Country Risk Report 2024

January 2024

(Data as December 2023)

Summary

SOVEREIGN RATINGS AND SPREADS:

- **Agencies' ratings have remained relatively stable during 2023.** Changes have been mostly positive in peripheral Europe, while US and France were downgraded by Fitch. **The rating cycle has been mostly negative for Emerging Economies (EE),** mainly due to specific idiosyncratic vulnerabilities.

- **Sovereign spreads remained fairly stable despite the FED and ECB rate hikes and quantitative tightening, a**nd they have actually narrowed in the second half of the year, as a result of a stabilizing and declining inflation, especially in EE. Some volatility due to episodes of local political instability and a general spike at the start of the Gaza conflict in October

FINANCIAL, FISCAL AND PRIVATE VULNERABILITIES:

- **Macroeconomic vulnerabilities have worsened across the board** given the persistence of high inflation, the consecutive negative shocks to economic activity and the lower growth levels after COVID-recovery effects have vanished. **Government balances and fiscal vulnerabilities have worsened overall in 2023** following the improvement in 2022, while public leverage further deteriorated and still constitutes one of the main risks across both AE and EE.

- **On the private sector side, debt gaps levels** (outstanding debt ratios vs. estimated equilibrium) **have decreased further in 2023** due to higher inflation and higher nominal GDP levels, but still remain elevated in several AE and China.

- **Housing prices corrected somewhat during the first months of the 2023,** but they have remained rather stable more recently. **The highest disequilibrium levels continue to be in northern Europe, Canada, China and Hong Kong.**

- **The regional banking crisis in the US coincided with a high probability indicated by our EWS.** However, since it was a crisis more associated with liquidity mismanagement rather than excess leverage, its overall impact was contained. **The high leverage and the real estate crisis in China keeps it under a warning.**

- **Currency tensions surged in 2022 and 2023 due to monetary tightening of the FED and other CBs and geopolitical risks. In contrast to previous episodes, tensions were stronger in AE rather than in EE.** The end of the monetary tightening cycle has softened the likelihood of FX tensions in the coming years.

Summary

SPECIAL TOPIC: STOCHASTIC PROJECTIONS OF RATINGS, SOVEREIGN SPREADS AND FISCAL STRESS

- There are growing uncertainties about debt **sustainability** in Europe due to (i) **higher** for **longer** interest **rates** as a result of higher real rates and **inflation uncertainty**; in a context of (ii) **high debt** levels in some European Countries and (iii) governments highly **pressured** to finance **climate** change, increase **defense** spending, and attend **social** demands. **We estimate several projections of debt-to-GDP ratios for Germany, Spain, France and Italy (EU4) for 2023-2028** that account for such an uncertain environment (stochastic), **and estimate how this uncertainty would affect the evolution of sovereign ratings, sovereign spreads and the probability of a fiscal stress episode in these countries**.

- According to our results, **Italy exhibits significant risks of experiencing a rating downgrade,** given the high probability of a substantial increase in its debt in the medium term. Additionally, **its equilibrium risk premium could experience a considerable widening (up to 150 bps)**, and consistent with the previous results, **the likelihood of experiencing a fiscal stress episode (such as the 2010 crisis) is significantly higher in the upper percentiles** of the public debt distribution. **France could also be downgraded if its public debt path follows the upper percentiles**, while Germany and Spain would be hardly affected even in the worst case scenarios.

SPECIAL TOPIC: GLOBAL TRADE AND GEOPOLITICAL FRAGMENTATION

- **We estimate what the consequences for trade would be of a world fragmentation into geopolitical-driven trading blocs**, using an indicator of the similarity of countries' votes in different United Nations sessions as a proxy of their ideological distance. We introduced this indicator in a gravitational model of bilateral exports, **finding a strong and negative correlation between the ideological distance between two countries and their bilateral trade**.

- **We then simulate three scenarios with different intensities, in which the World separates into a western liberal bloc aligned with the US, and another one aligned with Russia and China**, and estimate the impact on countries' bilateral trade, on each country exports and imports, and on their total trade and trade balance.

- **Our results show that world's trade would suffer in all the scenarios, with a maximum fall of 4% of GDP in the most extreme division scenario**. **It is clear that the western bloc would lose the least**: Not only would the impact on trade be small, but it might improve its trade balance position. On the other hand, **the biggest loser would be Russia**, since it might lose a large percentage of its trade (up until 9% of GDP), while also damaging its trade balance.
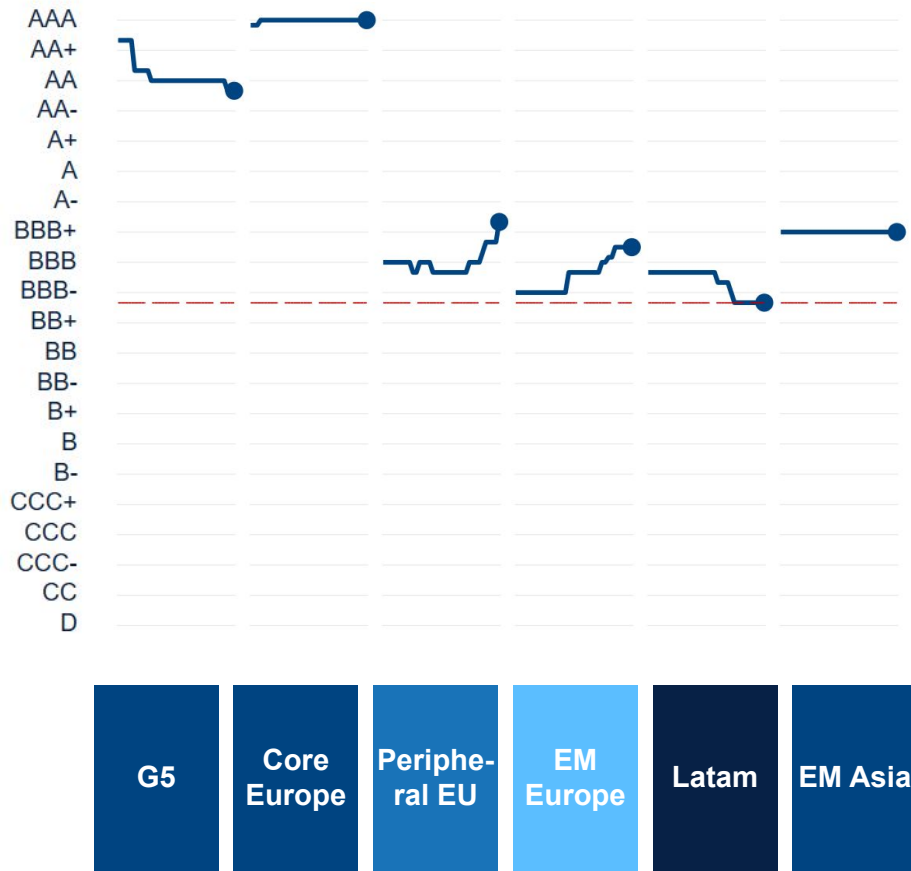
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Creating Opportunities

01

Sovereign Markets and Ratings Update

Evolution of sovereign ratings
Evolution of sovereign spreads by country
Evolution of Indicators of global risk aversion

Creating Opportunities

Sovereign markets and rating agencies update

MEDIAN SOVEREIGN RATING INDEX 2016-2023

- **Agencies' ratings have remained relatively stable during the year.**

- **Changes have been mostly positive in peripheral Europe, while US and France were downgraded by Fitch.**

- **Across the World, the rating cycle has been mainly negative for EE, mostly due to specific idiosyncratic vulnerabilities.**

- During 2023 and among AE, **Ireland, Greece and Portugal** were upgraded by at least one agency.

- **LATAM**'s ratings remained stable, with the exception of **Argentina**, which locates in default grade, and **Uruguay** who was upgraded.

- **Hungary, Pakistan and Tunisia (among others)** were downgraded in 2023. Russia stays in the default grade area.

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 0 (default). The index shows the average of the three rescaled numerical ratings.
G5 is the G7 Group without Canada and Italy
Source: BBVA Research by using S&P, Moody's and Fitch data

