

Country Risk Report

A Quarterly Guide to Country Risks

December 2018

(Data as of November 30th)

Summary

Ratings agencies

- **Italy** was downgraded Moody's. **Argentina** was downgraded by S&P. **Poland** was upgraded by S&P, and **Portugal** by Moody's ➔

Financial Markets

- **CDS implicit-rating gaps are close to neutral in most cases. High downgrade or upgrade pressures are concentrated on a few specific countries (Italy, Mexico, Thailand).** Sovereign CDS have remained quite stable across the board, with the exception of those countries where spreads have raised the most during the year (Argentina, Brazil, Italy, Turkey). ➔
- **Global Risk Aversion (GRA) and Financial Tensions (FT) have raised specially in Europe and overall in Developed Markets (DM)**, somewhat in Emerging Markets (EM) Asia, while they have improved to a certain extent in LatAm and EM Europe. ➔
- **Clear improvement in EMs currency markets**, specially during November, when there has been a high degree of a “good” synchronization: EMs currencies were appreciating together. ➔

BBVA Research

- **EM-Europe is the region where rating agencies have more room to improve their ratings according to our fundamentals-based ratings and the markets view.** ➔
- While **financial vulnerabilities have improved significantly in Periphery Europe**, they seem to be worsening or stagnant in other advanced economies. **Fiscal vulnerabilities are worsening in LatAm and Asia-EM.** However, financial vulnerabilities have indeed improved in these same regions. ➔
- **From this report on, we will show a color map of our estimated “private debt-gaps” and housing price gaps**, which are a measure of disequilibria in the debt and property markets. The former are also the basis for estimating our EWS of systemic banking crises. The information of these gaps will also be included in our vulnerability radars analysis. ➔
- **The gaps show that Canada, China, Hong Kong and Thailand** are the countries in which both markets (credit and housing prices) **are clearly in disequilibrium** and thus face a high vulnerability. ➔

Country Risk

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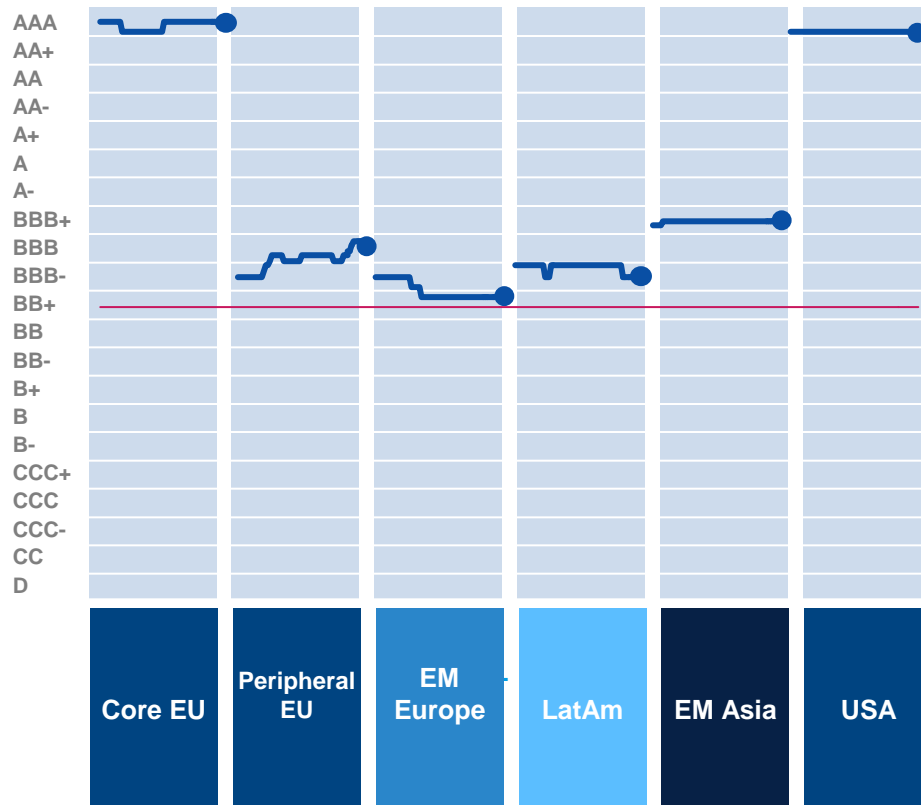
01

Sovereign Markets and Ratings Update

Evolution of sovereign CDS by country
Evolution of sovereign ratings
Market downgrade/upgrade pressure

Sovereign markets and rating agencies update

Sovereign Rating Index 2012-18



- Few changes from rating Agencies. On a regional basis, median ratings have remained constant during last quarter.
- **Italy** was downgraded by Moody's.
- **Argentina** was downgraded by S&P.
- **Poland** was upgraded by S&P, and **Portugal** by Moody's.

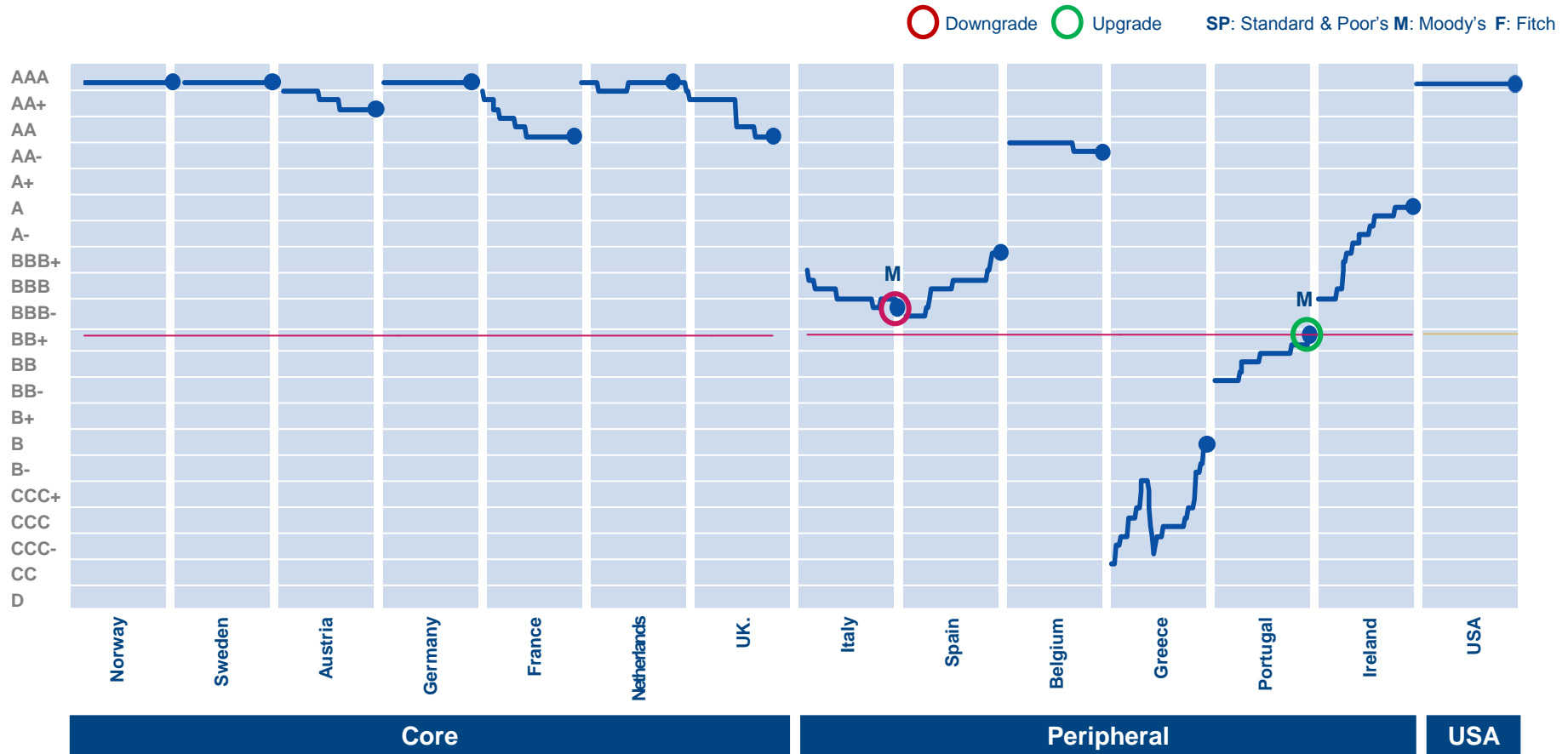
Source: BBVA Research by using S&P, Moody's and Fitch data

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



Sovereign markets and rating agencies update

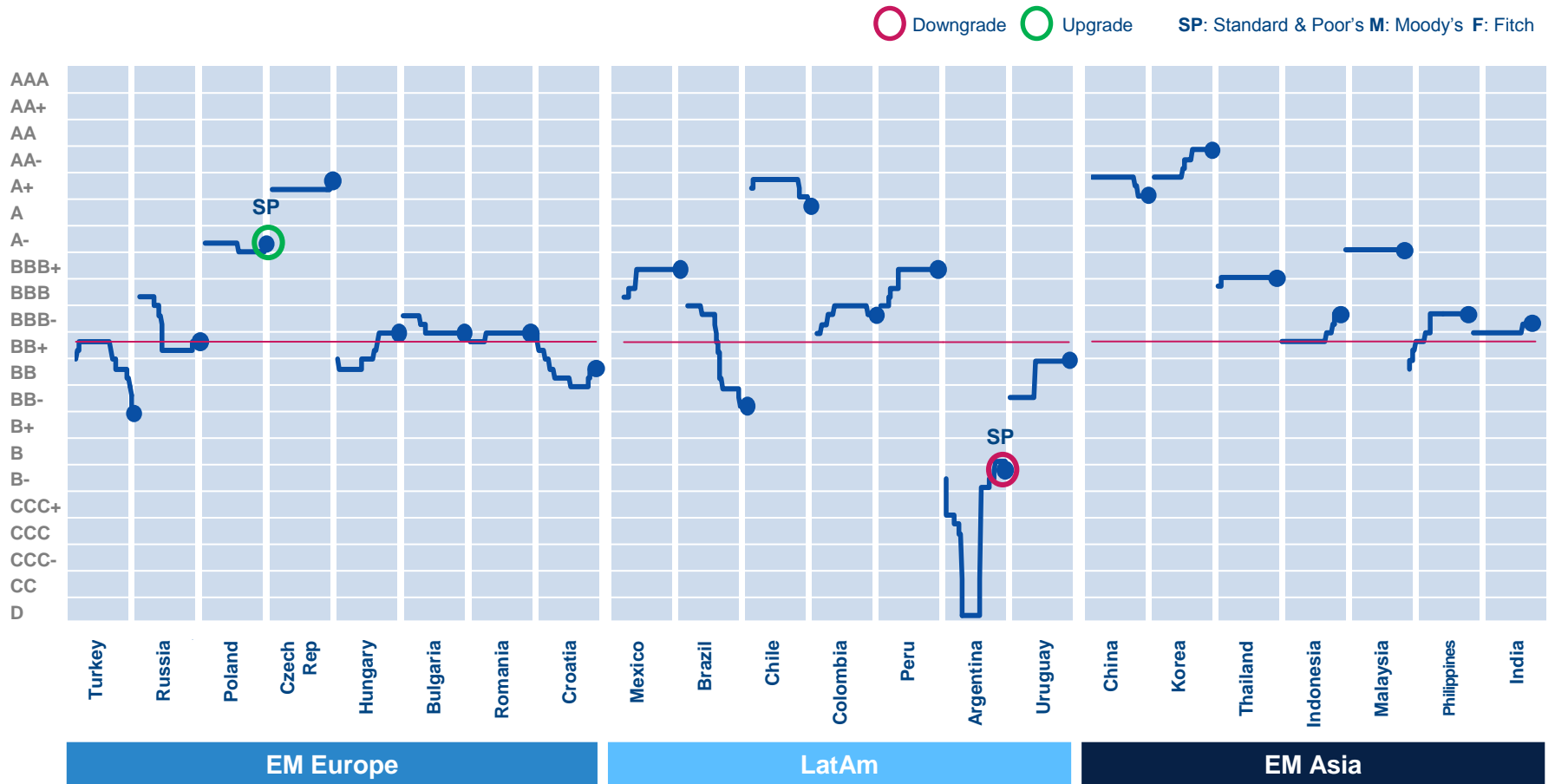
Sovereign Rating Index 2012-18: Developed Markets





