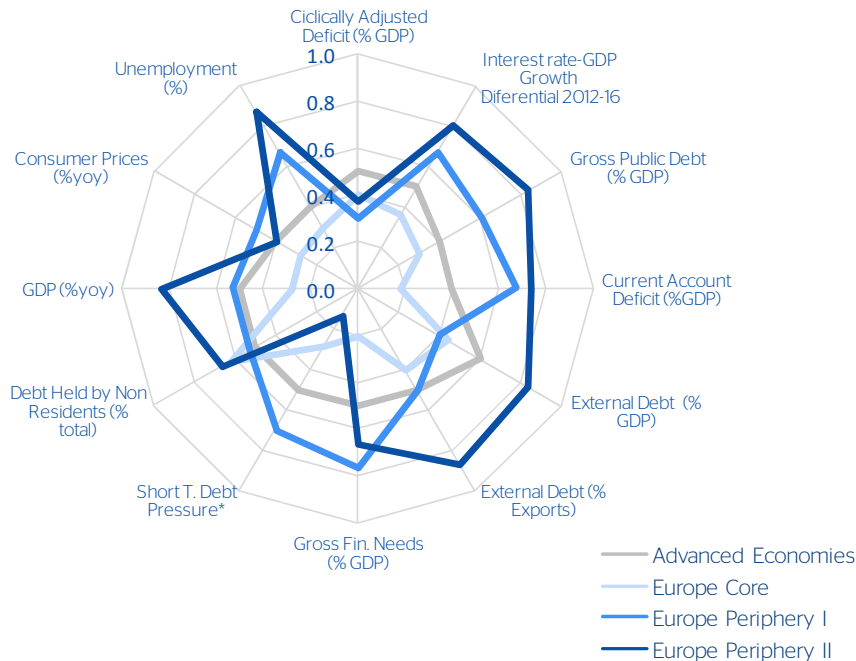
Tracking Markets & Ratings & Sustainability Indicators



West Europe: Vulnerability Radar 2011

(all data for 2011 excepts interest rate GDP growth differential and Gross Financial Needs for 2012)

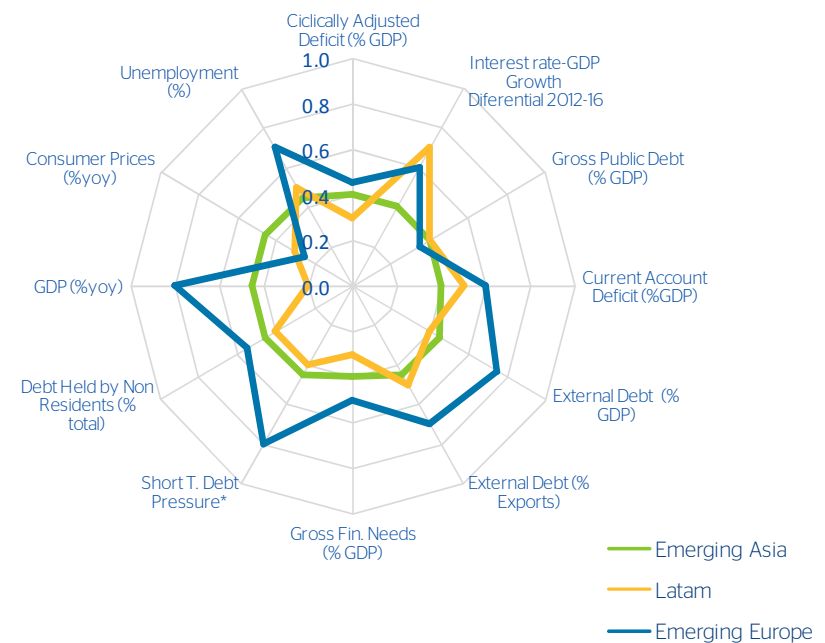
Source: BBVA Research



Emerging Markets: Vulnerability Radar 2011

(all data for 2011 excepts interest rate GDP growth differential and Gross Financial Needs for 2012)