Sovereign markets and rating agencies update

SOVEREIGN RATING INDEX 2016-2023 (AND CHANGES IN 2023): ADVANCED ECONOMIES

Changes in 2023: ⭕ Downgrade   ⭕ Upgrade   **SP**: Standard & Poor's   **M**: Moody's   **F**: Fitch
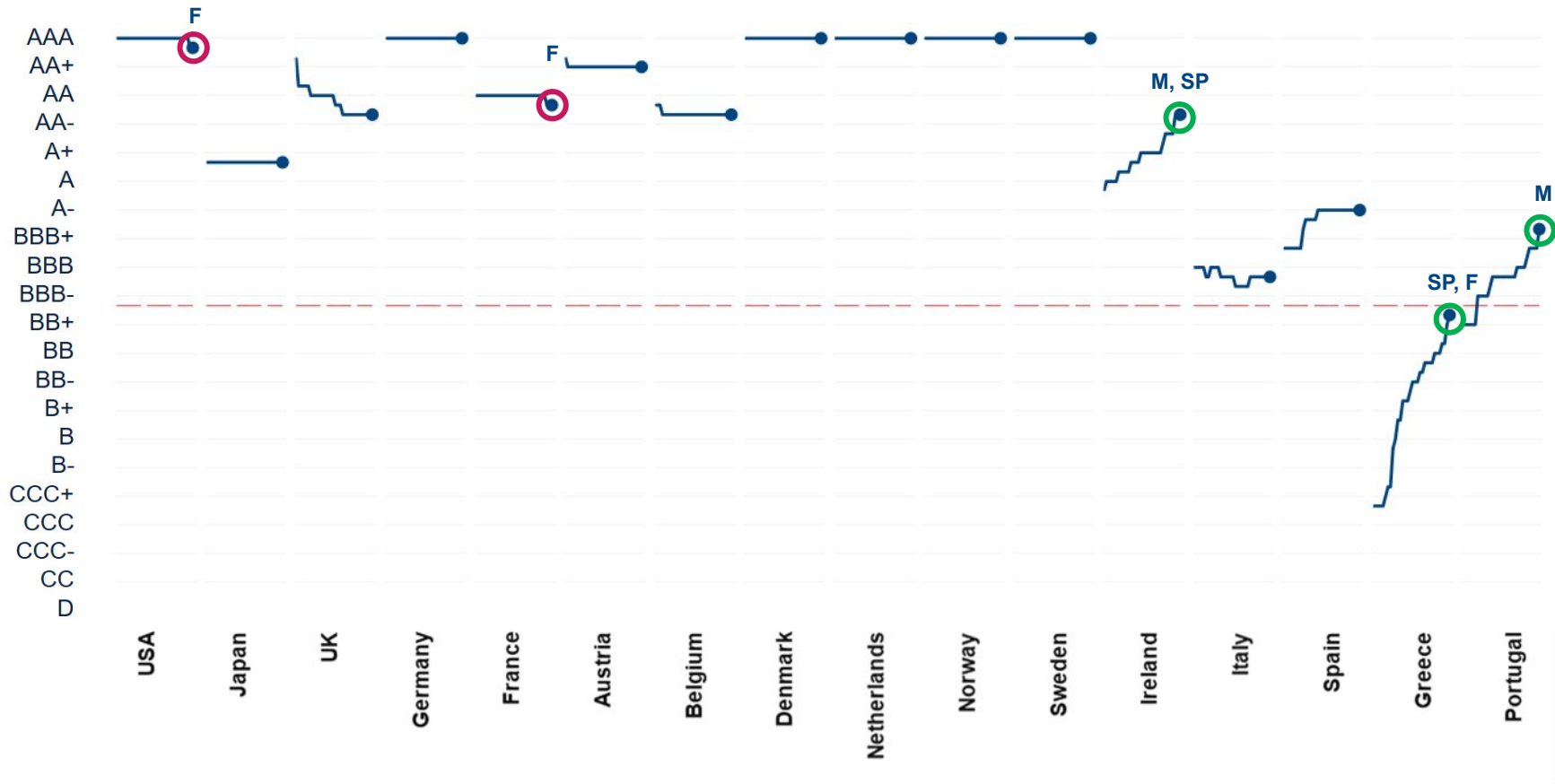
Source: BBVA Research

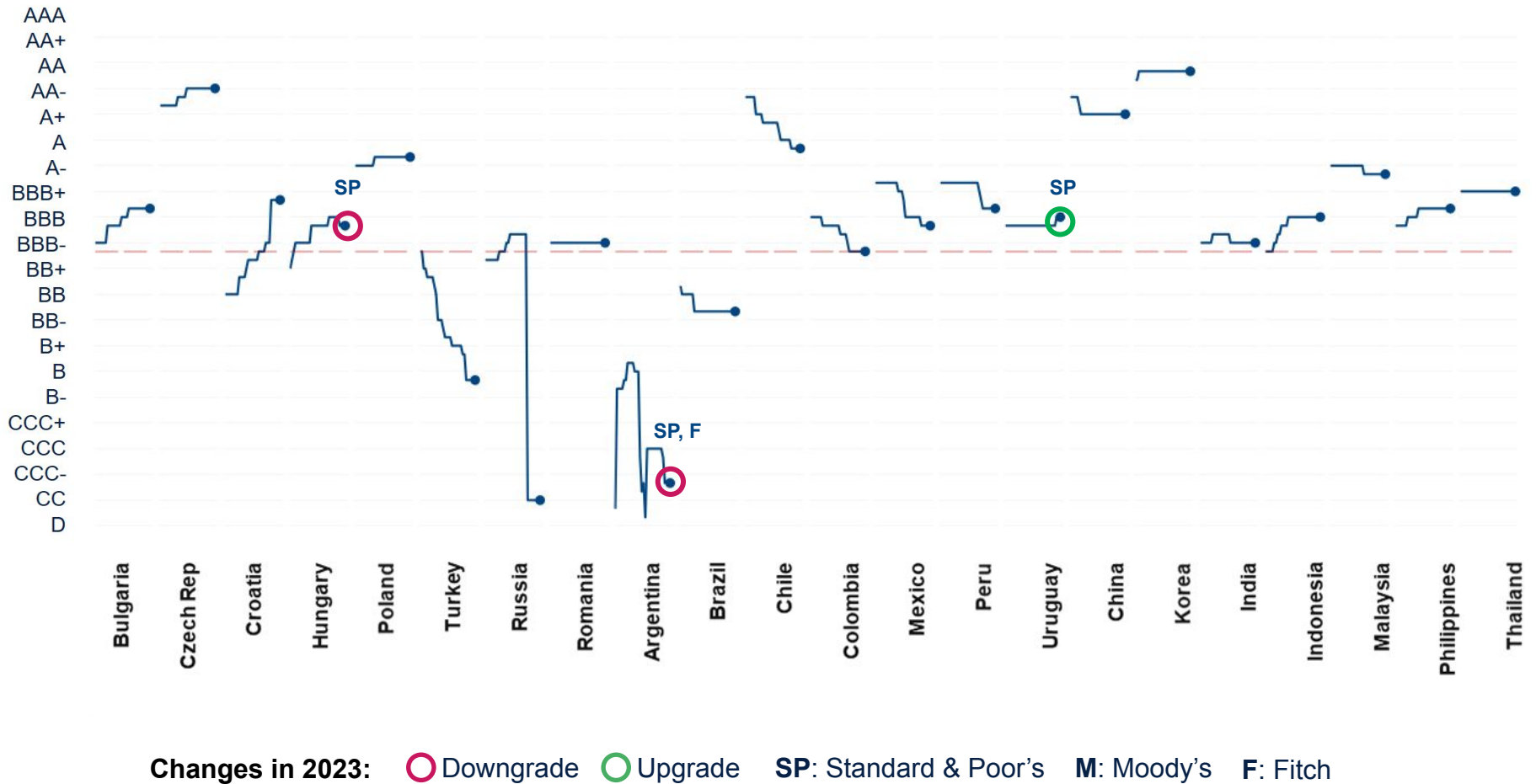# Sovereign markets and rating agencies update

SOVEREIGN RATING INDEX 2016-2023 (AND CHANGES IN 2023): EMERGING ECONOMIES

Changes in 2023:   ○ Downgrade   ○ Upgrade   **SP**: Standard & Poor's   **M**: Moody's   **F**: Fitch
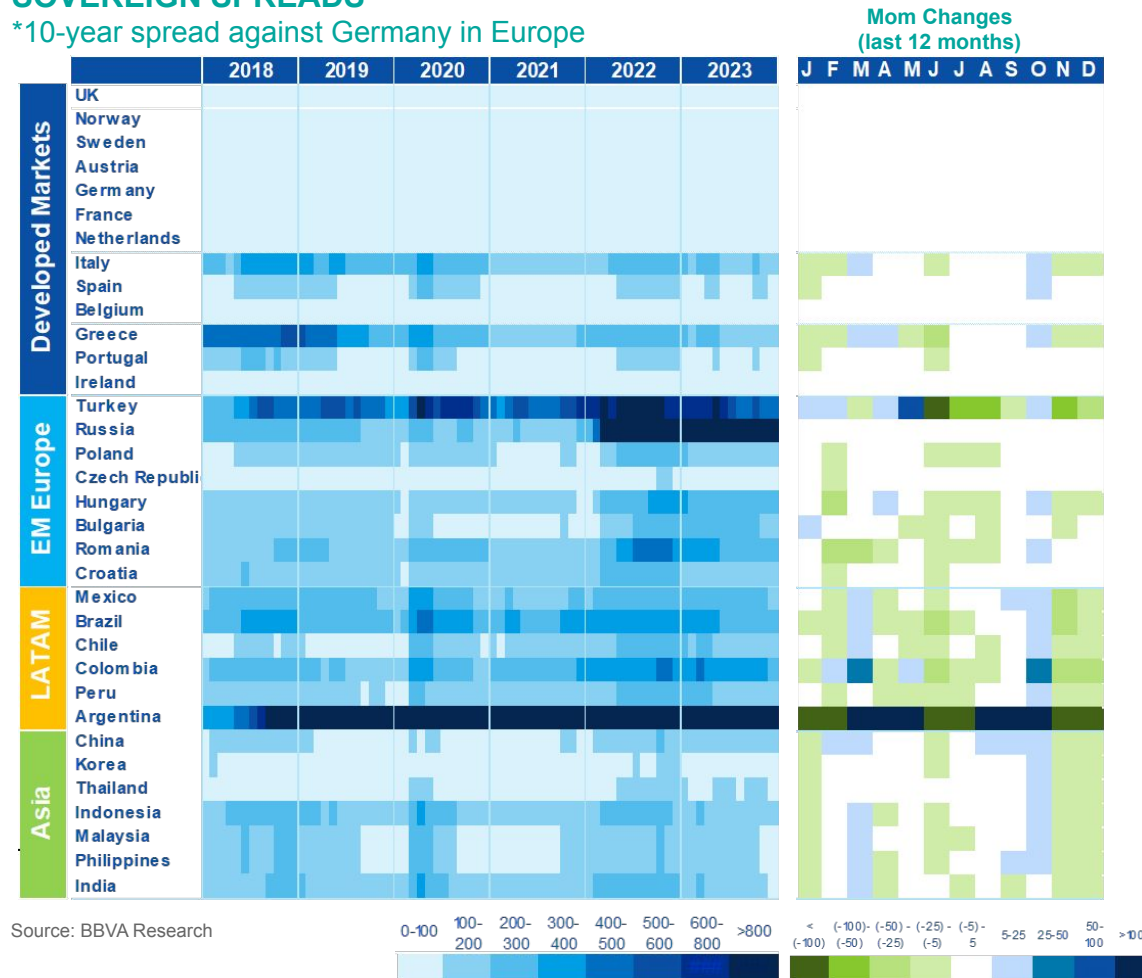
Source: BBVA Research

Sovereign spreads

Sovereign spreads remained fairly stable despite the FED and ECB rate hikes and quantitative tightening, and they have actually narrowed in the second half of the year, as a result of a stabilizing and declining inflation, especially in EE. Some volatility due to episodes of local political instability and a general spike at the start of the Gaza conflict in October