Sovereign markets and rating agencies update

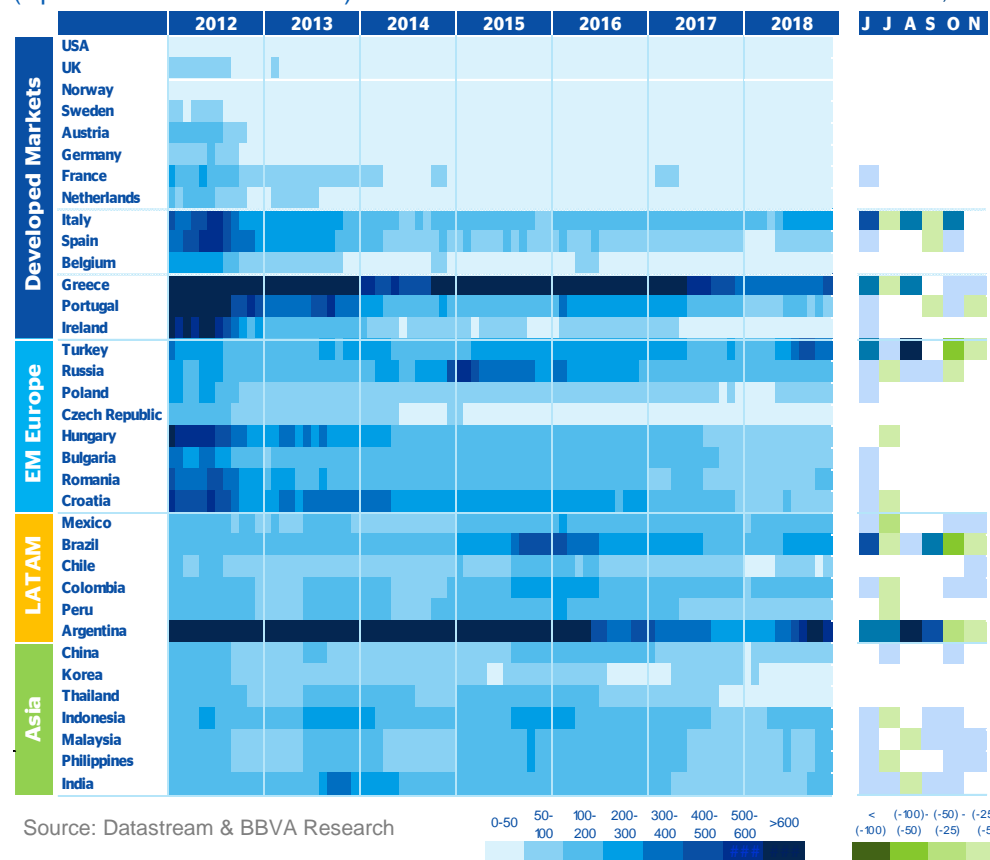
Sovereign Rating Index 2012-18: Emerging Markets



Sovereign markets and rating agencies update

Sovereign CDS Spreads

(Up until November 30 2018)



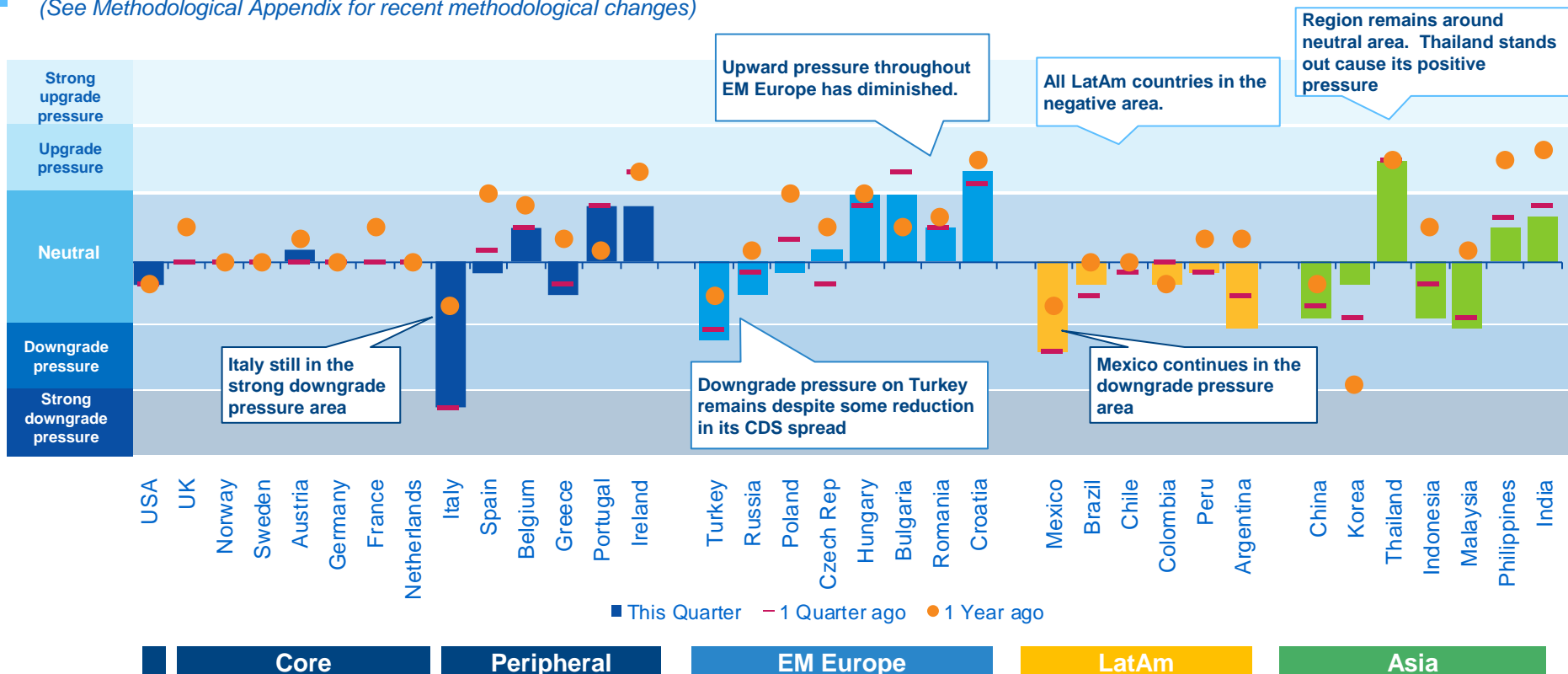
- High volatility in Italian CDS. Contagion to the rest of EU Periphery continues to be small
- Turkey's spread decreased more than 100 bps during the last months. Stability prevailed across other EM Europe spreads
- Brazil's and Argentina's spreads have also eased significantly during the quarter, while they rose in Mexico and Colombia
- Stability across CDS in EM Asia continues

In the most recent months we have seen a lessening of the spread of those countries that suffered the most during the previous two quarters (e.g. Italy, Turkey & Argentina), although some volatility still persists. Other areas and countries have remained stable

Sovereign markets and agencies ratings update

Markets vs. ratings pressure gap (Last date: November 30, 2018)

(difference between CDS-implied rating and actual sovereign rating, in notches, quarterly average)
 (See Methodological Appendix for recent methodological changes)



Source: BBVA Research

CDS implicit gaps are close to neutral in most cases. High downgrade or upgrade pressures are concentrated on a few specific countries (Italy, Mexico, Thailand). By regions (on average) EM Europe stands out because its positive pressure

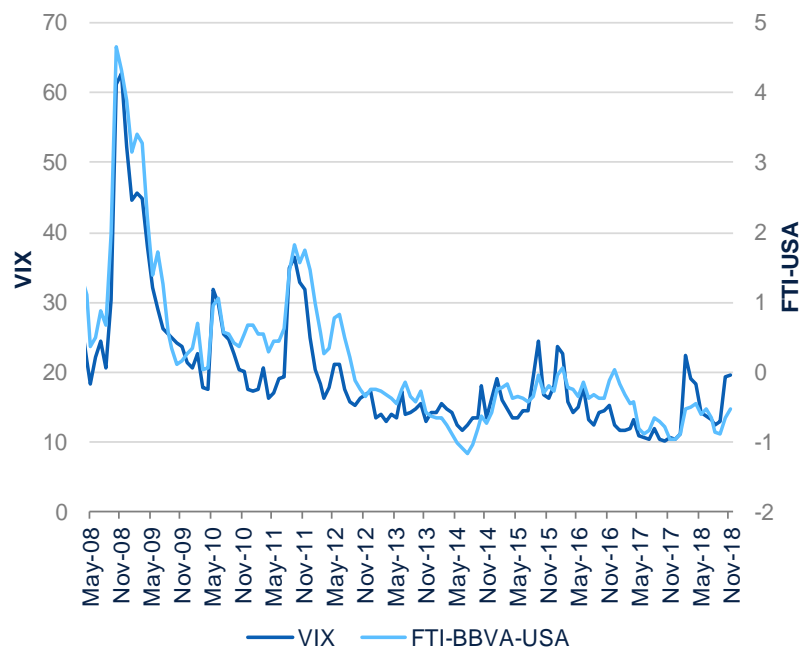
02

Financial Markets, Financial Tensions and Global Risk Aversion

Global Risk Aversion Evolution according to Different Measures
Financial Tensions Index
EMs FX Synchronization Indicator