Source: BBVA Research

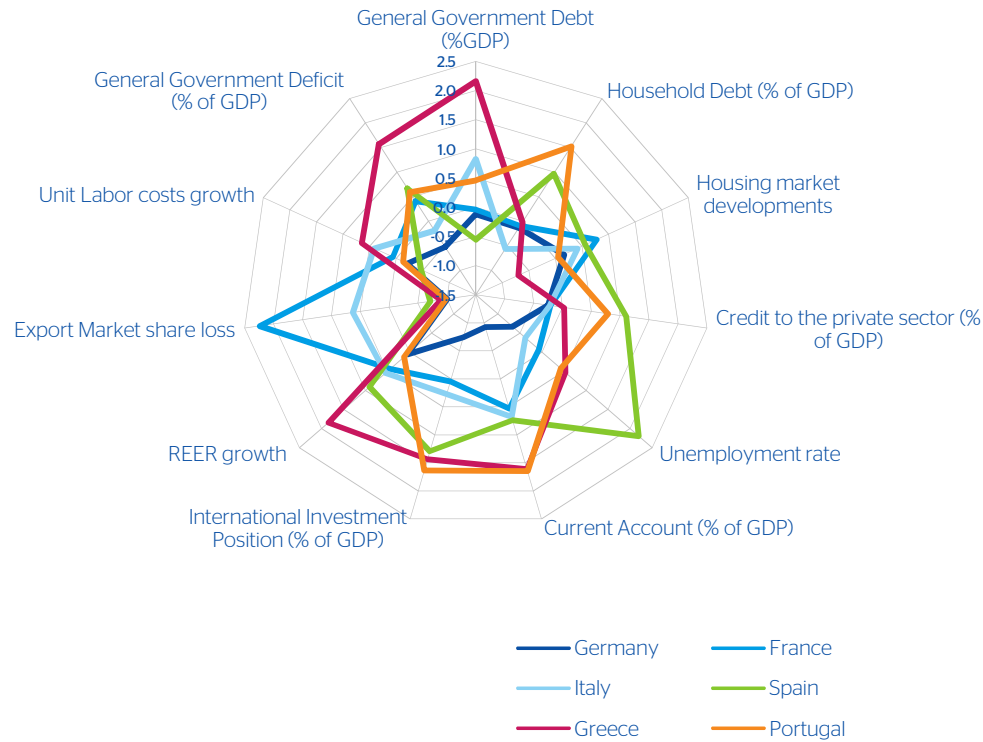


Section 1

Inside Europe: Europe's "Six Pack"

West Europe: The EU Commission "6 pack"

Source: EU commission and BBVA Research



2.5: High vulnerability -1.5: Low vulnerability

Tracking Markets & Ratings & Sustainability Indicators



The "Six Pack" Vulnerability Radars

To analyze structural vulnerability inside Europe tracking the "six pack" EU commission vulnerability indicators

Section 2

Alternative Models of Country Risk

	Type of Model	Dependent variable	Global Variables	Idiosyncratic Variables
IMF¹	Panel Data Error Correction	EMBI Spread (Levels)	3 month Fed Funds Volatility Fed Funds VIX	Sovereign Rating Index
IADB²	Panel Data Error Correction	EMBI Spread (Differences)	10 year US bond HYield US corporate	Sovereign Rating Index
Bank of England³	Panel Pool Mean Group	EMBI Spread (Differences)	10 and 30year US bond US Baa-Aaa spread SP500 index	Fiscal Budget, Openness Amortization to Reserves Current Account Short term Ext Debt /Reserves
ECB⁴	Panel Ordered Probit	Sovereign Debt Ratings (Levels)		GDP per capita, GDP growth, Unemployment, Inflation, Gov. Debt, Govt.Balance, Govt Effectiveness External Debt, Curr.Account, Reserves, Default History

(1) Hartelious et al (2008): "Emerging Market Spread Compression:Is it Real or is it Liquidity?". IMF WP 08/10

(2) Gonzalez Rozada and LevyYeyati (2006): Global Factors and Emerging Market Spreads. IADB WP 552

(3) Ferruci (2003) Empirical determinants of emerging market economies' sovereign bond spreads BOE WP 205

(4) Afonso et Al (2007). What "HIDES" Behind Sovereign Debt Ratings. ECB WP 711

Section 2

Countries

Sample period: lifespan of CDS (2004 to 2011)
Number of countries: determined by data availability
 (Credit Default Swaps and Country Risk Determinants)

**CDS Panel
 Error Correction Model**



Developed Countries		Emerging Countries		
Europe	Asia	EMEA	Latam	Asia
Austria Belgium Denmark France Germany Greece Ireland Iceland Italy Norway Portugal Sweden Spain	Australia Japan	Bulgaria Croatia Czech Rep Hungary Poland Romania Russia Slovenia Slovakia Turkey South Africa	Argentina Brazil Chile Colombia Mexico Peru Venezuela	China Indonesia Malaysia Philippines S.Korea Thailand