SOVEREIGN SPREADS
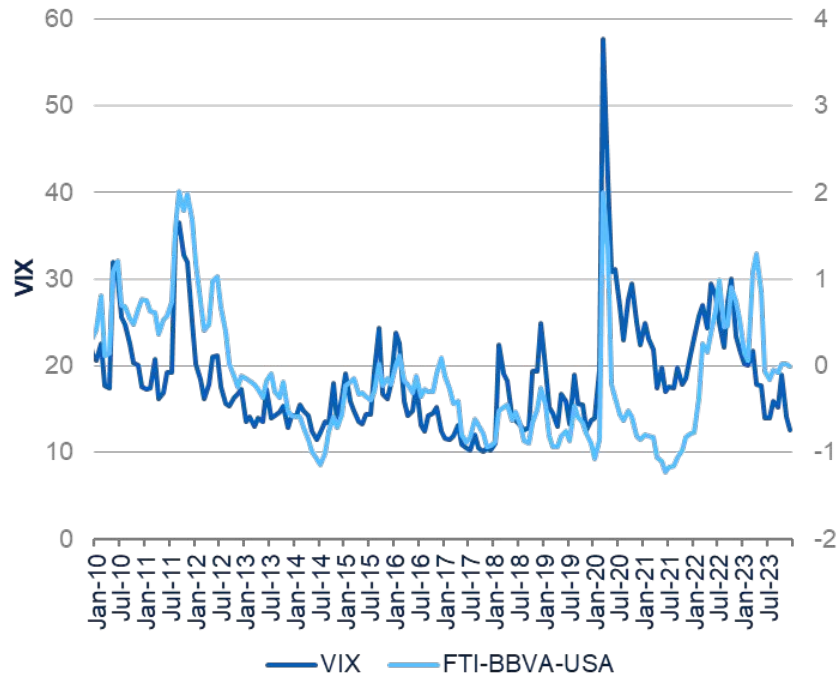*10-year spread against Germany in Europe

Mom Changes (last 12 months)

Region	Country	2018	2019	2020	2021	2022	2023	J F M A M J J A S O N D
Developed Markets	UK							
	Norway							
	Sweden							
	Austria							
	Germany							
	France							
	Netherlands							
	Italy							
	Spain							
	Belgium							
	Greece							
	Portugal							
	Ireland							
EM Europe	Turkey							
	Russia							
	Poland							
	Czech Republic							
	Hungary							
	Bulgaria							
	Romania							
	Croatia							
LATAM	Mexico							
	Brazil							
	Chile							
	Colombia							
	Peru							
	Argentina							
Asia	China							
	Korea							
	Thailand							
	Indonesia							
	Malaysia							
	Philippines							
	India							

Source: BBVA Research

Legend (spread levels): 0-100 | 100-200 | 200-300 | 300-400 | 400-500 | 500-600 | 600-800 | >800

Legend (Mom changes): < (-100) | (-100)-(-50) | (-50)-(-25) | (-25)-(-5) | (-5)-5 | 5-25 | 25-50 | 50-100 | >100

- **Central Banks' tightening has hardly impacted sovereign spreads in AE**, which was largely unexpected in the case of the EU Periphery where spreads have barely moved

- Bordering countries with Ukraine saw their spreads narrowing after conflict attenuation. **In Türkiye, a gradual improvement of inflationary pressures slowly pushed spreads downwards at the end of the year**.

- Political uncertainty from the election widened Argentina's already stressed spread, although Milei's triumph has resulted in a relaxation.

- Overall, spreads remained stable and relatively low in EE Asia, even descending in Indonesia and India.
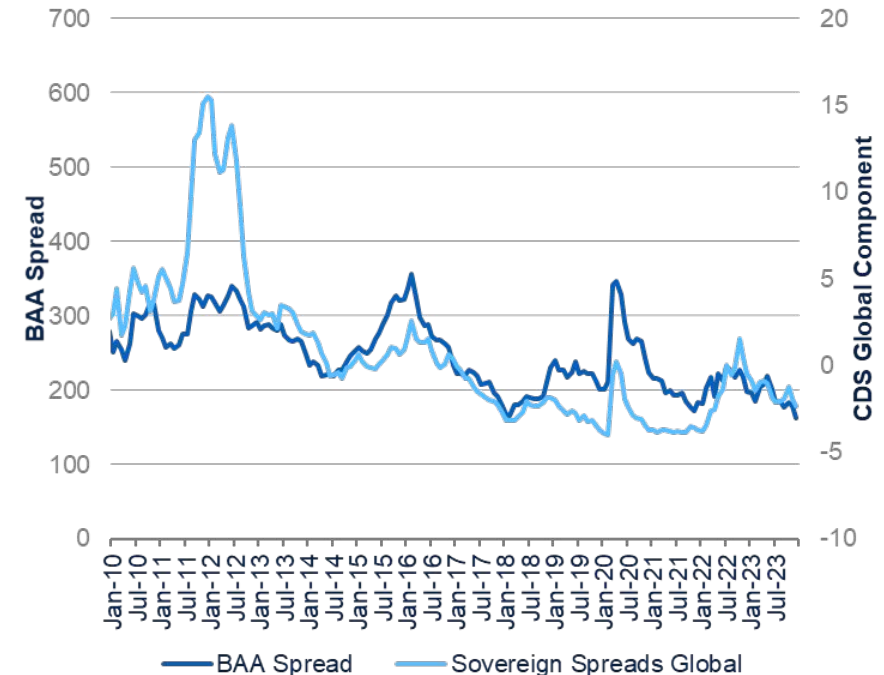
Global risk aversion indicators

Global Risk Aversion indicators have relaxed mainly during the second half of the year following the pause of central bank (CBs) interest rates hiking phase, returning to historical mean values.

GLOBAL RISK AVERSION INDICATORS: VIX & FINANCIAL TENSION INDEX (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 EEs and DMS
Source: FED, Datastream and BBVA Research

DEVELOPED MARKETS: VULNERABILITY RADAR 2023
(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: Fiscal balances risk have slightly increased, and high public debt levels keep the region highly vulnerable to fiscal shocks. **Despite high interest rates, strong nominal GDP growth kept vulnerability contained**. Housing prices and private debt gaps have improved.

Core Europe: Growth vulnerabilities have worsen due to persistent inflation and worse-than-expected short-term forecasts. **Financial vulnerabilities are declining due to the slowdown of housing prices and private debt.**

Periphery EU: Fiscal balances are improving, **but elevated public debt levels remain the highest risk**. Inflation has eased in line with the rest of advanced economies
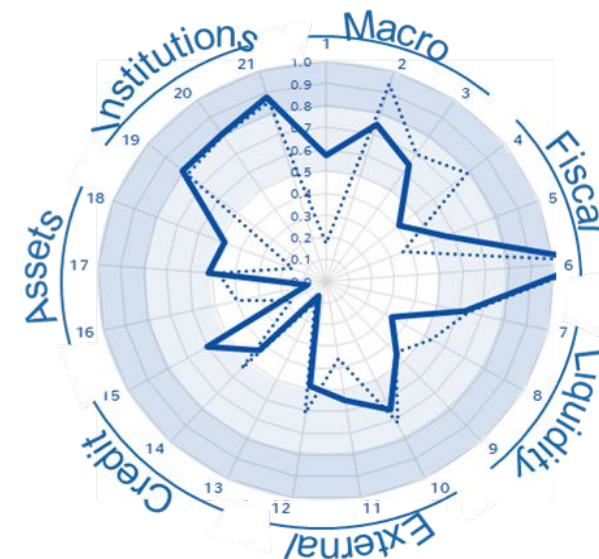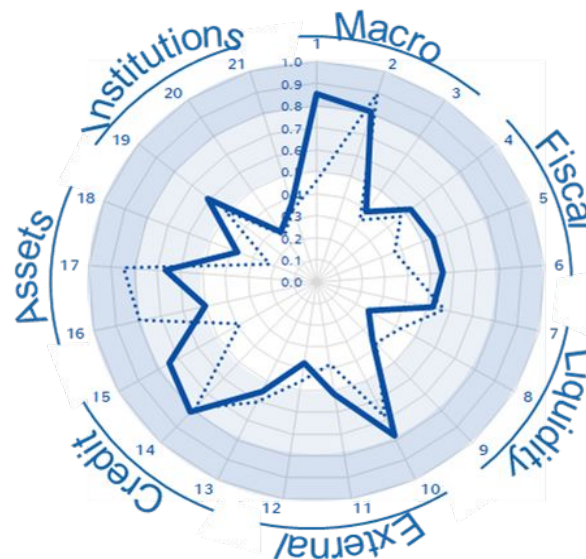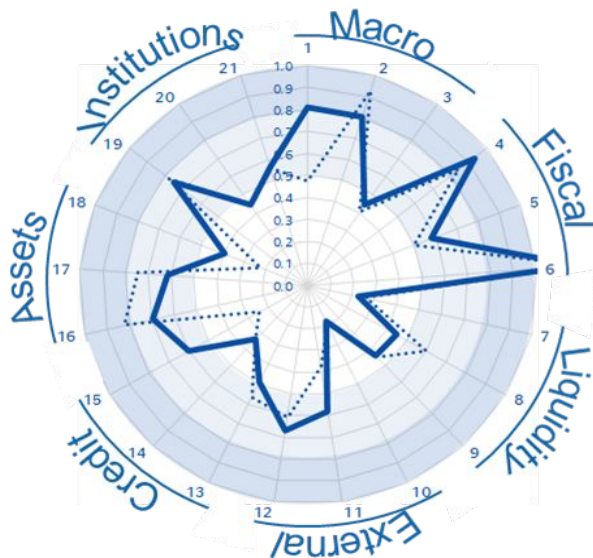
High risk   Moderate Risk   Safe