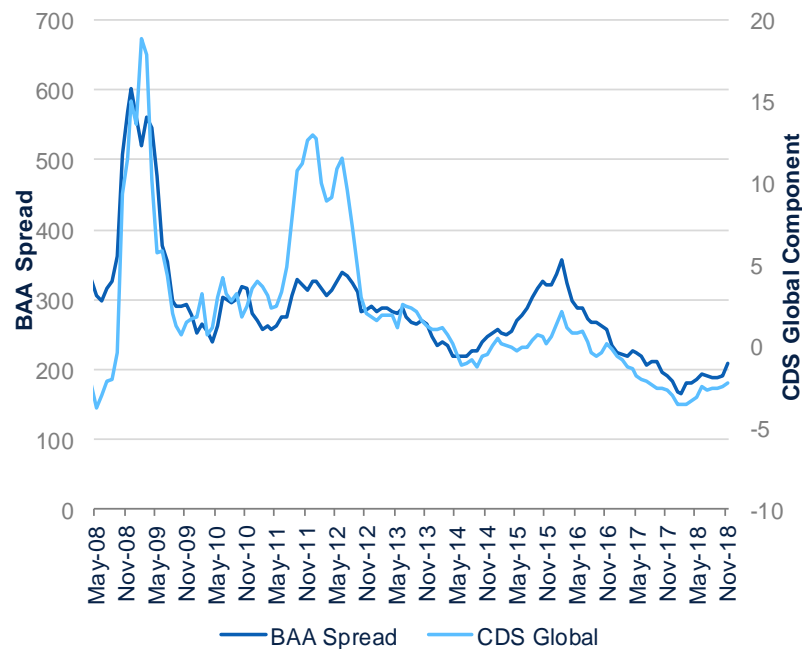
Financial Tensions (FT) and Global Risk Aversion (GRA)

Global risk aversion indicators: VIX & FTI
(Monthly average)



Source: Bloomberg and BBVA Research

Global risk aversion indicators: BAA Spread & Global component in sovereign CDS
(Monthly Average)



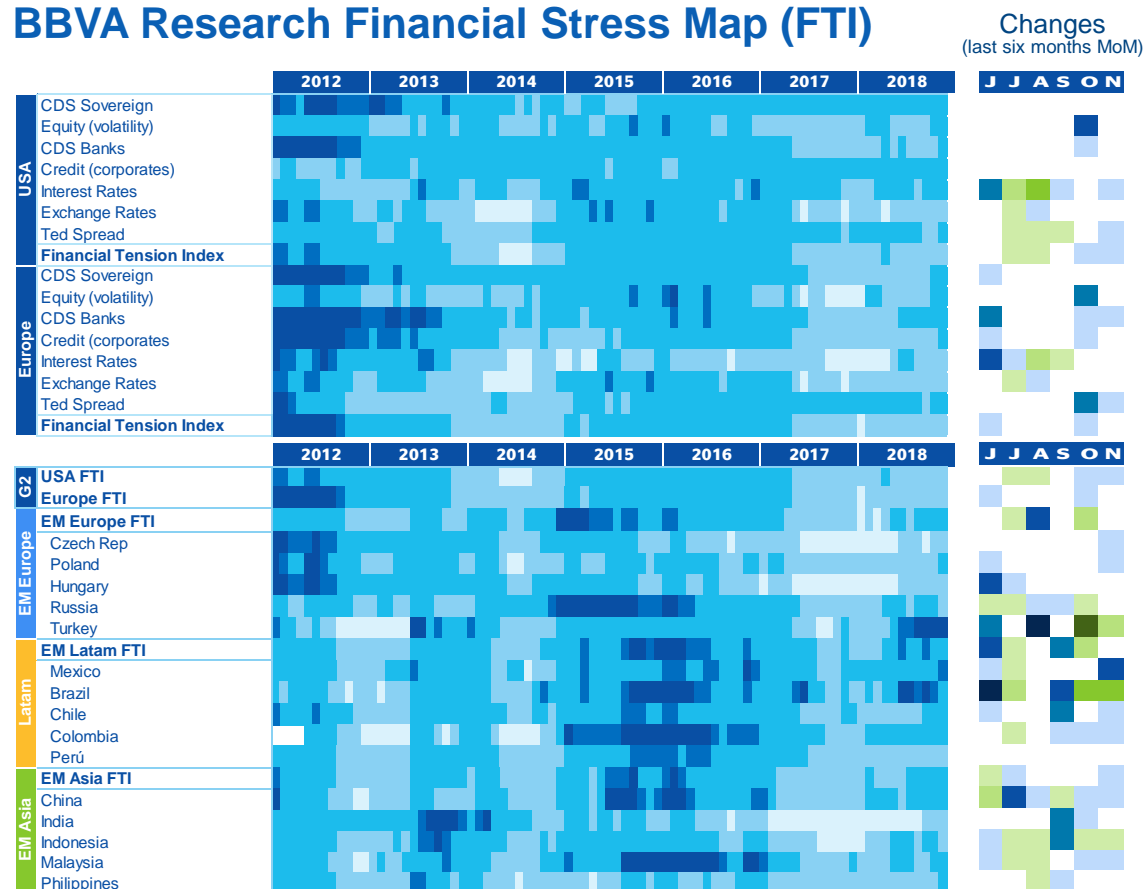
*The global component of sovereign CDS corresponds to the first component from a PCA Analysis on 51 CDS from both EMs and DMS
Source: FED, Datastream and BBVA Research

All GRA indicators have increased during last three months, but VIX is the one that has surged the most, reaching levels not seen since February of this year or the Taper-Tantrum episode



Financial tensions (FT) and global risk aversion

BBVA Research Financial Stress Map (FTI)



Source: BBVA Research

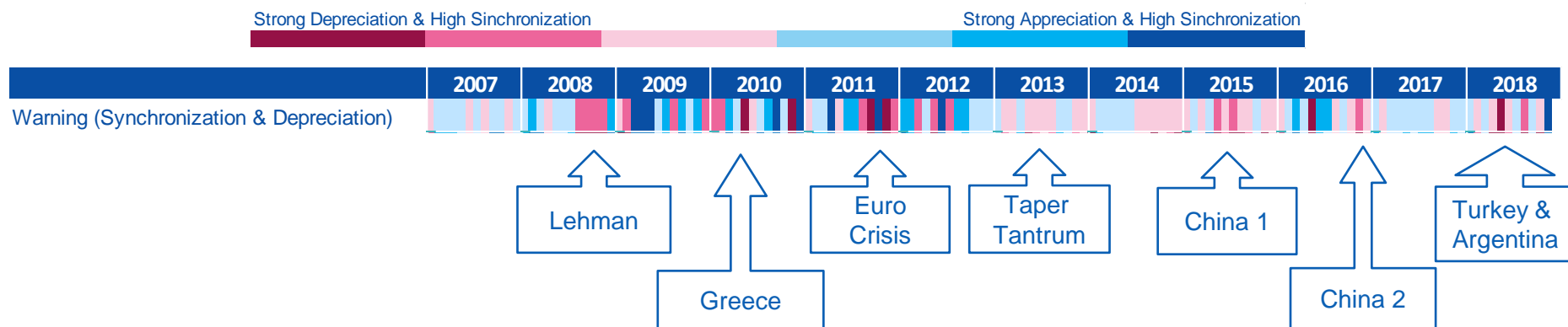
- FT in USA remain relatively stable, but tensions in equity markets have soared. FT in EU saw an overall increase across different assets.
- EM Europe FTI eased significantly thanks to Turkey's correction. The rest of the region remains stable
- Mixed situation in LatAm's biggest countries. While Brazil's FTI has seen a major decrease, Mexico's FTI has surged during November.
- Tensions in China continue to rise, increasing the region's FTI slightly.

Overall easing of Financial Tensions in stressed economies (Turkey, Argentina, Brazil) and some escalation of tensions in Europe (Italy) and Mexico

EMs FX Synchronization Indicator

Synchronization of EMs FX changes:

Warning indicator based on Median EM FX changes and Synchronization Indicator



Based on our estimated FX Synchronization index and the median change in EM markets currencies, our warning indicator takes the maximum value when (on average) EM FX rates are depreciating strongly and there is a high degree of synchronization (intense red). On the other hand, the minimum value of the warning index occurs when on average FX rates are appreciating strongly and in a synchronized fashion (intense blue). The intermediate colors include several possible combinations of lower levels of depreciation/appreciation and/or lower degrees of synchronization.

Source: BBVA Research

Clear improvement in EMs FX markets in line with the reduction of FTI in EM. Our combined warning indicator of EM FX synchronization indicates that in November we saw one of the most synchronized appreciation of FX EMs currencies in several years.