Section 2

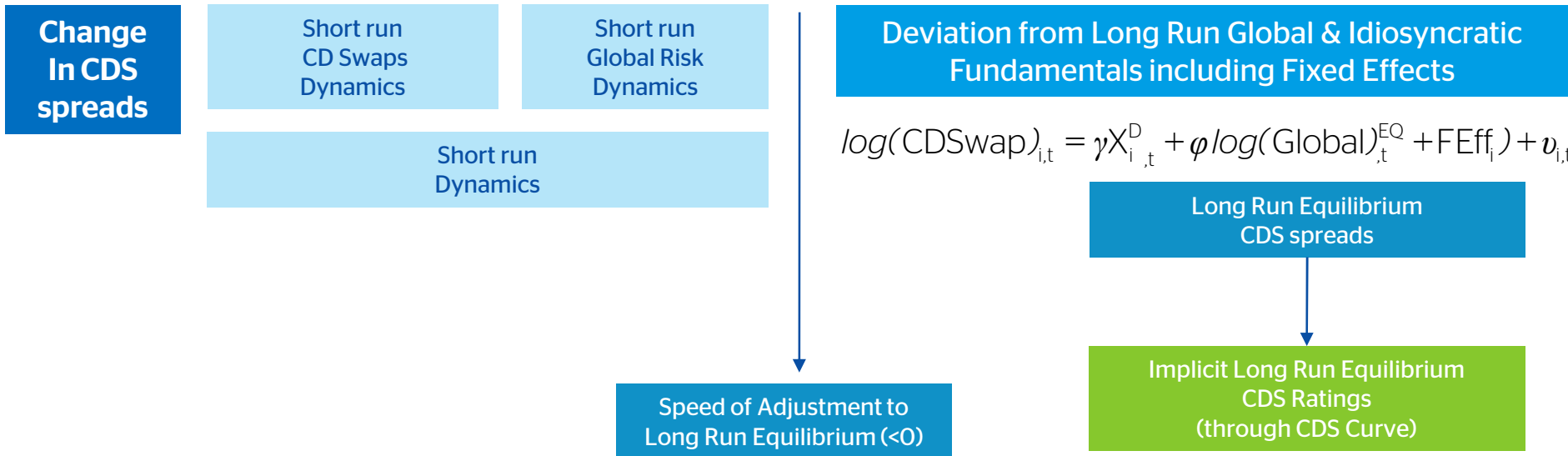
Models: Panel Data EC Model

CDS Panel Error Correction Model



Panel Data Error Correction Model (PDECM)

$$\Delta \log(\text{CDSwap})_{i,t} = \beta \Delta \log(\text{CDSwap})_{i,t-1} + \phi \Delta \log(\text{Global})_{t-1} + \lambda (\log(\text{CDSwap})_{i,t-1} + \gamma X_{i,t-1}^D + \phi \log(\text{Global})_{t-1}^{\text{EQ}} + \text{FEff}_i) + v_{i,t}$$



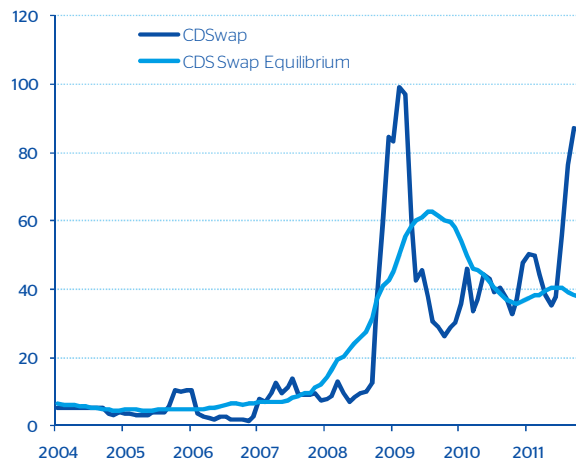
Section 2

Models: Panel Data EC Model

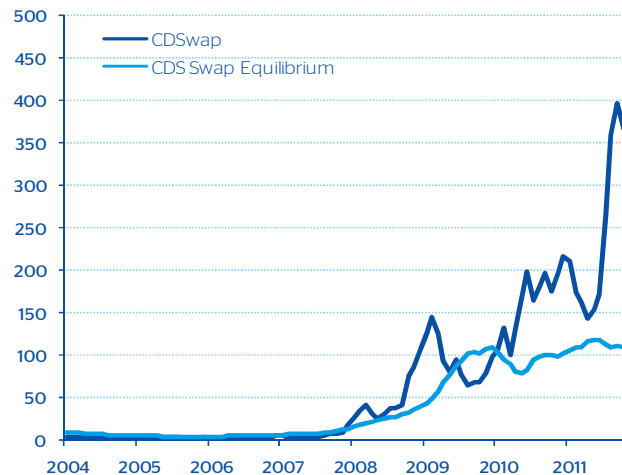
CDS Panel Error Correction Model



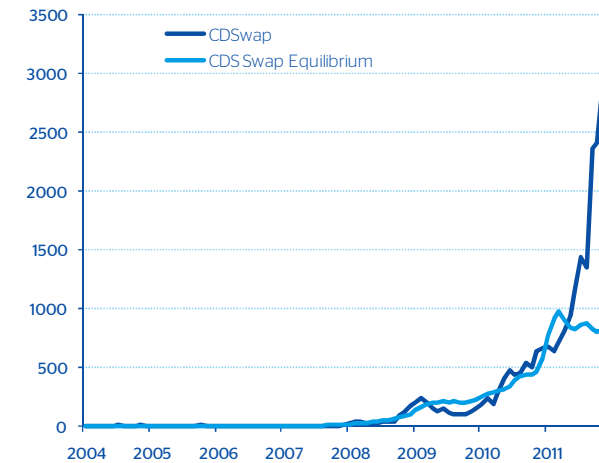
Europe Core: CD Swap
(Actual and Equilibrium CDSwap)
Source: BBVA Research



Europe Periphery I: CD Swap
(Actual and Equilibrium CDSwap)
Source: BBVA Research



Europe Periphery II: CD Swap
(Actual and Equilibrium CDSwap)
Source: BBVA Research