Macro: (1) GDP (% YoY) (2) Prices (% YoY) (3) Unemployment (% LF).
Fiscal: (4) Government Balance (%GDP) (5) Interest rate – GDP %YoY (6) Public debt (% GDP).
Liquidity: (7) Debt by non-residents (%total) (8) Financial needs (%GDP) (9) Short-term External Debt (%).
External: (10) External debt (%GDP) (11) RER appreciation (% deviation) (12) CAC balance (%GDP).
Private Debt: (13) Household (%GDP) (14) Corporate (%GDP) (15) Credit-to-deposit (%).
Assets: (16) Private Debt Gap (%GDP) (17) Housing Prices Gap (%GDP) (18) Equity gap (%).
Institutions*: (19) Political stability (20) Corruption (21) Rule of law. (*relative position of each group vis-à-vis the Developed/Emerging regions as a whole. **Institutional indicators are updated annually and last data corresponds to 2022**)

EMERGING ECONOMIES: VULNERABILITY RADAR 2023
(Relative position for the emerging countries. Risk equal to threshold=0.8, Min risk=0. Previous year data is shown as a dotted line)

EE Europe: **Macroeconomic vulnerability worsened due to lower growth and persistent inflation**. Current accounts have improved due to easing energy prices. Financial vulnerability is low relative to other regions, although increasing relative to previous year.
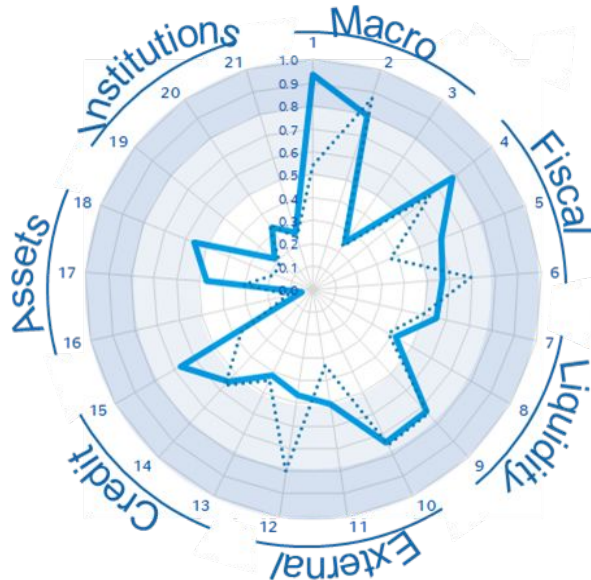
LatAm: **Macro vulnerabilities have worsened markedly due to low GDP growth**. Fiscal risks stabilized. Real housing prices and equity markets have cooled down, maintaining financial vulnerability in low levels.
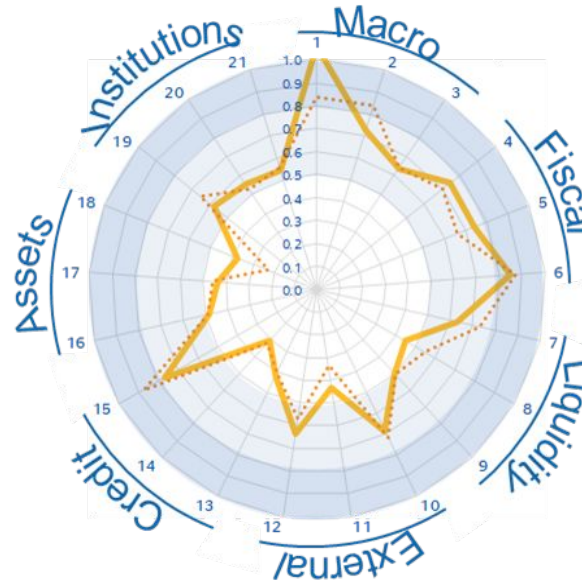
EE Asia: Fiscal vulnerabilities continue to be at high risk levels. Housing prices gaps and household leverage vulnerabilities remain significantly relaxed, but **public debt remain high and without changes**.
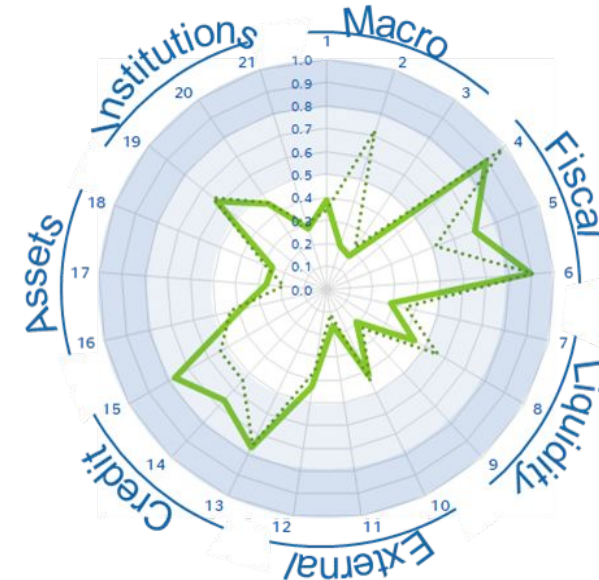
High risk   Moderate Risk   Safe

Macro: (1) GDP (% YoY) (2) Prices (% YoY) (3) Unemployment (% LF).
Fiscal: (4) Government balance (% GDP) (5) Interest rate – GDP %YoY (6) Public debt (% GDP).
Liquidity: (7) Debt by non-residents (%total) (8) Financial needs (%GDP) (9) Reserves to ST Ext. Debt (%)
External: (10) External debt (%GDP) (11) Reserves to ARA Metric (%) (12) CAC balance (%GDP).
Private Debt: (13) Household (%GDP) (14) Corporate (%GDP) (15) Credit-to-deposit (%).
Assets: (16) Private Debt Gap (%GDP) (17) Housing Prices Gap (%GDP) (18) Equity gap (%).
Institutions*: (19) Political stability (20) Corruption (21) Rule of law. (*relative position of each group vis-à-vis the Developed/Emerging regions as a whole. **Institutional indicators are updated annually and last data corresponds to 2022**)

BBVA-Research sovereign ratings by region

Our estimated ratings are currently in line with agencies in G7, Core Europe and EE Asia. We are in line but expect an improvement in the coming years in EU Periphery, thanks to the expected recovery in GDP pc levels and a decline in public debt ratios, and in Latam. We have a more negative view on EE Europe.

AGENCIES' SOVEREIGN RATING VS. BBVA RESEARCH RATING
(Median)
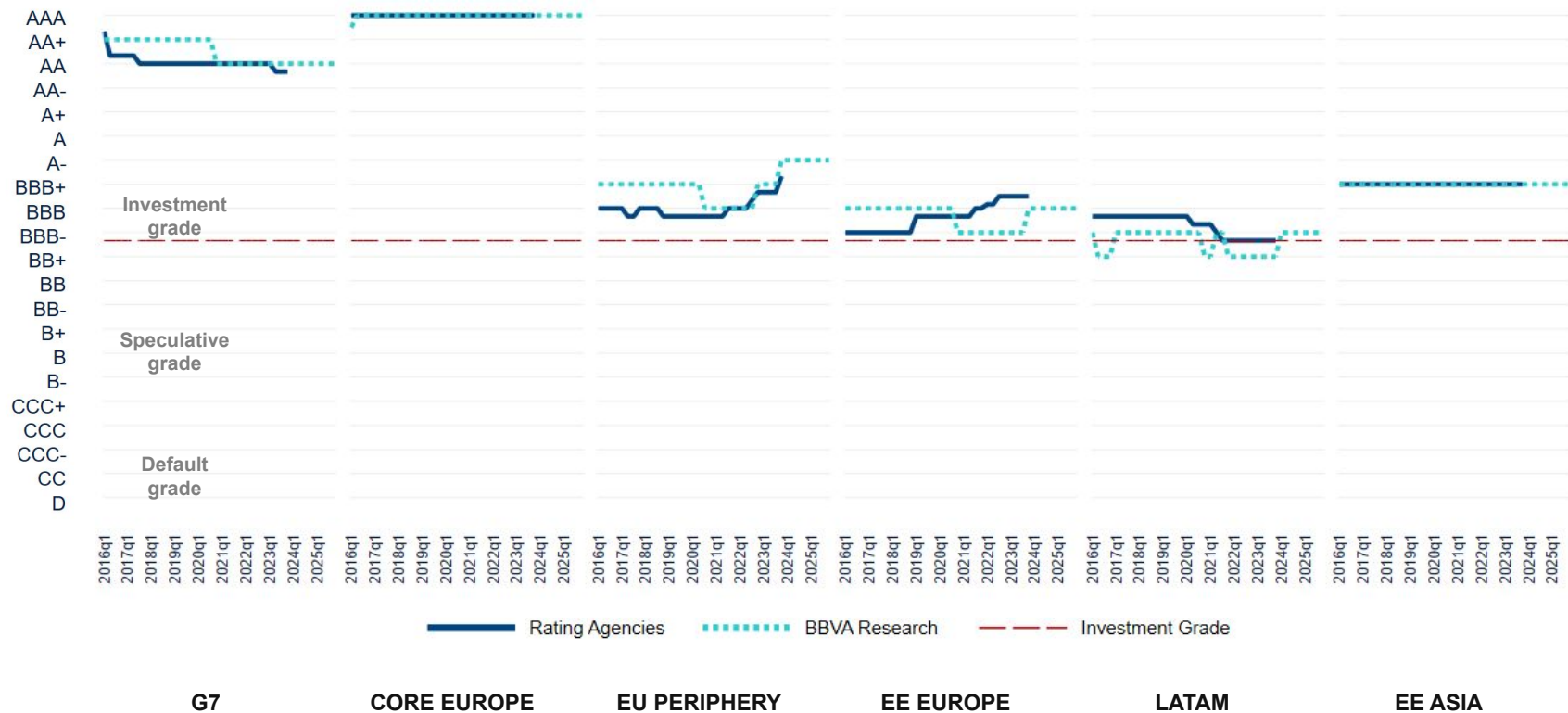
Latam includes: Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru, Uruguay and Venezuela. G7 Excludes Canada and Italy.
Source: Standard & Poor's, Moody's, Fitch & BBVA Research

Private debt gaps by country

Debt gaps (debt vs. equilibrium) levels have decreased overall in 2023 thanks to the increase in nominal GDP levels due to the high persistent inflation rates seen this year, but remain elevated in several AEs and China.