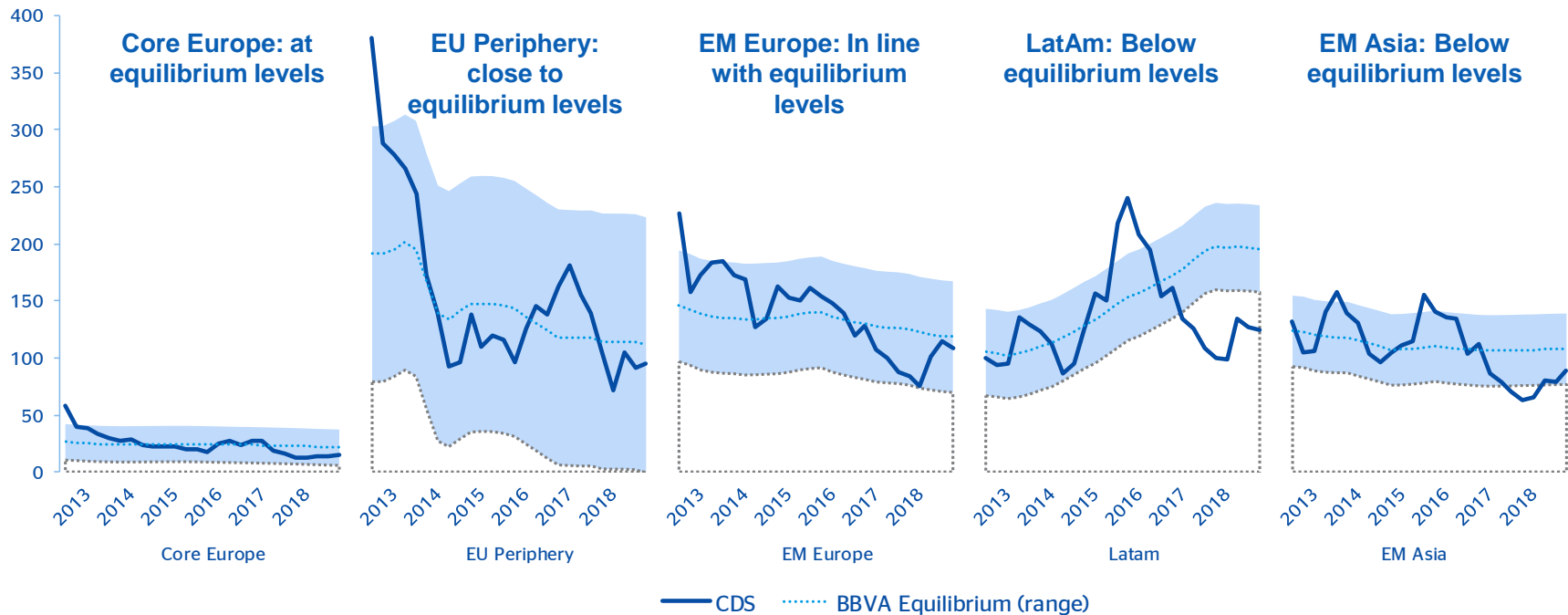
03

Macroeconomic vulnerability and in-house Regional country risk assessment

BBVA-Research sovereign ratings by regions
Equilibrium CDS by regions
Vulnerability Radars by regions

Macroeconomic Vulnerability and Risk Assessment

CDS and equilibrium risk premium: November 2018



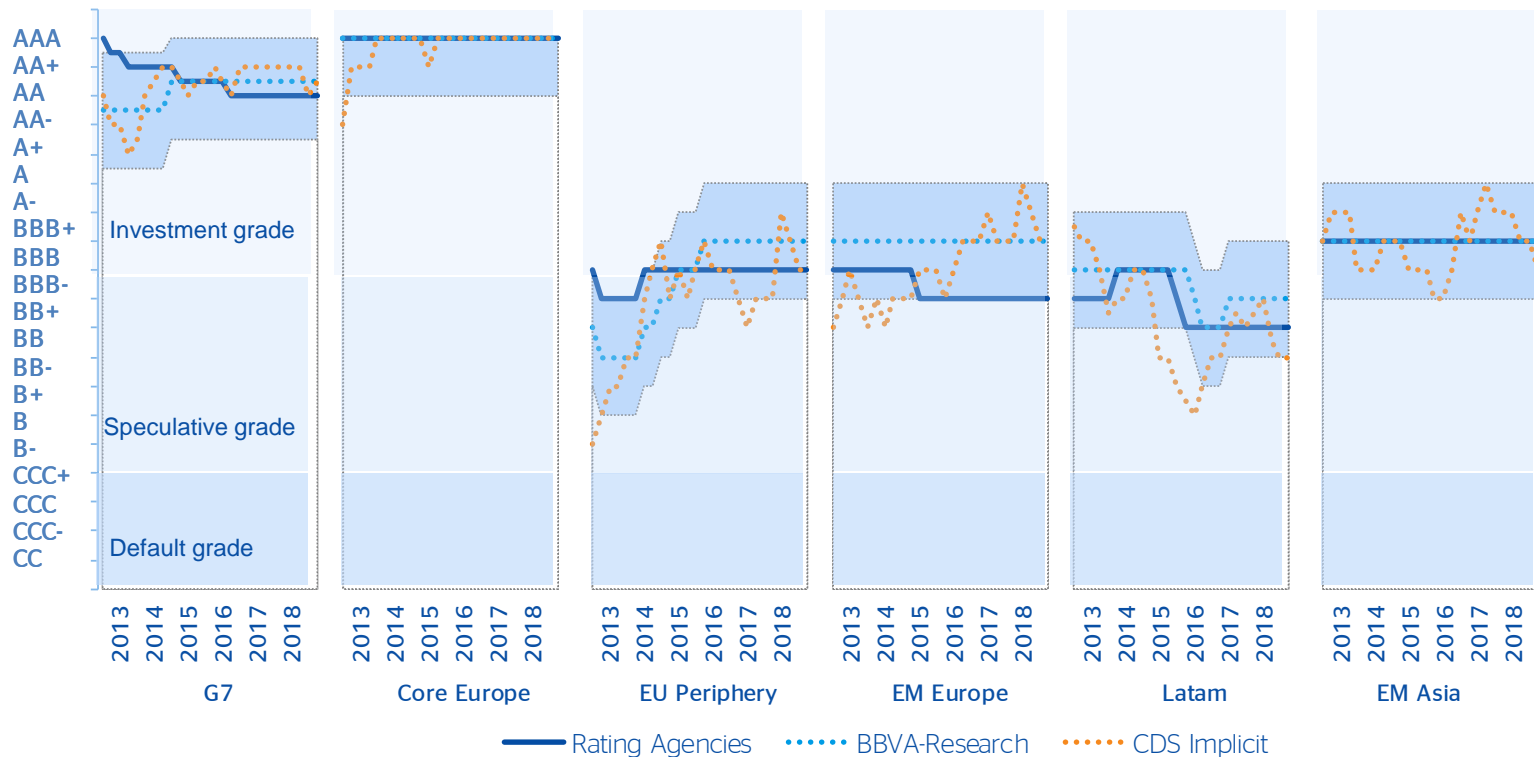
Periphery UE excludes Greece
 Source: BBVA Research and Datastream

Sovereign CDS spreads in most regions have been closing their gaps with their estimated equilibrium levels along this year, with the exception of LatAm, whose gap has been widening (on average) due to the worsening of fiscal vulnerabilities

Macroeconomic Vulnerability and Risk Assessment

Agencies' sovereign rating vs. BBVA Research rating and Market's Implicit rating

Agencies' Rating, BBVA's rating average (+/-1 std. dev.) and CDS implicit rating



Source: Standard & Poor's, Moody's, Fitch & BBVA Research

BBVA Research's fundamentals-based rating continues in line with the upgrade pressures seen in CDS markets for EM-Europe. On the other hand, our rating is slightly more positive in LatAm and in EU-Periphery than both the agencies and markets. In EM-Asia, markets are currently a bit more negative

Macroeconomic Vulnerability and Risk Assessment

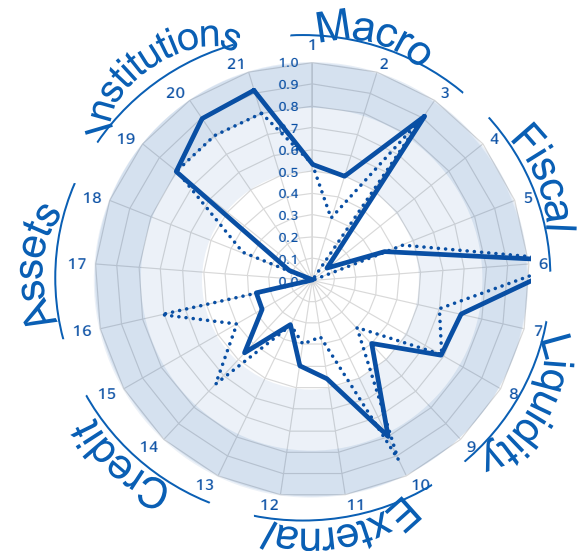
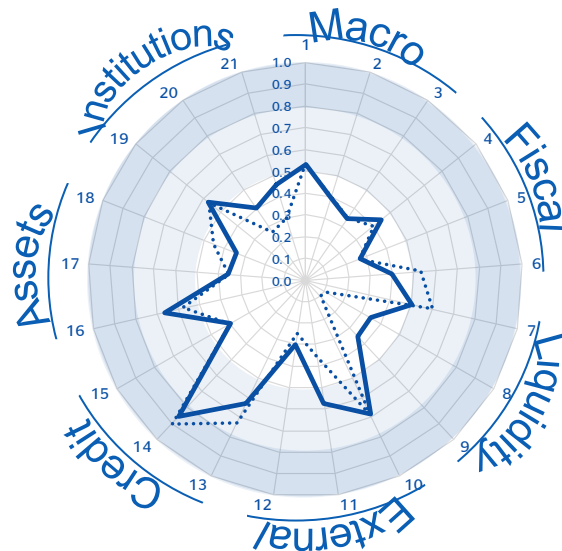
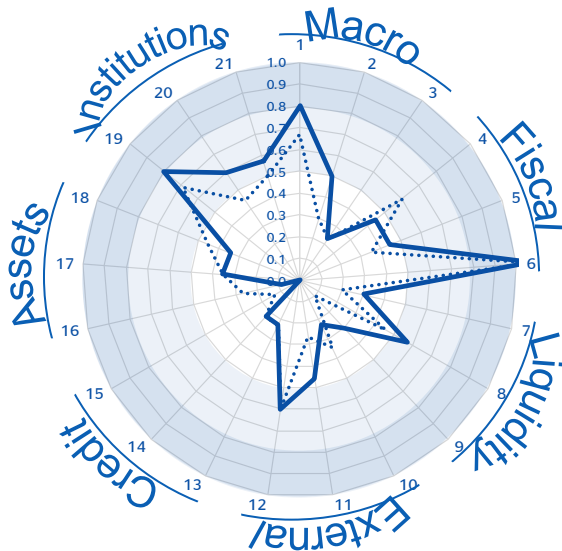
Developed markets: vulnerability radar 2018

(Relative position for the developed countries. Risk equal to threshold=0,8, Min risk=0. Previous year data is shown as a dotted line)

G7: Rising vulnerability from higher levels of public debt, higher financial needs and worsening political stability. Lower vulnerability from housing prices and leverage growth

Core Europe Increased vulnerability due to financial needs. Corporate leverage remains as the main vulnerability

Periphery EU: Unemployment, public & external debt levels and institutional risks remain as highest vulnerabilities. Private leverage vulnerability has vastly improved throughout recent years



High risk Moderate Risk Safe

Macro: (1) GDP (% YoY) (2) Prices (% YoY) (3) Unemployment (% LF)
Fiscal: (4) Structural balance (%) (5) Interest rate – GDP %YoY (6) Public debt (% GDP)
Liquidity: (7) Debt by non-residents (%total) (8) Financial needs (%GDP) (9) Financial pressure (% GDP)
External: (10) External debt (%GDP) (11) RER appreciation (%YoY) (12) CAC balance (%GDP)