Section 2

Models: Panel Data Ordinal Probit I

Sovereign Ratings Panel Ordinal Probit Model II



Panel Data Ordinal Probit Model

$$Rating_{Agencies\ i,t} = \beta_1 X_{1i,t-1} + \beta_2 X_{2i,t-1} + \beta_3 X_{3i,t-1} + \delta_i + v_{i,t}$$

Average of Three Rating Agencies

X₁: PCA of business cycle related (flow) variables:

- GDP Real Growth
- Fiscal Balance/GDP
- Unemployment
- Current Account Balance/GDP
- Inflation

X₂: PCA of debt (stock) variables:

- Public Debt/GDP
- External Debt/GDP

X₃: Economic Development Variables:

- Log(GDP per capita)
- Institutional Index

δ_i: Country Dummies

Sample: 1400 Observations from a Balanced (Quarterly) Panel from 2003 Q1 to 2011 Q4, including 40 Developed and Emerging Economies.

Variables related to the business cycle are also interacted with dummy variables related to the public debt level. We also estimate higher elasticities to the stock of debt, for higher levels of public debt.

Section 2

Models: Panel Data Ordinal Probit II

Sovereign Ratings Panel Ordinal Probit Model II



Panel Data Ordinal Probit Model

$$Rating_{Agencies} \text{ }_{i,t} = \beta_1 X_{1i,t-1} + \beta_2 X_{2i,t-1} + \beta_3 X_{3i,t-1} + \nu_{i,t}$$

Average of Three Rating Agencies

- X_1 : PCA of business cycle related (flow) variables:
- GDP Real Growth
 - Fiscal Balance/GDP
 - Unemployment
 - Current Account Balance/GDP
 - Inflation

- X_2 : PCA of debt (stock) variables:
- Public Debt/GDP
 - External Debt/GDP

- X_3 : Economic Development Variables:
- Log(GDP per capita)
 - Institutional Index

δ_i : Country Dummies



Sample: 1400 Observations from a Balanced (Quarterly) Panel from 2003 Q1 to 2011 Q4, including 40 Developed and Emerging Economies.

Variables related to the business cycle are also interacted with dummy variables related to the public debt level. We also estimate higher elasticities to the stock of debt, for higher levels of public debt.

Section 2

Models: Individual OLS country rating

Country Individual OLS Models



Country Individual OLS Model

$$Rating\ Agencies_t = \beta_1 \left[\frac{1}{n} \sum_{i=0}^n X_{1,t-i} \right] + \beta_2 \left[\frac{1}{n} \sum_{i=0}^n X_{2,t-i} \right] + \beta_3 \left[\frac{1}{n} \sum_{i=0}^n X_{3,t-i} \right] + \beta_4 \left[\frac{1}{n} \sum_{i=0}^n X_{4,t-i} \right] + \beta_5 \left[\frac{1}{n} \sum_{i=0}^n X_{5,t-i} \right] + \beta_6 \left[\frac{1}{n} \sum_{i=0}^n X_{6,t-i} \right] + v_{i,t}$$

Individual OLS Models

GDP per Capita

GDP Growth

Government Balance (% GDP)

Government Debt (% GDP)

External Debt (% GDP)

International Reserves (% Imports)

Section 3

BBVA Ratings Score

BBVA Sovereign Ratings Score



Panel Data Error Correction Model (PDECM)	1 Global Risk Aversion and Fundamentals through CD Swaps, Implicit Sovereign Ratings resulting from the model. Equilibrium rating includes equilibrium GRA	? Considering the impact of Global Risk Aversion and Fundamentals
Sovereign Ratings Panel Data Ordinal Probit Model I	2 Stock and flows fundamentals ratings modeling. Idiosyncratic fixed effects matters (i.e historical rating performance)	? Solvency and Liquidity but other factors including history Matters
Sovereign Ratings Panel Data Ordinal Probit Model II	3 Stock and Flows Fundamentals rating modeling. Idiosyncratic country fixed effects removed	? Solvency and liquidity absent of Fixed (including Historical factors)
Sovereign Ratings Country Specific Models	4 Sovereign rating individual models taking into account Country specific fundamentals and parameters.	? Just own fundamentals and History



BBVA Country Risk Quantitative Scoring

Average Sovereign Rating including Global Factors, Market CD Swaps and Ratings. Country specific effects (“history”) and equal treatment. Ucertainty +1 Standard deviations (2 notches)