PRIVATE DEBT GAPS COLOR MAP (2006-2023 Q3)
Gap between private debt-to-GDP ratio and its long-term structural trend
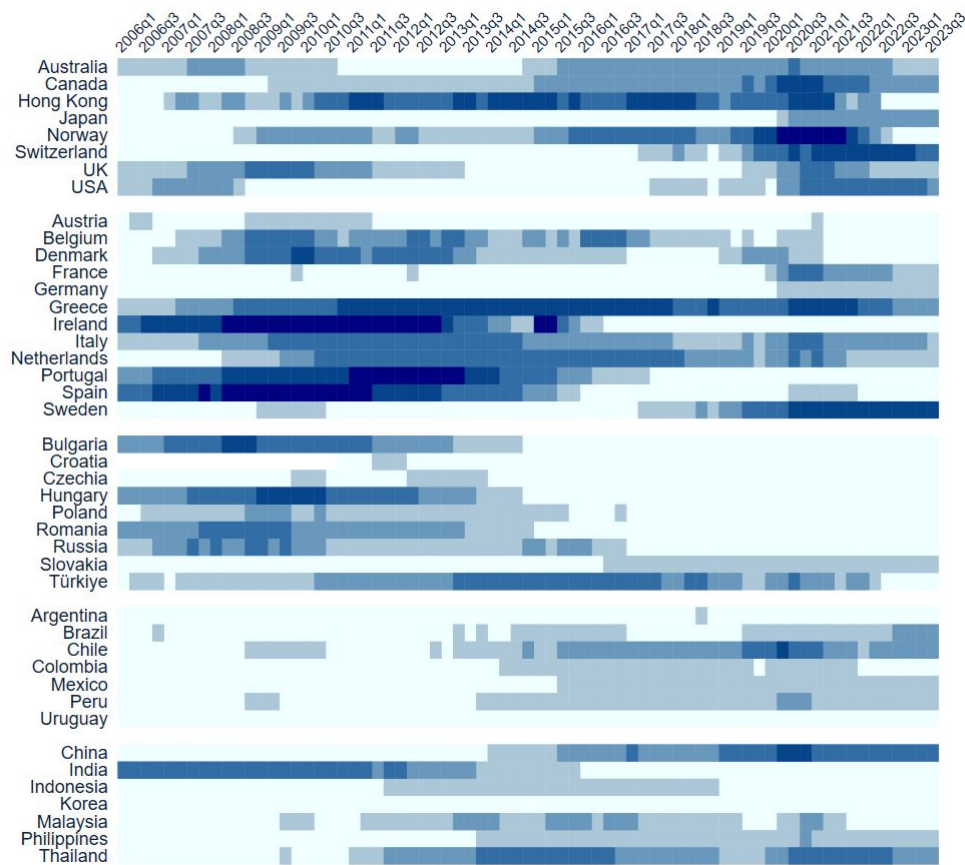
- **Private leverage gaps have clearly improved in the richest countries helped by the unusually high inflation rates**. However, they remain high in Canada, Switzerland and USA.

- Sweden is currently the country with the highest debt gap, (which coincides with a high gap in housing prices). Greece and Italy are also showing worrying levels, while in the rest of EU countries, gaps have declined helped by inflation

- Gaps across EE Europe remain well contained. Persistently high inflation rate have helped. Türkiye debt ratio has fallen well below equilibrium

- Debt gaps in Latam have remained contained and they have moderated significantly in Colombia during 2023, although Brazil, and Chile have experienced increases to warning levels in 2023.

- China's excess leverage remains high. It also remains high in Thailand, although it has started to decline in 2023.

The methodology for estimating debt gaps could be found at: https://goo.gl/LTeTHD, https://goo.gl/r0BLbI
Source: IFS, BIS & BBVA Research

Very High
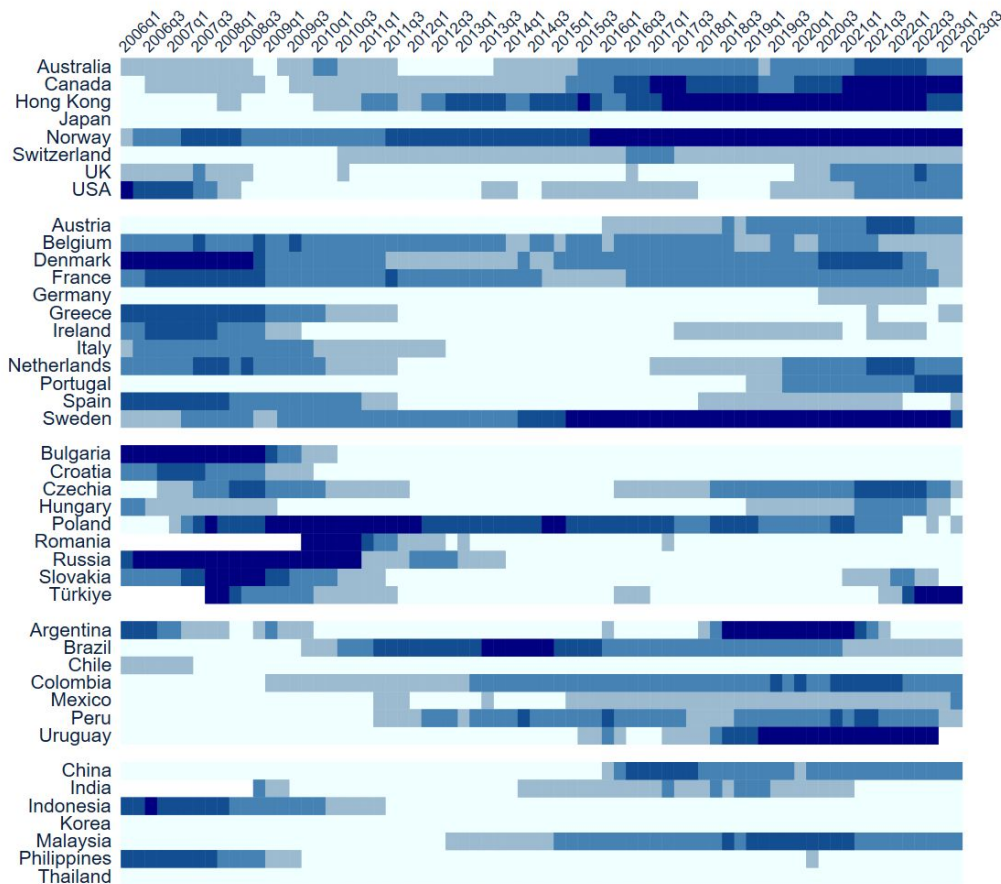High
Medium
Warning
Low
Negative

Housing prices gaps by country

Housing prices saw an initial correction during the first months of the year, but they have remained rather stable more recently. The highest disequilibrium levels continue to be seen in northern Europe, Canada Hong Kong and Türkiye.

REAL HOUSING PRICES GAPS COLOR MAP (2006-2023 Q3)
Gap between housing prices and its long-term structural trend

* https://goo.gl/xXj3Gm
Source: BBVA Research, BIS, Haver and Oxford Economics

- Canada's gap continues to be extremely high, despite some correction of prices in real terms in the beginning on 2023. **Gaps are also very high in HK and Norway, and have been increasing and remain high in USA and UK**

- Within EU countries, Sweden has the highest disequilibrium (despite a large price correction in 2023), followed by Portugal. Meanwhile in the Eurozone, Austria and Netherlands are also showing clear signs of excess.

- Gaps have decreased in Czech Republic to low levels, and to negative in Hungary and Slovakia. **The gap has recently grown quickly in Türkiye, where real housing prices have greatly outgrown the high inflation levels**.

- Price gap remains high in Uruguay, Colombia and Mexico, while it has declined in Peru, and remains mild in the rest of Latam.

- Gap remains high in China and Malaysia. Real prices remain contained in other countries in EE Asia.

Early Warning System (EWS) of banking crises

The regional banking crisis in the US coincided with a high probability indicated by our EWS. However, since it was a crisis more associated with liquidity mismanagement rather than excess leverage, its overall impact was contained. The high leverage and the real estate crisis in China keeps it under a warning.

PROBABILITY OF A SYSTEMIC BANKING CRISIS (2001Q1-2025Q3)
(based on 8-quarters lagged data*)
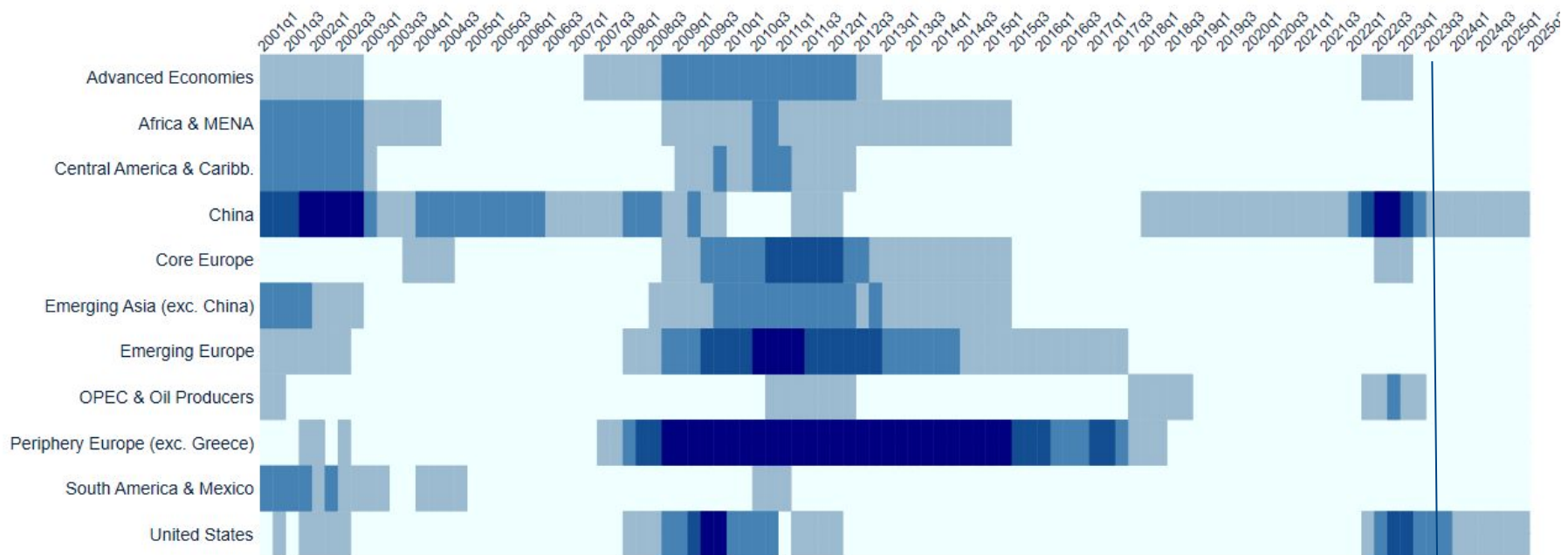
- A banking crisis in a given country follows the definition by Laeven and Valencia (2012), which is shown in the Appendix
- The complete description of the methodology can be found at https://goo.gl/r0BLbl and at https://goo.gl/VA8xXv
- The probabilities shown are the simple average of the estimated individual countries probabilities for each region. The definition of each region is shown in the Appendix