Credit: (13) Household (%GDP) (14) Corporate (%GDP) (15) Credit-to-deposit (%)
Assets: (16) Private credit to GDP (%YoY) (17) Housing Prices (%YoY) (18) Equity (%)
Institutional: (19) Political stability (20) Corruption (21) Rule of law

Macroeconomic Vulnerability and Risk Assessment

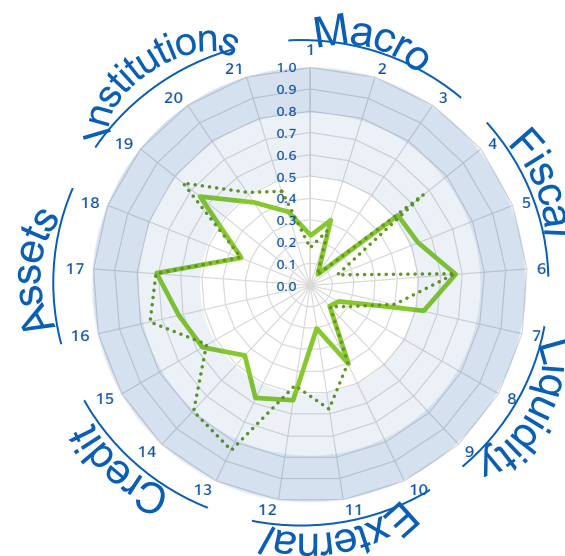
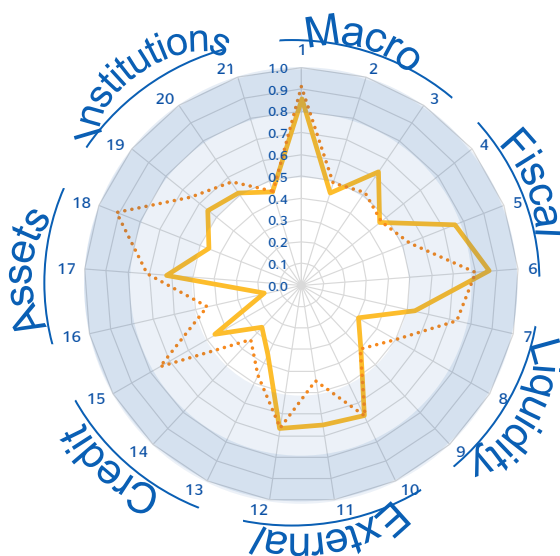
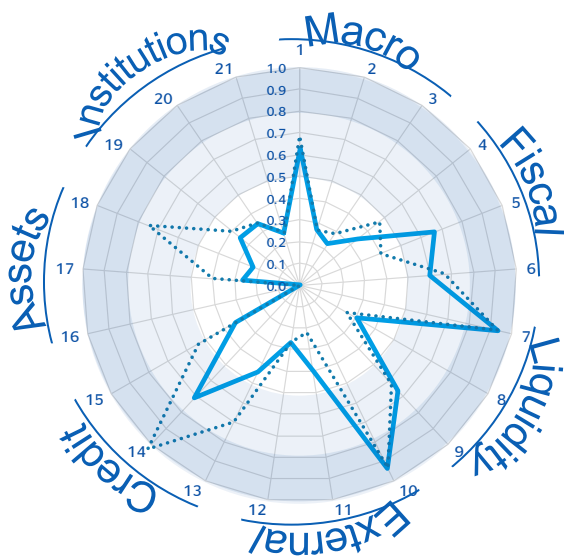
Emerging markets: vulnerability radar 2018

(Relative position for the emerging countries. Risk equal to threshold=0,8, Min risk=0. Previous year data is shown as a dotted line)

EM Europe: High vulnerabilities in external debt and debt held by non-residents, but lower corporate leverage. Higher fiscal vulnerability due to interest rate-growth differential.

LatAm: Low economic growth and high public debt levels stand out as highest vulnerabilities. Fiscal vulnerabilities continue deteriorating, while financial vulnerabilities are clearly improving

EM Asia: Corporate & Households leverage decreasing further. Worsening fiscal vulnerabilities.



High risk Moderate Risk Safe

Macro: (1) GDP (% YoY) (2) Prices (% YoY) (3) Unemployment (% LF)
Fiscal: (4) Structural balance (%) (5) Interest rate – GDP %YoY (6) Public debt (% GDP)
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04

Assessment of financial and external disequilibria

- Private credit gaps by country
- Housing prices gaps by country
- Early warning system of banking crises by regions
- Early warning system of currency crises by regions

Assessment of financial and external disequilibria



From now on, this section will show “private debt-gaps”, the difference between actual debt-to-GDP ratios and our in-house estimation of their long-term “equilibrium” levels, which rely on several economic and institutional determinants.

Private debt color map (2003-2018 Q3)

(Gap between private debt-to-GDP ratio and its long-term structural trend)



Private leverage remains way above its structural trend in Canada, while the gap is starting to grow in UK. The gap is currently negative in USA and Japan

Although most countries in Europe are currently deleveraging, private debt levels continues to be above fundamentals in Denmark, Netherlands, Belgium and Greece. Other peripheral EU countries are more advanced in their deleveraging process

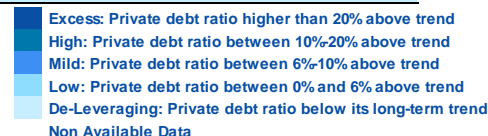
Leverage growth has accelerated in Turkey in the last two quarters and thus its disequilibrium persists. Other EM Europe countries maintain their deleveraging processes and levels below their structural levels.

Leverage growth in LatAm continues to be mild or stagnant and debt levels are currently close to or below their structural trends.

China's leverage growth has slowed down. However, its level is still way above its structural one. HK leverage growth show first signs of moderation but is also at very high levels of disequilibrium. Some signs of disequilibria can be seen in Thailand, Malaysia and Philippines.

The methodology for estimating debt gaps could be found at: <https://goo.gl/LTeTHD>, <https://goo.gl/r0BLbl>

Source: IFS, BIS & BBVA Research,

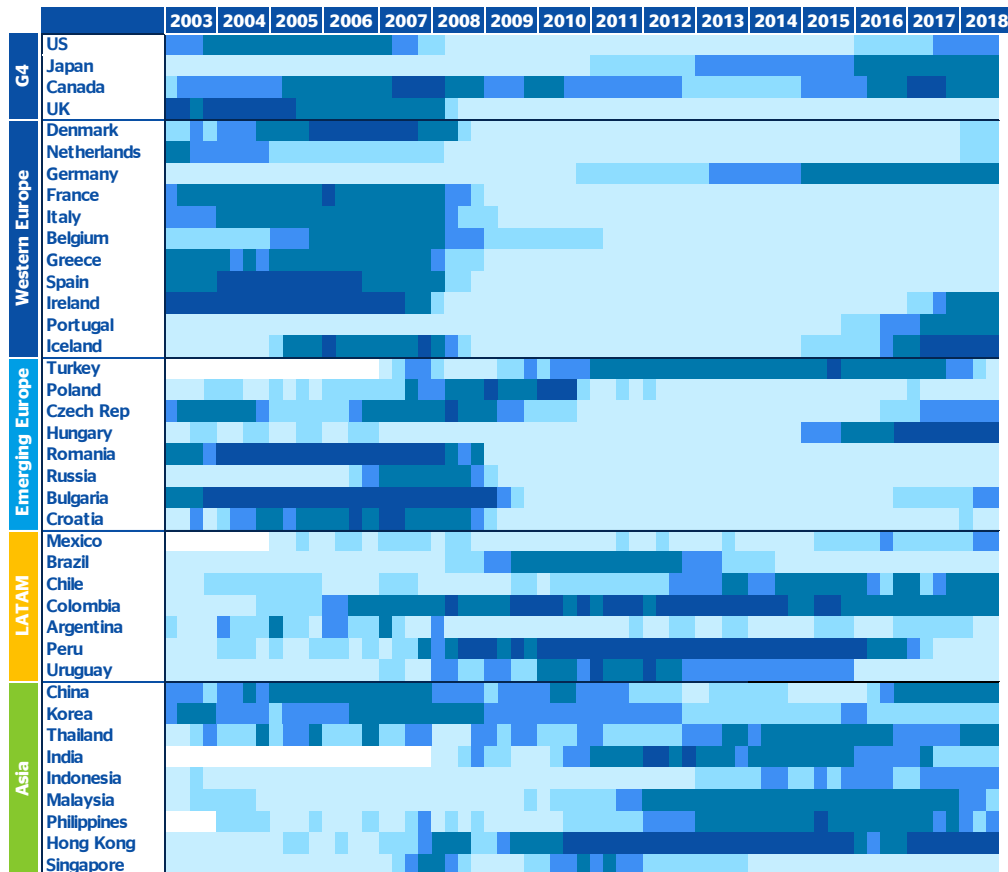


Assessment of financial and external disequilibria

This section will show our estimated “real housing price-gaps” which are a measure of the disequilibrium (gap) between real prices and a stochastic trend (Hodrick-Prescott) in the same fashion as those gaps estimated by BIS*.

Real housing prices color map (2003-2018 Q3)

(Gap between real housing prices and their trend (Hodrick-Prescott))



Housing prices gaps are large in Japan and Canada (the latter coincide with a high credit-gap)

The gap in Germany seems to be decreasing, while prices show an “excess growth” level in Portugal and Iceland.

Real price levels appear to be excessive in Hungary, and to a lesser extent in Czech Republic, while are now cooling down significantly in Turkey

Prices in Latam seem to be slowing down throughout the region after showing clear signs of excess in the previous years. Chile and Colombia still show high price gaps levels.