Section 3

BBVA Ratings Score

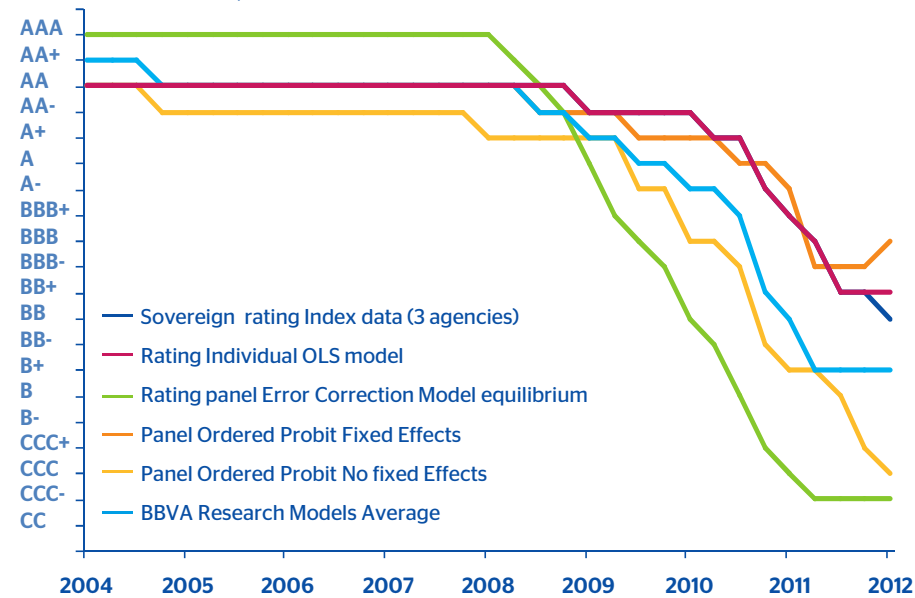
BBVA Sovereign Ratings Score



Europe Periphery II*: Sovereign Rating Alternative

Models (Rating agencies and BBVA Research Models)

Source: Standard & Poors, Moody's, Fitch and BBVA Research

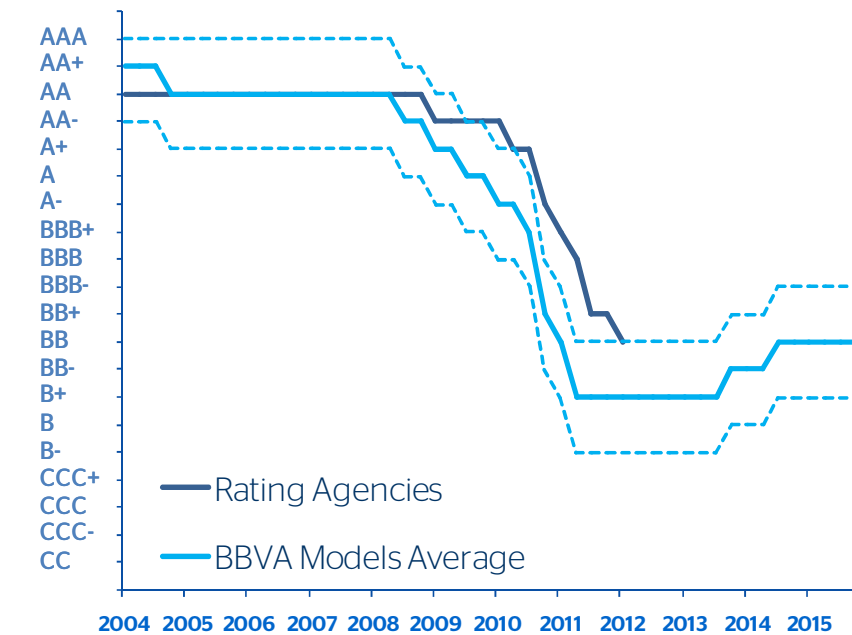


* Europe Periphery II: Greece, Portugal and Ireland (average)

Europe Periphery II*: Sovereign Rating

(Rating agencies and BBVA scores +1 std dev)

Source: Standard & Poors, Moody's, Fitch and BBVA Research



* Europe Periphery II: Greece, Portugal and Ireland (average)

Section 3

Sovereign Ratings: Western Europe

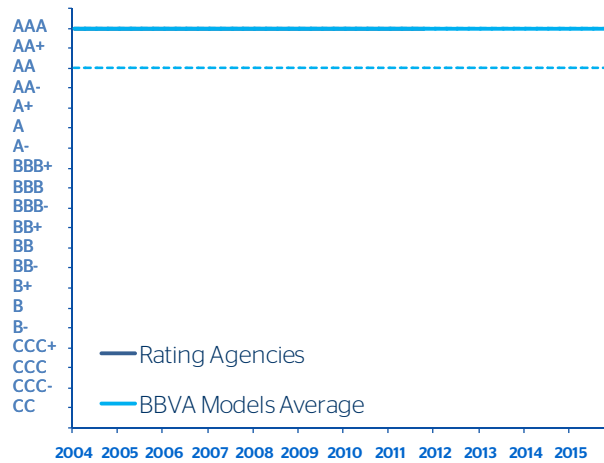
BBVA Sovereign Ratings Score



Europe Core: Sovereign Rating

(Rating agencies and BBVA scores +1std dev)