Legend: Very High Risk / High Risk / Medium Risk / Warning / No Risk

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

Early Warning System (EWS) of fiscal stress

Fiscal vulnerability remains controlled overall in the post-COVID era. However, public debt levels remain elevated, which keep some countries in Emerging Europe, Latam and Africa & MENA with a warning.

PROBABILITY OF A FISCAL STRESS EPISODE (2000 - 2026)
(Based on 1-year lagged data)

Source: BBVA Research

Legend:
- Very High Risk
- High Risk
- Medium Risk
- Warning
- No Risk
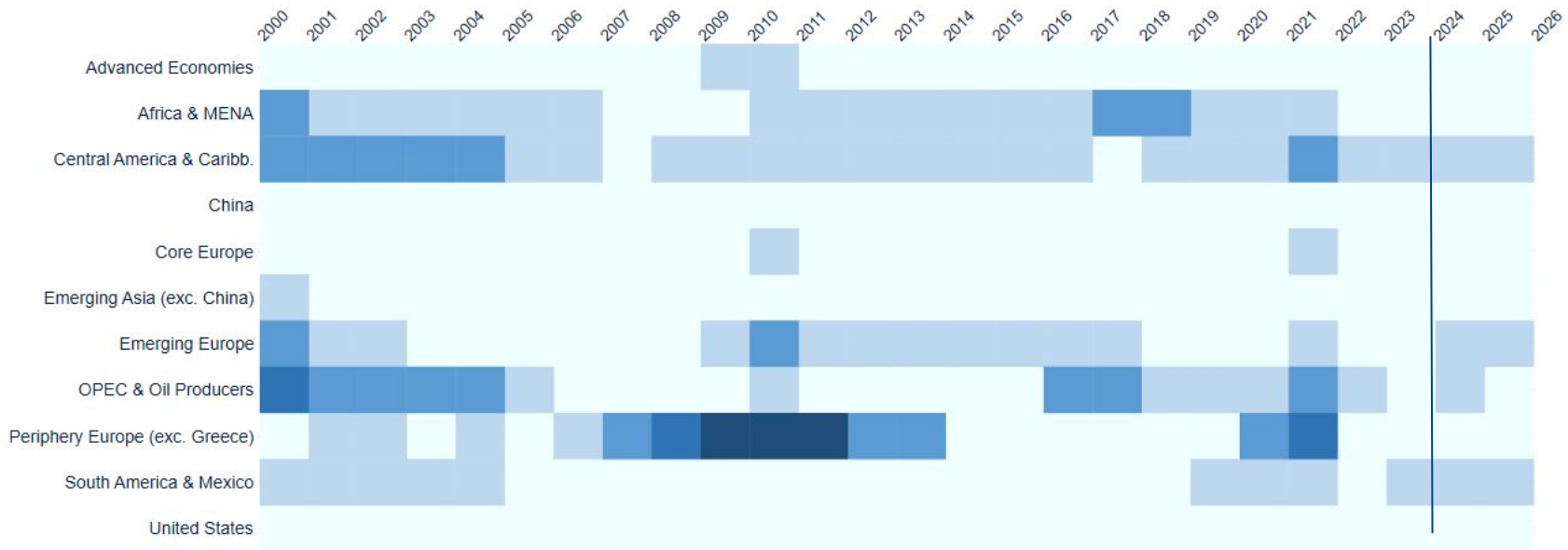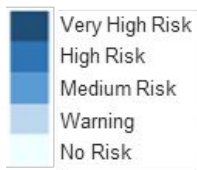
- The Fiscal Stress Early Warning System EWS estimates the probability of a fiscal crisis or stress, which is defined as one of four different events: Public default or restructuring, a large IMF-Supported program, a very high inflation rate (implicit default) or a extreme spike in the sovereign spread.

- The probabilities shown in the table are the simple average of the individual countries probabilities for each region.

Early warning system of currency crisis

Exchange rate tensions surged in recent years due to monetary tightening of the FED and other CBs and the surge of geopolitical risks. In contrast to previous episodes, tensions were stronger in AE rather than in EE. The end of the monetary tightening cycle has softened the likelihood of FX tensions in the coming years

PROBABILITY OF CURRENCY TENSIONS (2001Q1-2025Q4)
The probability of a crisis is based on 4-quarters lagged data, e.g. Probability in Q4-2016 is based on Q4-2015 data

Legend:
- Low Risk
- Warning
- High Risk
- Very High Risk
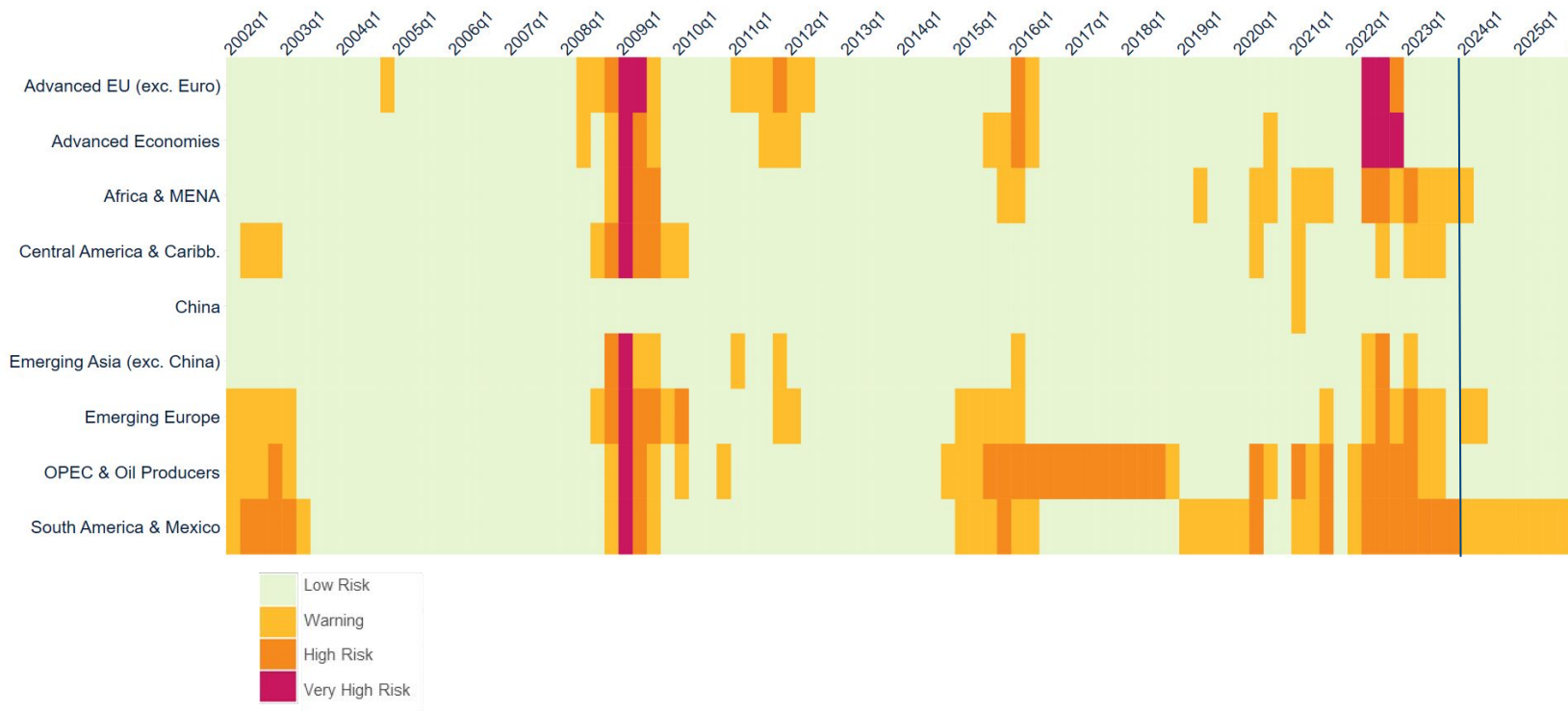
- Our Currency-Crises Early Warning System EWS allows us to estimate the probability of a currency crisis, which is defined as a "large" fall in the exchange rate and in foreign reserves in a given country, according to certain predefined measures.
- The probabilities shown in the table are the simple 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

Stochastic debt projections of Euro Area EU4

Higher-for-longer long-term **interest rates** and **inflation uncertainty, high debt** levels and **defense, climate change** and **social** spending **pressures** are heightening **uncertainties** regarding future **debt sustainability** in Europe.

We estimate **stochastic projections** of **debt-to-GDP** ratio for **Germany, Spain, France and Italy** for 2023-2033 following the **Variance-Covariance** (VCV) **Matrix** methodology by the **European Commission** (based on Berti, K. (2013)*).