Hong Kong real property prices continue to be in a clear excess level, also coinciding with the gap in private debt. Prices in China and Thailand show also high levels with respect to their trends

*<https://goo.gl/xXj3Gm>

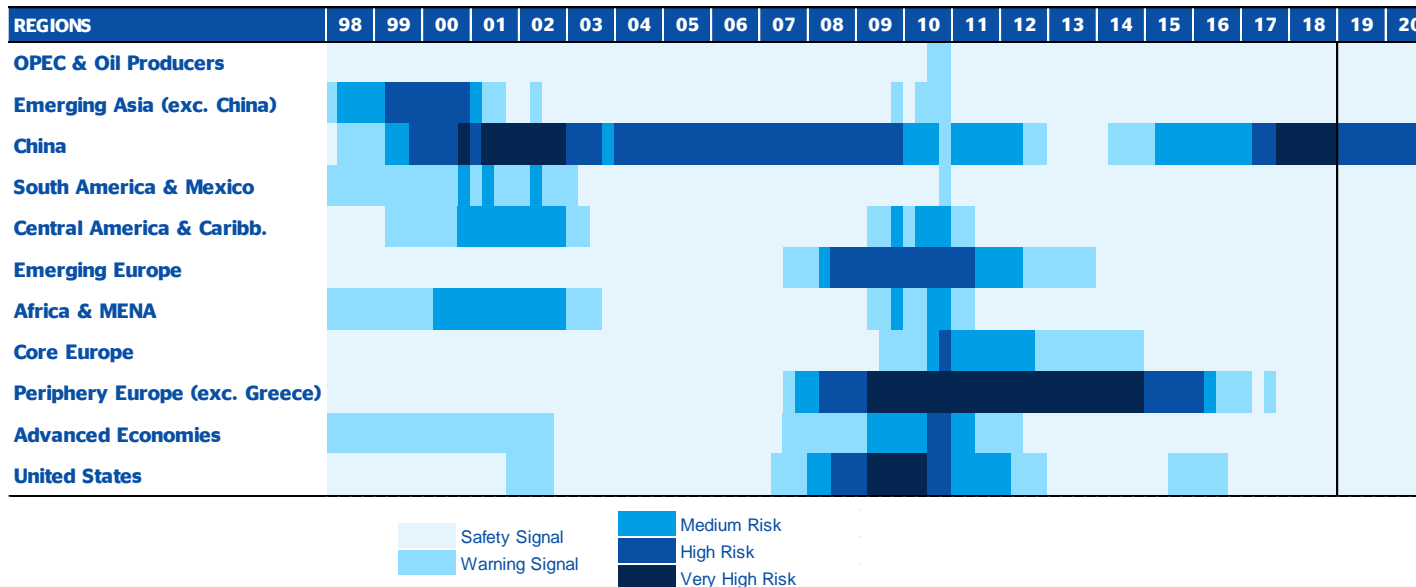
Source: BBVA Research, BIS, Haver and Oxford Economics.

Excess: Real house prices higher than 20% above trend
 High: Real house prices between 10%-20% above trend
 Mid: Real house prices between 6%-10% above trend
 Low: Real house prices between 0% and 6% above trend
 De-Leveraging: Real house prices below its long-term trend
 Non Available Data

Assessment of financial and external disequilibria

Early warning system (EWS) of Banking Crises (1998Q1-2020Q4)

(Probability of Systemic Banking Crisis (based on 8-quarters lagged data*):



- The slowdown in leveraging in China has somewhat reduced the risk of a banking crisis in the coming years
- The warning signals from the EU periphery have currently vanished

- A banking crisis in a given country follows the definition by Laeven and Valencia (2012), which is shown in the Appendix
- The complete description of the methodology can be found at <https://goo.gl/r0BLbl> and at <https://goo.gl/VA8xXv>
- The probabilities shown are the simple average of the estimated individual countries probabilities for each region. The definition of each region is shown in the Appendix

*The probability of a crisis in Q4-2016 is based on Q4-2014 data. Source: BBVA Research

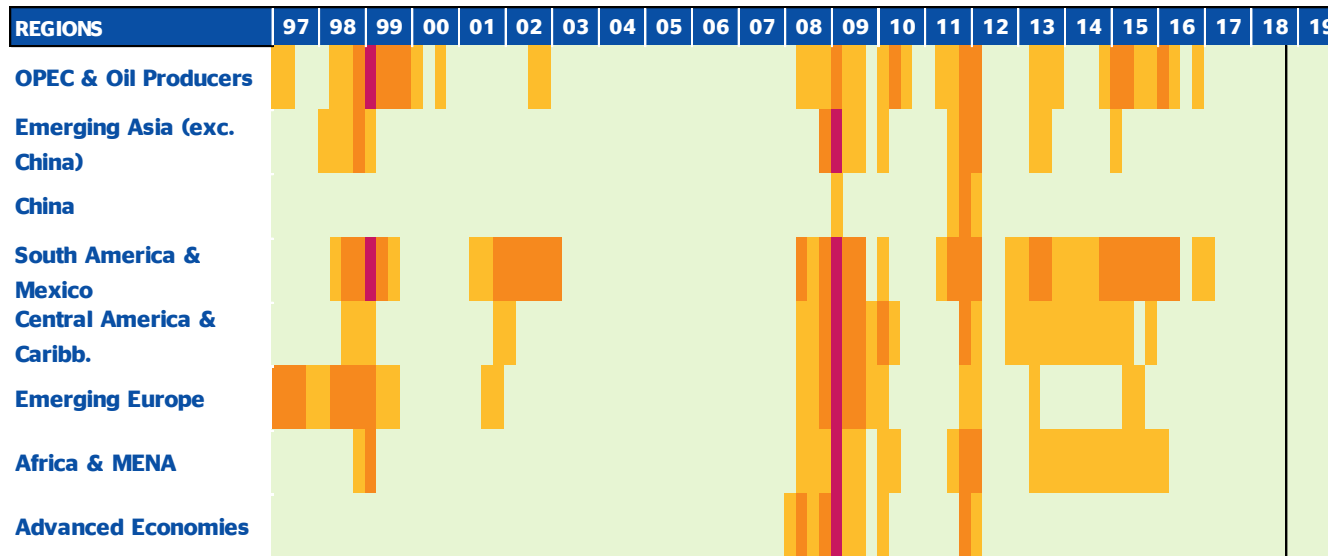
China's over-indebtedness continues to generate a relevant vulnerability of its banking sector in the coming years which must continue being tackled with macro-prudential and other economic policies oriented to reach a soft absorption of previous excesses.

Assessment of financial and external disequilibria



Early warning system (EWS) of Currency Crisis Risk: probability of currency tensions

The probability of a crisis is based on 4-quarters lagged data, e.g. Probability in Q4-2016 is based on Q4-2015 data



Our currency tensions Early Warning System, do not anticipate a **generalized crises** in any of the regions, although it does show a high degree of differentiation *within* regions



- Our Currency-Crisis Early Warning System EWS allows us to estimate the probability of a currency crisis, which is defined as a “large” fall in the exchange rate and in foreign reserves in a given country, according to certain predefined measures.
- The probabilities shown in the table are the simple average of the individual countries probabilities for each region. The list of the leading indicators used in the estimation of the probability and the definition of each region are shown in the Appendix.

Source: BBVA Research

Exchange rates tensions have relaxed significantly during the recent months, especially in Emerging Markets. Although we do not anticipate serious tensions in the coming months in any particular region as a whole, there may be tensions in countries within each region

Vulnerability Indicators table by country

Vulnerability Indicators Table



Vulnerability indicators* 2018: developed markets

	Fiscal sustainability			External sustainability			Liquidity management			Macroeconomic performance			Credit and housing			Private debt			Institutional		
	Structural primary balance (1)	Interest rate GDP growth differential 2016-21	Gross public debt (1)	Current account balance (1)	External debt (1)	RER appreciation (2)	Gross financial needs (1)	Short-term public debt (3)	Debt held by non-residents (3)	GDP growth (4)	Consumer prices (4)	Unemployment rate (5)	Private credit to GDP growth (4)	Real housing prices growth (4)	Equity markets growth (4)	Household debt (1)	NF corporate debt (1)	Financial liquidity (6)	WB political stability (7)	WB control corruption (7)	WB rule of law (7)
United States	-3.3	-1.4	106	-2.5	96	1.7	23	18	32	2.8	2.5	3.8	-1.8	3.8	18.1	77	74	65	-0.3	-1.4	-1.6
Canada	-0.9	-0.1	87	-3.0	114	-1.0	10	10	26	2.1	2.7	6.1	0.9	-1.3	2.8	100	121	130	-1.1	-1.9	-1.8
Japan	-3.3	-1.1	238	3.6	75	-0.3	41	16	11	1.0	1.4	2.9	1.8	-0.7	18.5	57	101	49	-1.1	-1.5	-1.6
Australia	-0.2	-1.2	41	-2.8	112	-3.7	3	4	44	3.2	2.2	5.3	1.5	-5.8	10.1	121	75	133	-0.9	-1.8	-1.7
Korea	1.4	-1.1	40	5.0	28	3.1	0	7	13	2.8	1.6	3.7	7.2	0.5	-2.1	98	96	100	-0.3	-0.5	-1.2
Norway	-10.5	-2.6	36	7.8	155	1.5	-9	0	49	2.1	1.8	3.8	-8.5	0.1	22.1	100	144	146	-1.2	-2.2	-2.0
Sweden	0.5	-2.9	38	2.6	175	-4.8	3	11	38	2.4	2.0	6.2	-2.0	-1.7	1.5	88	153	181	-1.0	-2.1	-1.9
Denmark	-0.8	0.1	35	7.7	176	1.1	5	12	38	2.0	1.6	5.4	2.9	2.9	-4.4	119	123	283	-0.9	-2.2	-1.9
Finland	-0.8	-1.7	61	0.9	176	1.6	7	11	81	2.6	1.6	7.7	-0.7	-0.1	5.8	66	115	138	-1.1	-2.2	-2.0
UK	-0.3	-0.4	87	-3.5	303	-5.5	9	8	37	1.4	2.3	4.1	-1.0	0.9	1.9	86	83	57	-0.3	-1.8	-1.7
Austria	0.6	-1.7	74	2.2	159	2.0	6	8	81	2.8	1.9	5.2	-3.7	2.9	0.8	50	94	90	-1.0	-1.5	-1.8
France	-1.0	-1.2	97	-0.9	214	1.7	10	8	61	1.6	1.6	8.8	0.7	0.9	3.1	58	132	105	-0.2	-1.3	-1.4
Germany	1.5	-2.2	60	8.1	141	3.2	4	8	54	1.9	1.8	3.5	-15.5	2.5	-4.5	53	55	76	-0.6	-1.8	-1.6
Netherlands	0.9	-1.8	53	9.9	514	2.6	7	14	48	2.8	1.5	3.9	-15.5	7.2	2.3	103	172	100	-0.9	-1.9	-1.8
Belgium	0.8	-1.0	101	0.1	230	2.8	17	16	64	1.5	1.9	6.4	-10.0	1.3	-4.1	60	158	52	-0.4	-1.5	-1.3
Italy	2.1	0.5	130	2.0	120	1.1	22	16	37	1.2	1.9	10.8	-2.7	-0.1	-8.7	41	73	92	-0.2	-0.2	-0.3
Spain	-0.5	-1.1	85	1.2	162	1.6	17	15	52	2.7	2.2	15.6	-11.3	1.9	-9.6	60	95	96	-0.3	-0.5	-1.0
Ireland	0.9	-2.2	67	7.4	649	0.5	7	10	70	4.7	1.8	5.3	-32.8	12.0	-5.2	47	207	46	-1.0	-1.5	-1.4
Portugal	2.6	-0.5	121	0.0	212	0.6	13	10	62	2.3	4.7	7.0	-6.6	10.2	5.5	68	103	109	-1.1	-0.9	-1.1
Greece	5.8	-1.8	188	-0.8	214	0.0	15	8	82	2.0	0.9	19.9	-7.5	0.7	-8.5	58	61	128	0.1	0.1	-0.1