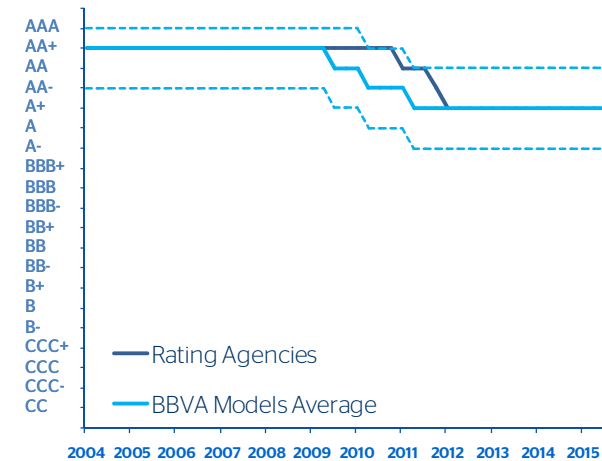
Source: Standard & Pooors, Moody's, Fitch and BBVA Research



Europe Periphery I: Sovereign Rating

(Rating agencies and BBVA scores +1 std dev)

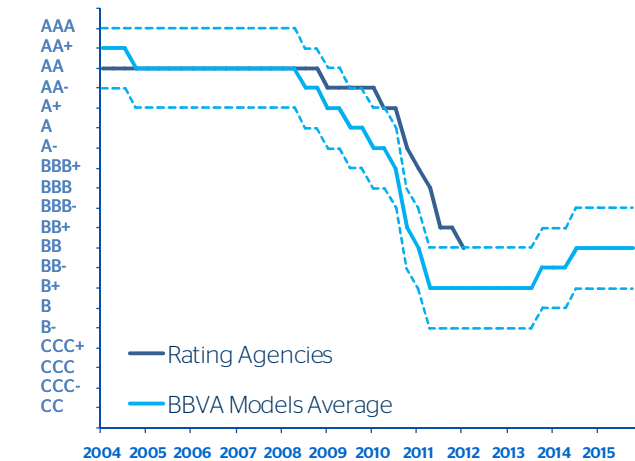
Source: Standard & Pooors, Moody's, Fitch and BBVA Research



Europe Periphery II: Sovereign Rating

(Rating agencies and BBVA scores +1 std dev)

Source: Standard & Pooors, Moody's, Fitch and BBVA Research



Section 3

Sovereign Ratings: Emerging Markets

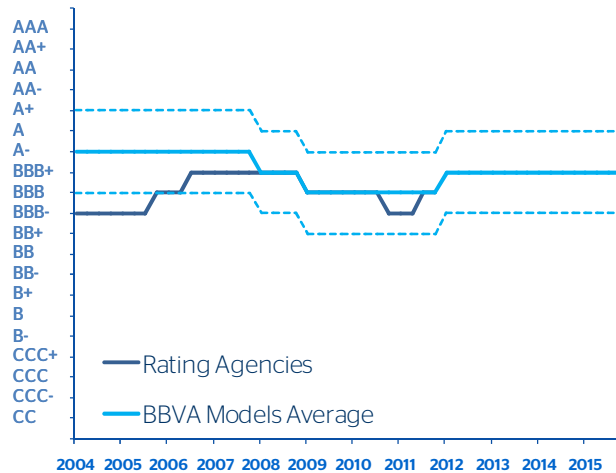
BBVA Sovereign Ratings Score



EM Europe: Sovereign Rating

(Rating agencies and BBVA scores)

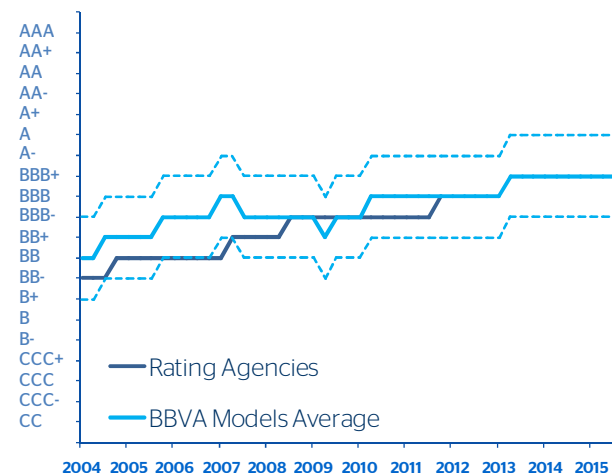
Source: Standard & Poors, Moody's, Fitch and BBVA Research



Latam: Sovereign Rating

(Rating agencies and BBVA scores)

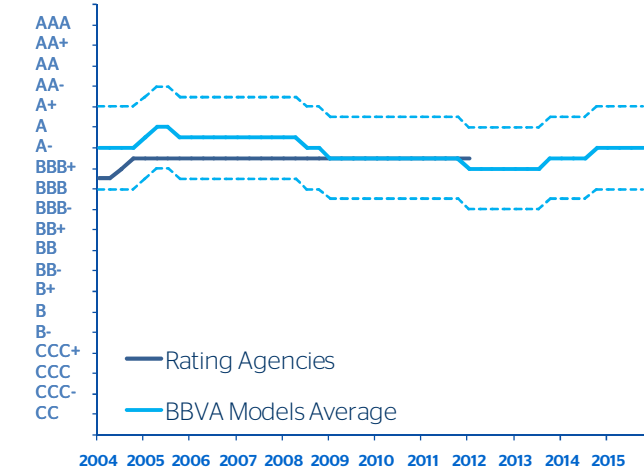
Source: Standard & Poors, Moody's, Fitch and BBVA Research