Estimation starts by computing a **central debt scenario**, calculated by introducing **baseline** forecasts of GDP growth, implicit nominal interest rates, inflation and primary deficit (**BBVA** & **WEO** Oct.23 (IMF)) on **debt law of motion****.

EC's VCV methodology is applied to **compute annual** random **shocks** of debt law of motion key input variables, which are **added** to the annual forecasts of these variables. Thus, we generate by a **Montecarlo simulation N** random **vectors** of real GDP growth rate, implicit nominal interest rates, inflation and primary deficit, that **introduced** in the debt law of motion **generate N debt paths**. Finally, we compute **percentiles** of debt **distribution** at each projection **horizon**.

*Berti, K. (2013). Stochastic public debt projections using the historical variance-covariance matrix approach for EU countries (No. 480). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.
**Forecasts of annual real GDP growth rate, inflation, primary deficit and implicit nominal interest rate of debt for Spain for 2023-2033 are from BBVA Research, as well as implicit nominal interest rate of debt for the rest of countries of G4. Forecasts for the rest of input variables for Germany, France and Italy steam from IMF WEO of October 2023 for 2023-2028.

Stochastic debt projections of EU4: 2nd part

We therefore present a method to **calculate** such **uncertainty** and subsequently apply such calculation to show **risks** associated with the evolution of sovereign **ratings**, **CDS** and the probability of **fiscal stress** in these countries, taking advantage of the econometric models developed for these variables and used along this report, details of which can be seen in the appendix.

The **goal** is to introduce **stochasticity** in the projections of ratings, CDS and fiscal stress via estimating **separate regressions** for each **percentile** (p10, p20, p40, p50, p60, p80, p90) of the stochastic debt distribution, given that public debt is the main determinant of all these variables.

STOCHASTIC DEBT PROJECTIONS (2000 - 2028)
(Percentiles, (% of GDP))
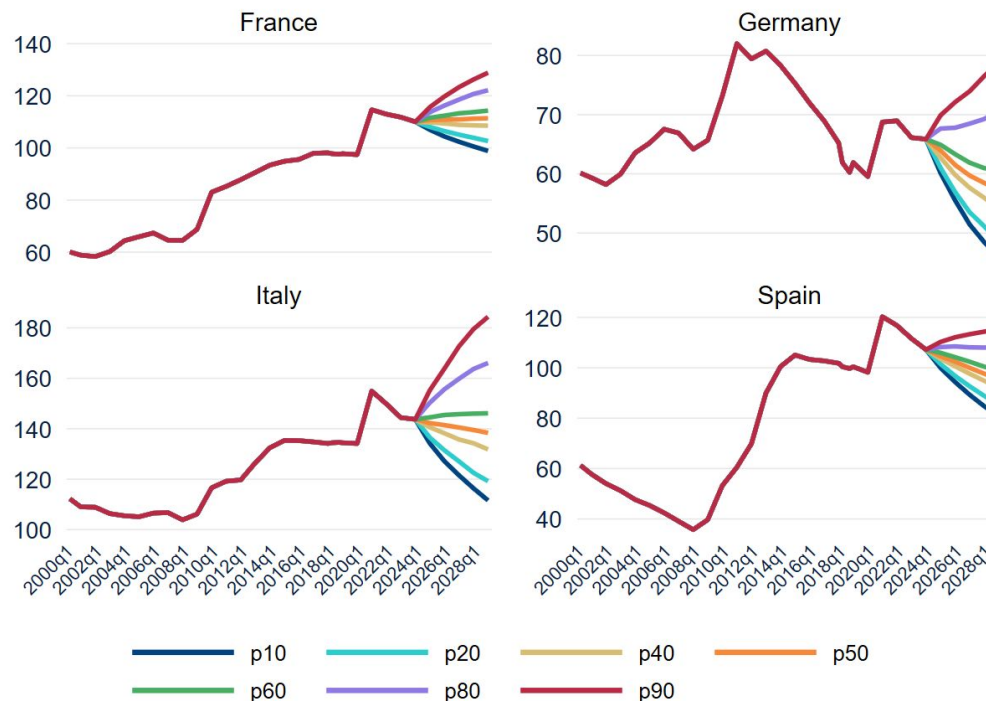
Source: BBVA Research

Stochastic ratings projections of EU4

Debt **stochasticity** implies **heterogeneous uncertainty** of sovereign ratings **across EU4.** While **high** debt uncertainty in **Italy** could lead to notable **rating deterioration**, low debt stochastic risks in Germany have **no effect** on future ratings **uncertainty**

The **Spanish** case is of special interest: even at the **highest percentile** of debt (warning future debt path), sovereign **ratings** are estimated to at **least stabilize** at current levels.

RATING PROJECTIONS CONDITIONAL ON PUBLIC DEBT PERCENTILES (2003 - 2028)
(Quarterly, notches, AAA=20)

Source: BBVA Research
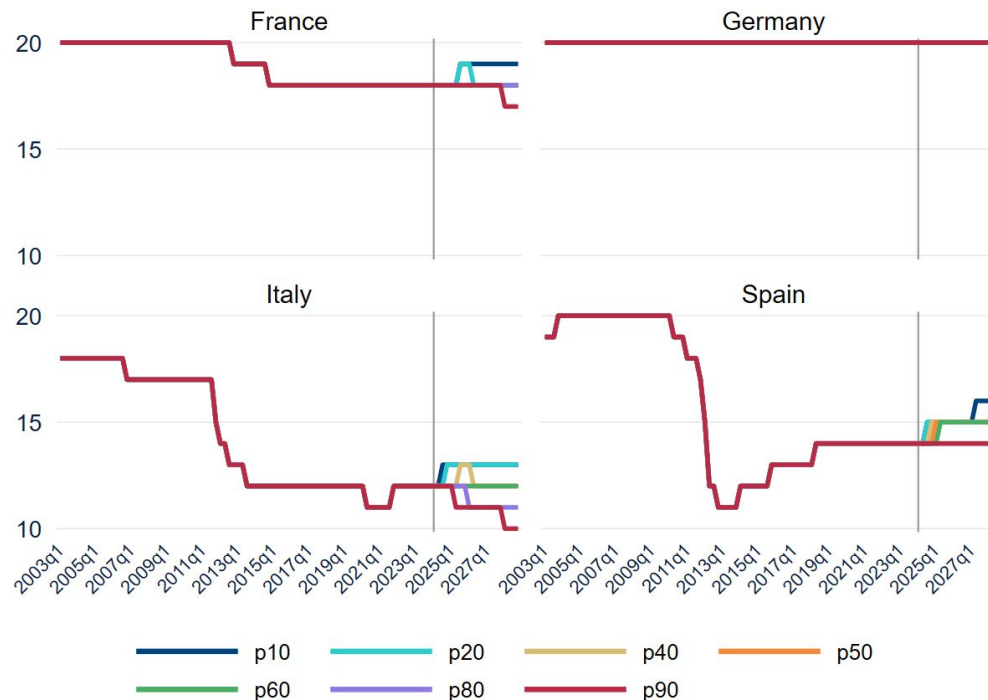
Stochastic sovereign spreads projections of EU4

As expected, **explosive debt** paths, such as **Italy's** case for **high** percentiles, imply equilibrium risk premia (sovereign CDS) that could **skyrocket** to nearly **150** points by **2028**.

Conversely, the **rest of the G4** would see more **contained** spreads given the **lower** uncertainty associated with the **future** of the **debt**.

CDS EQUILIBRIUM PROJECTIONS CONDITIONAL ON PUBLIC DEBT PERCENTILES (2003 - 2028)
(Quarterly, basis points difference to the median projection)
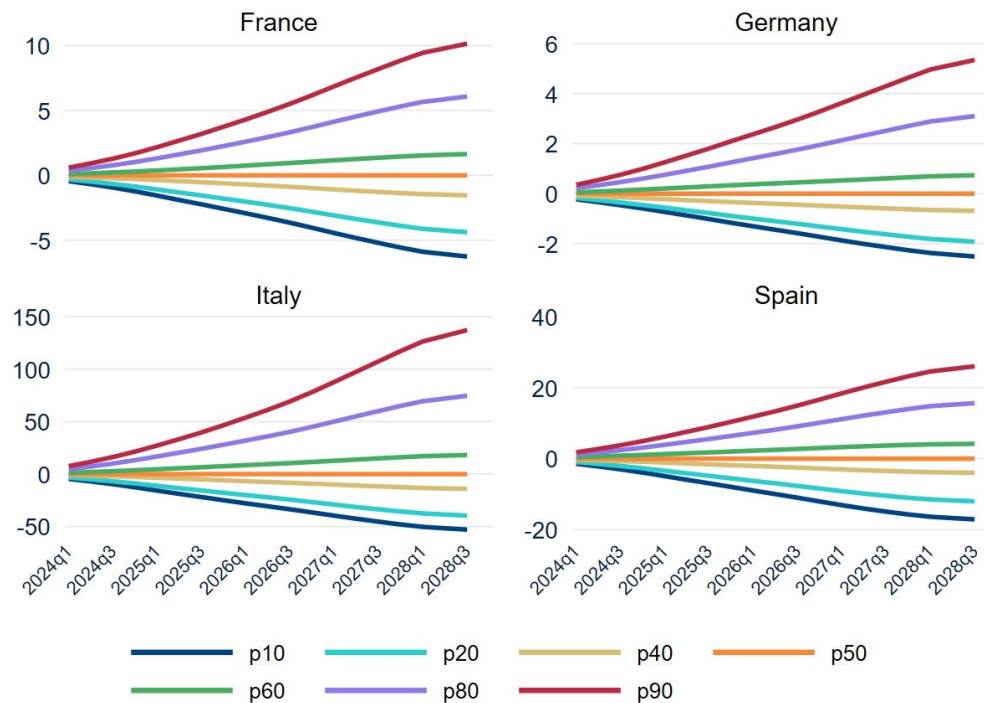
Source: BBVA Research

Stochastic fiscal stress projections of EU4

Since the **debt-to-GDP** ratio is one of the main **determinants** of the likelihood of **fiscal stress**, greater **uncertainty** associated with future debt implies **high uncertainty** about **future** fiscal stress.