Source: BBVA Research, Haver, BIS, IMF and World Bank

*Vulnerability indicators: (1) % GDP (2) Deviation from four-year average (3) % of total debt (4) % year on year (5) % of Total labour force (6) Financial system credit to deposit (7) Index by World Bank governance indicators

Vulnerability Indicators Table



Vulnerability indicators* 2018: emerging markets

	Fiscal sustainability			External sustainability			Liquidity management			Macroeconomic performance			Credit and housing			Private debt			Institutional		
	Structural primary balance (1)	Interest rate GDP growth differential 2016-21	Gross public debt (1)	Current account balance (1)	External debt (1)	RER appreciation (2)	Gross financial needs (1)	Reserves to short-term external debt (3)	Debt held by non-residents (3)	GDP growth (4)	Consumer prices (4)	Unemployment rate (5)	Private credit to GDP growth (4)	Real housing prices growth (4)	Equity markets growth (4)	Household debt (1)	NF corporate debt (1)	Financial liquidity (6)	WB political stability (7)	WB control corruption (7)	WB rule of law (7)
Bulgaria	-0.5	0.4	23	2.4	65	5.6	4	1.8	44	3.6	3.0	5.6	0.6	4.8	-9.3	20	79	78	-0.4	0.2	0.0
Czech Rep	1.9	-1.8	33	-0.4	80	7.0	6	22	50	3.1	2.6	2.5	1.5	5.1	5.4	32	56	83	-1.0	-0.6	-1.1
Croatia	2.4	-0.6	74	2.7	80	2.2	12	3.6	40	2.8	1.3	12.0	-1.6	3.1	-1.6	32	26	84	-0.7	-0.2	-0.3
Hungary	-0.3	-2.2	71	2.3	95	-0.1	18	1.0	44	4.0	3.1	3.9	0.5	13.3	-0.3	18	79	82	-0.8	-0.1	-0.5
Poland	-0.5	-2.1	50	-0.8	69	1.3	7	1.6	55	4.4	2.3	4.1	-0.5	5.0	-8.3	36	89	107	-0.5	-0.7	-0.5
Romania	-2.9	-2.9	37	-3.5	49	3.0	8	1.6	52	4.0	3.5	4.7	-1.2	-0.6	6.8	15	33	81	-0.1	0.0	-0.4
Russia	2.2	0.3	15	6.2	29	-3.4	1	4.9	23	1.7	3.6	5.5	-0.2	-0.8	17.5	18	50	106	0.7	0.9	0.8
Turkey	-2.7	-1.8	32	-5.1	52	0.6	7	0.8	37	3.0	23.5	11.3	7.4	-2.1	-2.9	16	73	126	1.8	0.2	0.3
Argentina	-0.9	-11.6	63	-3.7	64	-35.0	15	1.0	39	-2.6	40.5	8.9	4.3	1.0	28.3	7	15	74	-0.2	0.3	0.2
Brazil	-1.3	1.7	88	-1.3	33	-7.3	15	4.0	9	1.4	4.2	11.8	-1.3	-3.1	6.8	26	44	88	0.4	0.5	0.3
Chile	-1.4	-2.0	25	-2.5	66	4.2	3	1.5	30	4.0	2.9	6.9	1.0	8.2	-1.1	35	52	162	-0.4	-1.0	-1.0
Colombia	0.2	0.2	49	-2.4	38	32.0	5	3.0	31	2.8	3.1	9.2	-1.2	3.3	12.3	21	24	115	0.8	0.4	0.4
Mexico	1.3	0.5	54	-1.3	37	-0.5	9	3.6	31	2.2	4.3	3.5	0.4	5.1	-1.6	16	26	85	0.6	0.9	0.6
Peru	-1.3	-0.8	26	-1.8	30	9.6	7	6.3	31	4.1	2.4	6.9	0.9	-2.7	5.5	16	35	109	0.3	0.5	0.5
China	-3.1	-5.6	70	0.7	14	-2.3	4	3.7	..	6.6	2.6	4.0	2.6	3.8	-24.2	49	164	96	0.3	0.3	0.3
India	-1.7	-3.6	70	-3.0	20	-2.7	11	3.9	6	7.3	5.1	3.5	-1.0	0.5	15.8	11	44	79	0.8	0.2	0.0
Indonesia	-0.5	-3.1	30	-2.4	37	-4.4	4	2.4	61	5.1	3.6	5.2	0.3	0.0	1.3	17	22	101	0.5	0.3	0.3
Malaysia	-0.7	-2.0	55	2.9	61	1.4	11	0.9	30	4.7	3.0	3.2	-1.6	0.5	2.1	89	--	112	-0.2	0.0	-0.4
Philippines	0.9	-4.1	40	-1.5	21	-4.5	4	5.5	25	6.5	5.2	5.5	1.9	0.1	-10.9	4	42	70	1.2	0.5	0.4
Thailand	-0.2	-2.5	42	9.1	33	4.6	5	3.1	13	4.6	0.5	0.7	-0.3	6.9	5.0	69	46	100	0.8	0.4	0.0

Source: BBVA Research, Haver, BIS, IMF and World Bank

*Vulnerability indicators: (1) % GDP (2) Deviation from four-year average (3) % of total debt (4) % year on year (5) % of Total labour force (6) Financial system credit to deposit (7) Index by World Bank governance indicators

Methodological Appendix

Appendix

Methodology: indicators and maps

- **Financial Stress Map:** It stresses levels of stress according to the normalised time series movements. Higher positive standard units (1.5 or higher) stand for high levels of stress (dark blue) and lower standard deviations (-1.5 or below) stand for lower level of market stress (lighter colours)
- **Sovereign Rating Index:** An index that translates the letter codes of the three important rating agencies' rating (Moody's, Standard & Poors and Fitch) to numerical positions from 20 (AAA) to default (0). The index shows the average of the three rescaled numerical ratings
- **Sovereign CD Swaps Maps:** It shows a colour map with six 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)
- **Downgrade Pressure Gap:** The gap shows the difference between the implicit ratings according to the Credit Default Swaps and the current ratings index (numerically scaled from default (0) to AAA (20)). We calculate implicit probabilities of default (PD) from the observed CDS and the estimated equilibrium spread. For the computation of these PDs we follow a standard methodology as 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. From June 2018 on, the cluster analysis is performed recursively, starting with an initial sample going from Jan-2004 to Dec-2008 and adding one month at each step, generating monthly specific thresholds for determining the implicit ratings.
- The graph plots the difference between CDS-implied sovereign rating and the actual sovereign rating index, in notches. Higher positive differences account for potential Upgrade pressures and negative differences account for Downgrade potential. We consider the +/- 2 notches area as being Neutral
- **Vulnerability Radars:** A Vulnerability Radar shows a static and comparative vulnerability for different countries. For this we assigned several dimensions of vulnerabilities, each of them represented by three vulnerability indicators. The dimensions included are: Macroeconomics, Fiscal, Liquidity, External, Excess Credit and Assets, Private Balance Sheets and Institutional. Once the indicators are compiled, we reorder the countries in percentiles from 0 (lower ratio among the countries) to 1 (maximum vulnerabilities) relative to their group (Developed Economies or Emerging Markets). Furthermore, Inner positions (near 0) in the radar shows lower vulnerability, while outer positions (near 1) stand for higher vulnerability. Furthermore, we normalize each value with respect to given risk thresholds, whose values have been computed according to our own analysis or empirical literature. If the value of a variable is equal to the threshold, it would take a value of 0.8 in the radar

Appendix

Methodology: indicators and maps

Risk Thresholds Table

Vulnerability Dimensions	Risk thresholds Developed Economies	Risk thresholds emerging economies	Risk direction	Research
Macroeconomics				
GDP	1.5	3.0	Lower	BBVA Research
Inflation	4.0	10.0	Higher	BBVA Research
Unemployment	10.0	10.0	Higher	BBVA Research
Fiscal vulnerability				
Cyclically adjusted deficit ("Structural Deficit")	-4.2	-0.5	Lower	Baldacci et Al (2011). Assesing fiscal stress. IMF WP 11/100
Expected interest rate GDP growth diferential 5 years ahead	3.6	1.1	Higher	Baldacci et Al (2011). Assesing fiscal stress. IMF WP 11/100
Gross public bebt	73.0	43.0	Higher	Baldacci et Al (2011). Assesing fiscal stress. IMF WP 11/100
Liquidity problems				
Gross financial needs	17.0	21.0	Higher	Baldacci et Al (2011). Assesing fiscal stress. IMF WP 11/100
Debt held by non residents	84.0	40.0	Higher	Baldacci et Al (2011). Assesing fiscal stress. IMF WP 11/101
Short term debt pressure				
Public short-term debt as % of total public debt (Developed)	9.1		Higher	Baldacci et Al (2011). Assesing fiscal stress. IMF WP 11/100
Reserves to short-term debt (Emerging)		0.6	Lower	Baldacci et Al (2011). Assesing fiscal stress. IMF WP 11/100
External Vulnerability				
Current account balance (% GDP)	4.0	6.0	Lower	BBVA Research
External debt (% GDP)	200.0	60.0	Higher	BBVA Research
Real exchange rate (Deviation from 4 yr average)	5.0	10.0	Higher	EU Commission (2012) and BBVA Research
Private Balance Sheets				
Household debt (% GDP)	84.0	84.0	Higher	Chechetti et al (2011). "The real effects of debt". BIS Working Paper 352 & EU Comission (2012)
Non-financial corporate debt (% GDP)	90.0	90.0	Higher	Chechetti et al (2011). "The real effects of debt". BIS Working Paper 352 & EU Comission (2013)
Financial liquidity (Credit/Deposits)	130.0	130.0	Higher	EU Commission (2012) and BBVA Research
Excess Credit and Assets				
Private credit to GDP (annual change)	8.0	8.0	Higher	IMF global financial stability report
Real housing prices growth (% YoY)	8.0	8.0	Higher	IMF global financial stability report
Equity growth (% YoY)	20.0	20.0	Higher	IMF global financial stability report
Institutions				
Political stability	0.2 (9th percentile)	-1.0 (8th percentile)	Lower	World Bank governance Indicators
Control of corruption	0.6 (9th percentile)	-0.7 (8th percentile)	Lower	World Bank governance Indicators
Rule of law	0.6 (8th percentile)	-0.6 (8 th percentile)	Lower	World Bank governance Indicators