Emerging Asia: Sovereign Rating

(Rating agencies and BBVA scores)

Source: Standard & Poors, Moody's, Fitch and BBVA Research

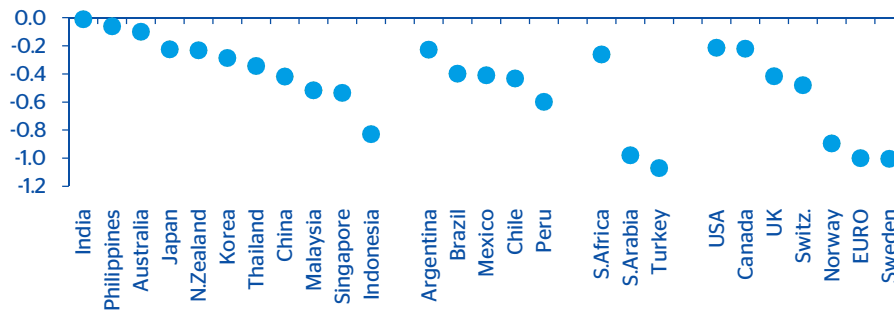


Section 4

Spill over Analysis

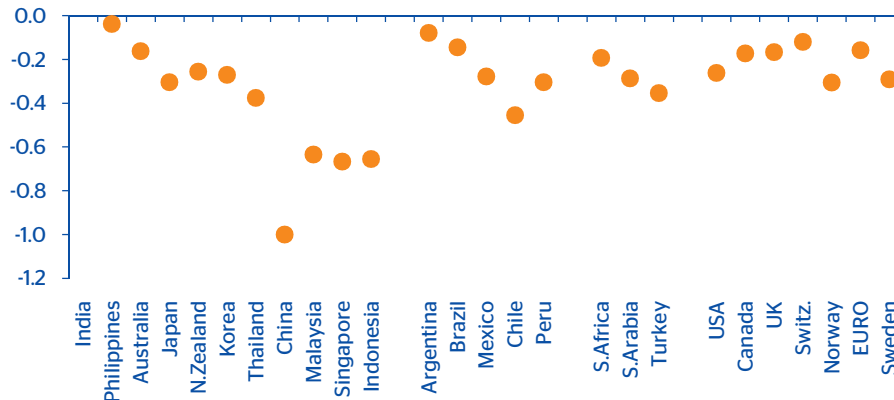
GVAR EuroArea negative growth shock Spillovers

Source: BBVA Research and GVAR



GVAR China negative growth shock Spillovers

Source: BBVA Research and GVAR



Studies , Spill Over analysis & Experts Feedback



Using Research Tools for Specific situations

Up to date research tools for the analysis of special risks (Spill Over Analysis...)

Example: Spill-over analysis with GVAR

GVAR: The GVAR Toolbox was originally launched in December 2010 with the release of version 1.0, sponsored by the European Central Bank. Version 1.1 was released in July 2011 and is available to [download](#), free of charge, from this website. The program itself can be used either with the existing GVAR structure based on [Dees, di Mauro, Pesaran and Smith \(2007\)](#) or variants of it, or as a very general modelling framework for any large system where components are driven by weighted averages of other components. **It can be applied to countries, regions, states, firms, regional housing markets to name a few possibilities. Many or few countries (for example) can be used, so long as the required weak exogeneity assumptions are satisfied.**

GVAR is Matlab Toolbox and can be downloaded at:

<http://www-cfap.ibs.cam.ac.uk/research/gvartoolbox/download.html>

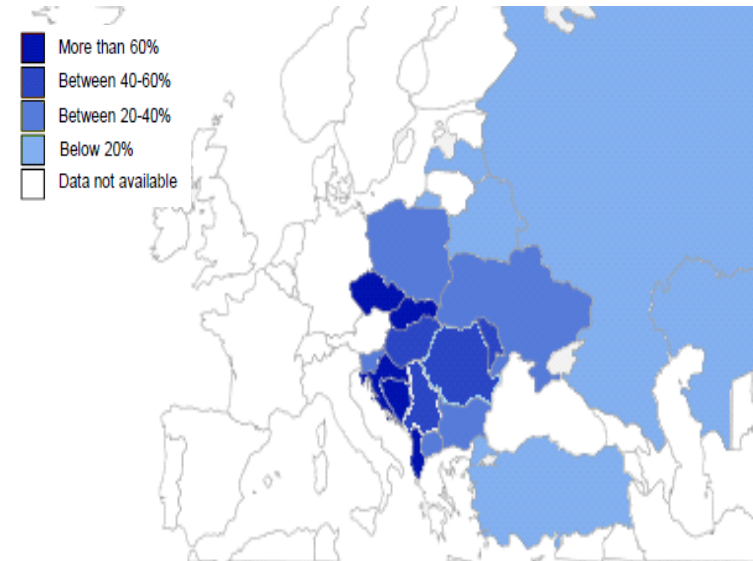
Section 4

Special Studies: Emerging Europe

Emerging Europe Bank links to Eurozone

(in % of total assets)