Appendix

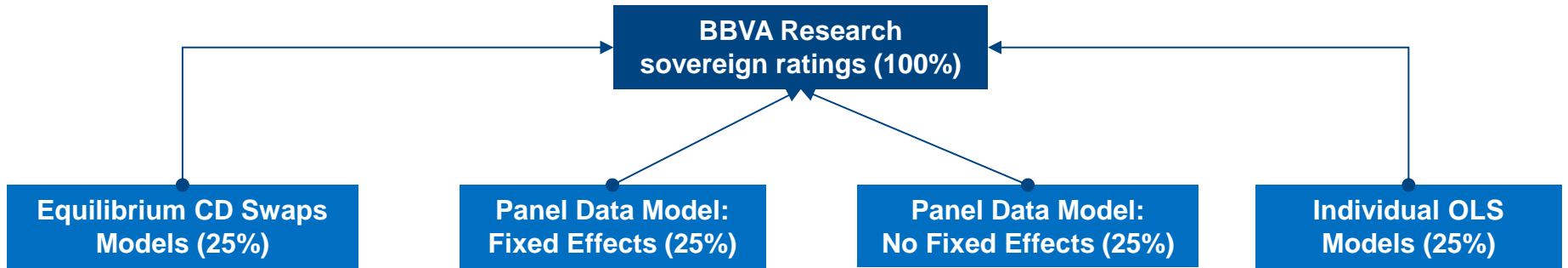
Methodology: models and BBVA country risk

- **BBVA Research sovereign ratings methodology:** We compute our sovereign ratings by averaging four alternative sovereign rating models developed at BBVA Research:
- **Credit Default Swaps Equilibrium Panel Data Models:** This model estimates actual and forecast equilibrium levels of CDS for 48 developed and emerging countries and 10 macroeconomic explanatory variables. The CDS equilibrium is calculated using the centered 5-year moving average of the explanatory variables weighted according to their estimated sensitivities. For estimating the equilibrium level, the BAA spread is left unchanged at its long-term median level (2003-2016). The values of these equilibrium CDS are finally converted to a 20 scale sovereign rating scale.
- **Sovereign Rating Panel Data Ordered Probit with Fixed Effects Model:** The model estimates a sovereign rating index (a 20 numerical scale index of the three sovereign rating agencies) through ordered probit panel data techniques. This model takes into account idiosyncratic fundamental stock and flows sustainability ratios allowing for fixed effects , thus including idiosyncratic country-specific effects
- **Sovereign Rating Panel Data Ordered Probit without Fixed Effects Model:** We used the estimates of the previous model but retaining only the contribution of the macroeconomic and institutional variables, without adding the country “fixed-effect” contribution. In this way we are able to account more clearly for the effect of only those macroeconomic variables that we can identify.
- **Sovereign Rating Individual OLS Models:** These models estimate the sovereign rating index (a 20 numerical scale index of the three sovereign rating agencies) individually. Furthermore, parameters for the different vulnerability indicators are estimated taken into account the history of the country, independent of others. The estimation comes from Oxford Economics Forecasting (OEF) for the majority of countries. For those countries that are not analysed by OEF, we estimate a similar OLS individual model.

Appendix

Methodology: models and BBVA country risk

BBVA Research sovereign ratings methodology diagram



Appendix

Methodology: Synchronization Indicator

- **Synchronization Indicator:** This indicator measures by how much all the exchange rates (against USD) in a group of 23 emerging economies are moving together during a period of 15 days (rolling window). A more extensive description of the methodology will be included in a forthcoming note. We first calculate the daily percentage change of the exchange rate of each one of the 23 countries using a daily sample of FX rates changes that goes from January-2004 to the last available date. Then, we estimate through a PCA a unique common factor using all the observations in the whole sample of 3576 days. Additionally, we also estimate the daily median of FX changes for the 23 countries (changes are standardized).
- The weights that each country has on the common factor are kept constant during the whole sample. However, we estimate in a daily fashion how much this common factor explains of the total variation in the 23 countries' FX rates (R^2) within a rolling period including the latest 15 days. We assume that the highest the R^2 the higher the Synchronization or comovement of the 23 FX rates. This moving- R^2 corresponds to the dark blue line in the graph shown in slide 19. The dotted red line corresponds to the average within the latest 15 days of the daily median change among the 23 countries.
- Once we have estimated the Synchronization index and the median change in EM markets, we construct a warning indicator that takes the maximum value when (on average) EM FX rates are depreciating strongly and there is a high degree of Synchronization (intense red). On the other hand, the minimum value of the warning index occurs when on average FX rates are appreciating strongly and in a synchronized fashion (intense blue). The intermediate colors include several possible combinations of lower levels of depreciation/appreciation and/or lower degrees of Synchronization.

Appendix

Methodology: Credit Gaps (Debt-to-GDP)

- **Credit Gaps (Debt-to-GDP):** The methodology is based on the idea that the long-term relationship between the Private Credit-to-GDP ratio and income per capita follows a non-linear relationship with a saturation level at the highest levels of income, i.e. a Gompertz-curve type of relationship. Thus we assume the following relationship between the credit ratio and income per capita:

$$\frac{C}{Y} = \alpha \cdot \exp(\gamma \cdot \exp(\beta Ypc))$$

- Where α is the constant “maximum” saturation level. If there were no other variables in place, this is the level that a country will approach as long-term per capita income tends to infinity. γ is the parameter that defines the curvature of the Gompertz curve and β defines the sensitivity to income per capita.
- In the model we also allow different elasticities of the credit ratio to income per capita and to other explanatory variables in the long run versus the medium or the short run. We compute our Credit Gap as the difference between the observed level of the credit ratio and the estimated “structural” long-term level. Therefore, we extend the previous specification to include different sensitivities to income per capita:

$$\frac{C}{Y} = \exp[\alpha \cdot \exp(\gamma \cdot \exp(\beta_{LT} \overline{Ypc}_{it} + \beta_{MT} \widetilde{Ypc}_{it} + \beta_{ST} \widehat{Ypc}_{it}))]$$

- Where \overline{Ypc}_{it} represents the long-term (15 years) moving average of GDP per capita, \widetilde{Ypc}_{it} represents the medium-term deviation of income per capita with respect to its long-term level, i.e. $\widetilde{Ypc}_{it} = (\overline{Ypc}_{it}^{5yr} - \overline{Ypc}_{it}^{15yr})$, and \widehat{Ypc}_{it} represents the short-term deviation of the observed income per capita with respect to its medium-term (5-years) moving average, i.e. $\widehat{Ypc}_{it} = (Ypc_{it} - \overline{Ypc}_{it}^{5yr})$.
- We define the credit gap as the difference between the current Credit-to-GDP ratio and the “structural” part explained by long-term component of income per capita:

$$CreditGap_{i,t} = \frac{C}{Y} - [\exp[\alpha \cdot \exp(\gamma \cdot \exp(\beta_{LT} \overline{Ypc}_{it})) + \phi_{LT} \overline{X}_{it}^{15yr}]]$$

- The full description of the methodology can be found in <https://goo.gl/LTeTHD> and <https://goo.gl/r0BLbl>

Appendix

Methodology: Early Warning Systems

EWS Banking Crises:

The complete description of the methodology can be found at <https://goo.gl/r0BLbl> and at <https://goo.gl/VA8xXv>. A banking crisis is defined as systemic if two conditions are met: 1) Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations), 2) Significant banking policy intervention measures in response to significant losses in the banking system. The probability of a crisis is estimated using a panel-logit model with annual data from 68 countries and from 1990 to 2012. The estimated model is then applied to quarterly data. The probability of a crisis is estimated as a function of the following leading indicators (with a 2-years lag):

- Credit-to-GDP Gap (Deviation from an estimated long-term level)
- Current account balance to GDP
- Short-term interest rate (deviation against US interest rate)
- Libor interest rate
- Credit-to-Deposits
- Regulatory Capital to Risk Weighted Assets ratio..

EWS Currency Crises:

We estimate the probability of a currency crisis (a large fall in exchange rate and foreign reserves event) is estimated using a panel-logit model with 78 countries from 1980Q1 to 2015Q4, as a function of the following variables (with an 4-quarters lag):

- Credit-to-GDP ratio Gap (based on HP filter)
- Inflation
- BAA Spread
- Cyclical Current Account (based on HP filter)
- Short-term interest rate (deviation against US interest rate)
- Libor interest rate (different lags)
- Real effective exchange rate
- Investment to GDP
- GDP real growth rate (HP-trend and cyclical deviation from trend)
- Total trade to GDP

Appendix

Methodology: Early Warning Systems

EWS Banking Crises Definition of Regions:

- OPEC and Other Oil Exporters: Algeria, Angola, Azerbaijan, Bahrain, Canada, Ecuador, Nigeria, Norway, Qatar, Russia and Venezuela
- Emerging Asia: Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand and Vietnam.
- South America & Mexico: Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru and Uruguay
- Other LatAm & Caribbean: Bolivia, Costa Rica, Dominican Rep., El Salvador, Guatemala, Honduras, Nicaragua and Panama
- Africa & MENA: Botswana, Egypt, Israel, Morocco, Namibia and South Africa.
- Emerging Europe: Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Rep, Slovenia, Turkey, Ukraine
- Core Europe: Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Sweden and United Kingdom.
- Periphery Europe: Greece, Ireland, Italy, Portugal and Spain
- Advanced Economies: Australia, Japan, Korea, Singapore, Iceland, New Zealand and Switzerland.

EWS Currency Crises Definition of Regions:

- OPEC and Other Oil Exporters: Algeria, Angola, Azerbaijan, Bahrain, Nigeria, Norway, Oman, Qatar, Russia, Trinidad and Tobago, United Arab Emirates and Venezuela
- Emerging Asia: Bangladesh, China, Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand and Vietnam.
- South America & Mexico: Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru and Uruguay
- Other LatAm & Caribbean: Bolivia, Costa Rica, Dominican Rep., El Salvador, Guatemala, Honduras, Jamaica and Nicaragua
- Emerging Europe: Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Rep, Slovenia, Turkey, Ukraine
- Africa & MENA: Botswana, Egypt, Israel, Morocco, Namibia, South Africa and Tunisia
- Advanced Economies: Australia, Japan, Korea, Singapore, Canada, Iceland, New Zealand and Switzerland.

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