Source: IMF

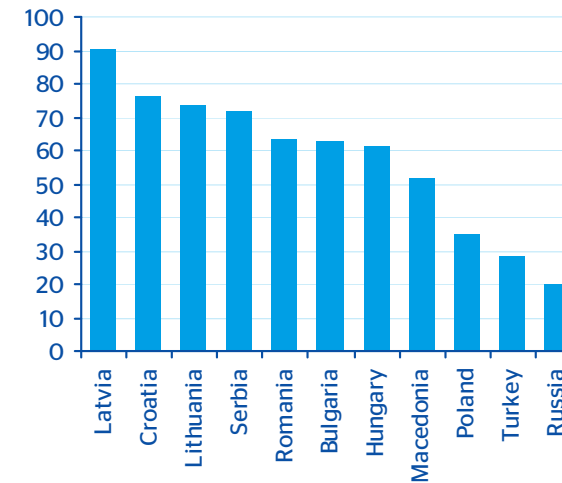


Studies , Spill Over analysis & Experts Feedback



FX credits in Emerging Europe (in % of total loans)

Source: EBRD



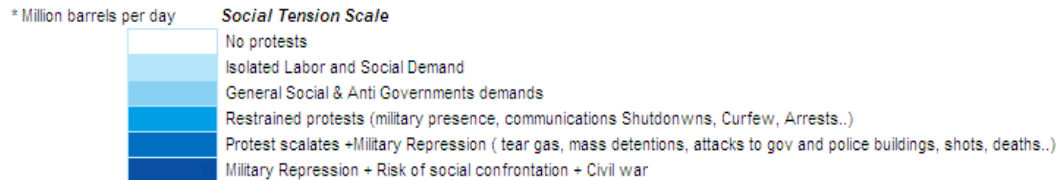
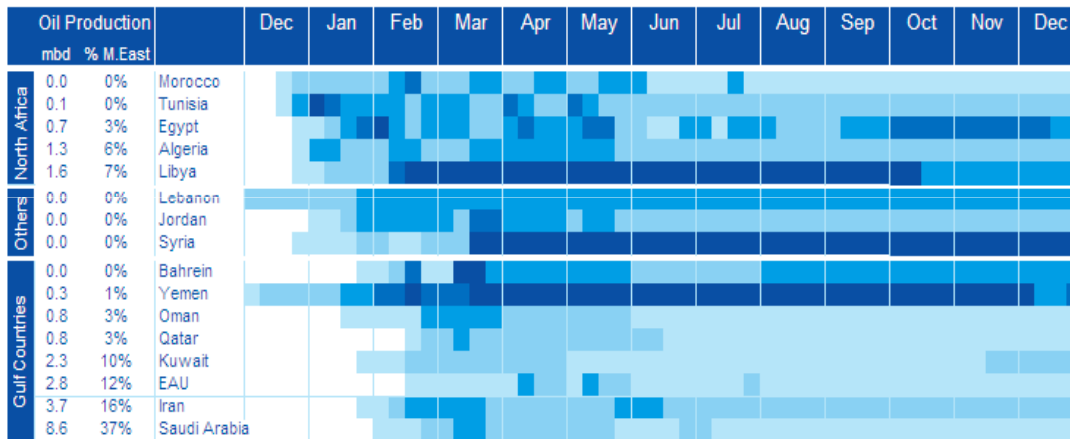
- **Eastern Europe’s Bank dependence on Western Europe countries poses special risks.** Traditional high loan to deposits ratios in the former make some of them highly dependence on funding by Western Europe’s matrix as contrary to Latam countries their bank subsidiaries are not financially independent. Thus higher capital requirements and funding needs in West Europe Banks makes EM Europe vulnerable to credit restraint
- **This problem could be amplified by the high share of euro denominated liabilities.** As global risk aversion triggers foreign exchange depreciation euro denominated mortgages payments will increase prompting an implicit monetary tightening and increasing the risk of an important increase in non performing loans. This is specially the case of Baltics, Balkans and Hungary

Section 4

Special studies: Arab Unrest Tracker

Arab Countries Social Unrest Tracker

Source:BBVA Research a



Studies , Spill Over analysis & Experts Feedback



The Arab Countries Social Unrest Tracker

To analyze the potential impact of “Arab Social Unrest Dynamics”.

- It shows that social dynamics has been highly interconnected among the countries (contagion)
- So far Social Unrest have reached to non relevant oil countries. Their importance lies in the possibility of contagion to the relevant ones
- Countries are ordered geographically and in oil relevance terms. Moving to the bottom of the table (to the East) will have more serious implications for the Global Economy

Section 4

Experts Meetings Feedback

Multidimensional Assessment

Combining information from Global Economic and Financial Scenarios, Country Economic outlook with Country Risk specific information

Studies , Spill Over analysis & Experts Feedback