Specifically, the **large** difference between the highest and lowest percentiles of debt in Italy implies that for **high** debt **percentiles**, the **probability** of **stress** is **high** in the later forecast years.

Thus, **Italy** shows an **upward risk** of the probability of **stress**, and to a **lesser** extent, **France** as well, while **Spain** and **Germany** would **not** face such a risk.

FISCAL STRESS PROBABILITIES PROJECTIONS CONDITIONAL ON PUBLIC DEBT PERCENTILES (2000 - 2028) (%)
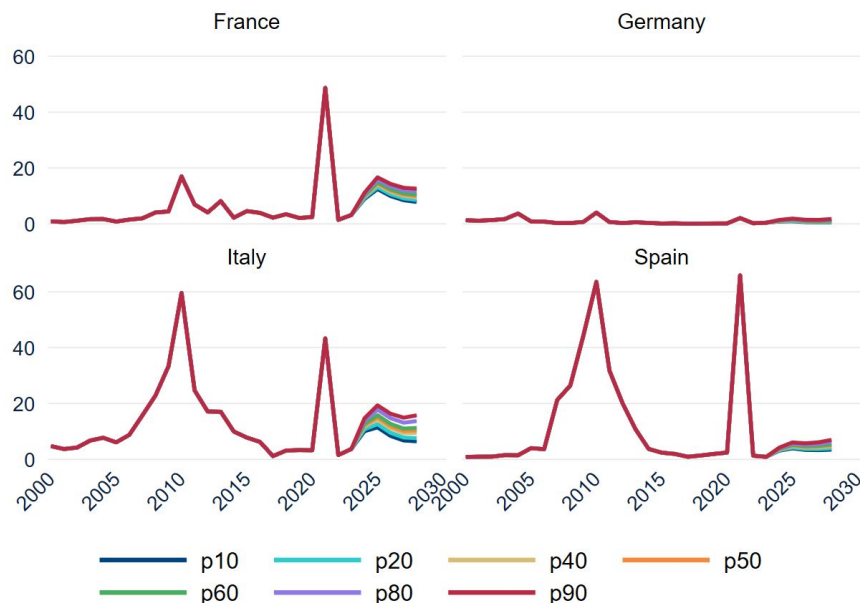
Source: BBVA Research
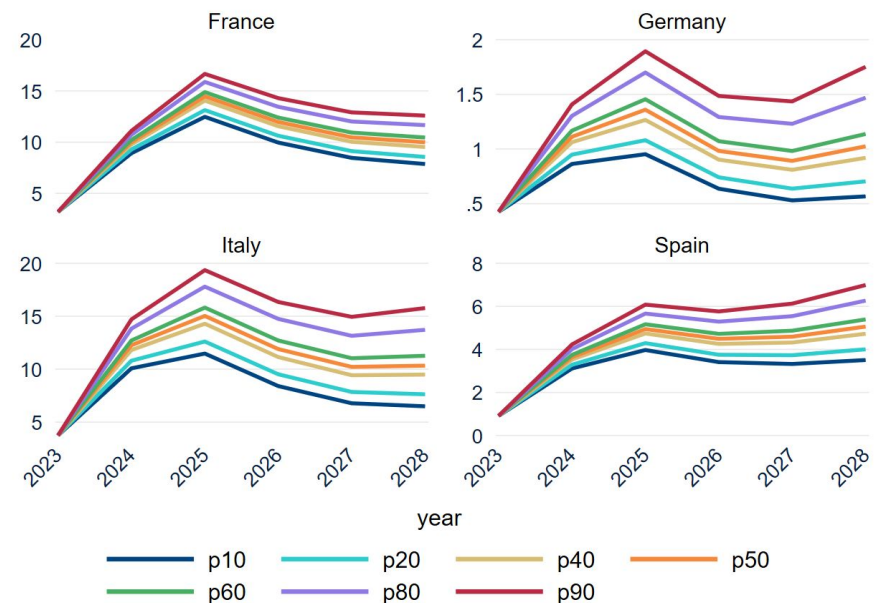
Source: BBVA Research

Conclusions

- As expected, the **estimation** of credit rating predictions, CDSs (Credit Default Swaps), and fiscal stress, **conditioned** on the distribution of **debt** projections, **yields** results subject to **uncertainty** both on the upside and the downside.

- Specifically, **Italy** exhibits significant **risks** of experiencing a **downgrade** in its credit **rating** starting from 2024, given the high probability of seeing a substantial increase in its debt in the medium term.

- Consistent with the previous result, EU4 countries would have their CDS **anchored** to relatively **low uncertainty** in the **medium** term when conditioned on the corresponding debt distribution, **except** for **Italy**, whose upside risk warrants attention and caution.

- Ultimately, this **uncertainty** associated with future debt is directly related to the **likelihood** of fiscal **stress episodes**. In detail, once again, Italy is the EU4 economy that shows a higher **probability** of **experiencing** such episodes when projecting this probability **conditioned** on the **upper** percentiles of the debt distribution.

05

Special Topic: Global Trade and Geopolitical Fragmentation

Geopolitical conflicts are increasing the risk of fragmentation of countries into large trading blocs

- Since the start of the Ukraine invasion there has been a wide discussion about **the possibility of a fragmentation of countries into trade blocs**, with countries increasingly trading with geopolitically close countries

- **We try to estimate what would be the consequences of such fragmentation**, using as a proxy of the distance between countries an **indicator of the similarity of their votes in different United Nations sessions and resolutions**.

- **We introduced this indicator in a gravitational model of bilateral exports**. **We find a strong and negative correlation between the ideological distance between two countries and their bilateral trade**.

- Based on these estimated relationship, **we estimate what would happen if the World separates in two trading blocs**: A western liberal one aligned with the US, and another one aligned with Russia and China.

- **We simulate three different scenarios with different intensities of separation between blocs**. Starting from the current ideological distance between each pair of countries, we increase or decrease such distance depending on how they vote in the UN Resolution regarding the suspension of Russia membership.

We can divide the world based on each country's vote in the UN resolution about the suspension of Russia's membership, resulting in 3 separate trading blocs

Trade blocs

Based on 07-04-22 UNGA Res. about the suspension of Russian membership

Vote: Absent   Abstain   No   Yes
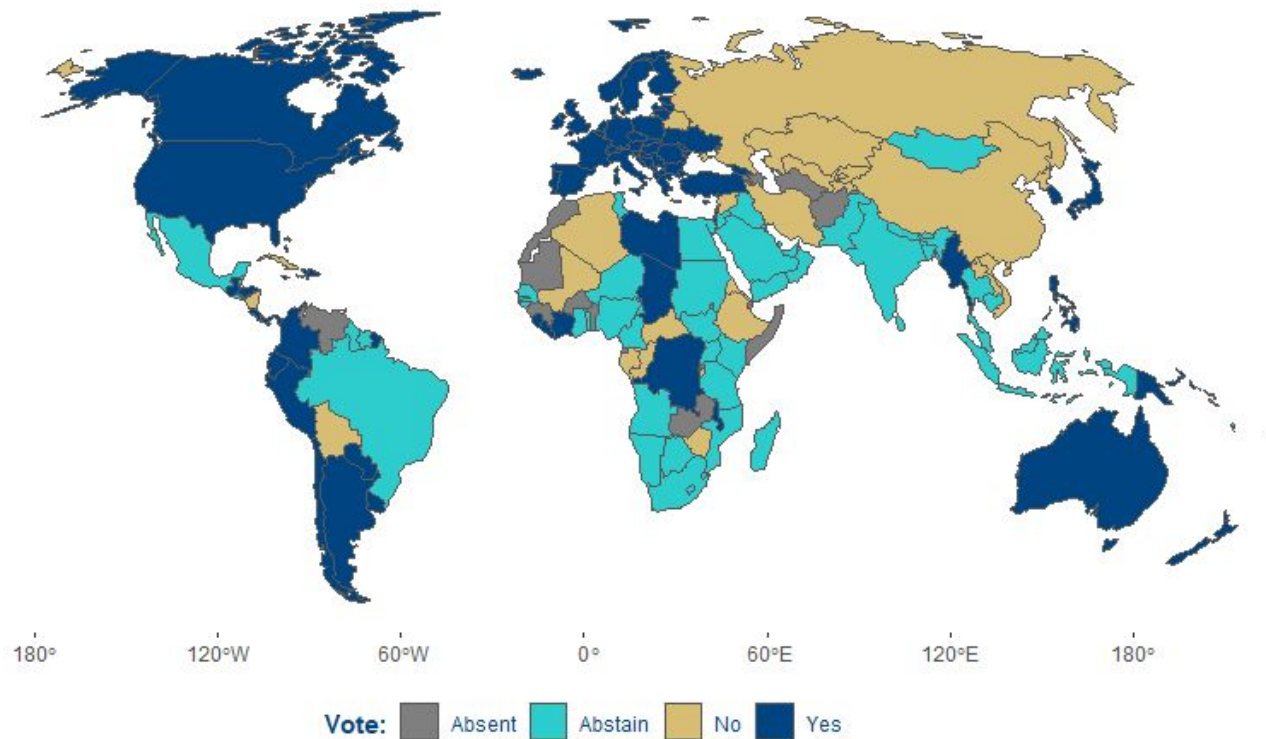
Source: BBVA Research

Historical ideological distance between countries

- To estimate the Ideological Distance, Voeten et al. (2017) use **Item Response Theory (IRT) models to estimate one-dimensional preferences from United Nations (UN) votes data over time**.
- The model assumes that the observed vote is a function of the latent preference of the country for that particular vote and the cut points separating the three alternatives (Yes, No or Abstention).

BILATERAL IDEOLOGICAL DISTANCE
(Units from 0 to 5)

Bailey, Michael A., Anton Strezhnev, and Erik Voeten. "Estimating dynamic state preferences from United Nations voting data." Journal of Conflict Resolution 61, no. 2 (2017): 430-456.
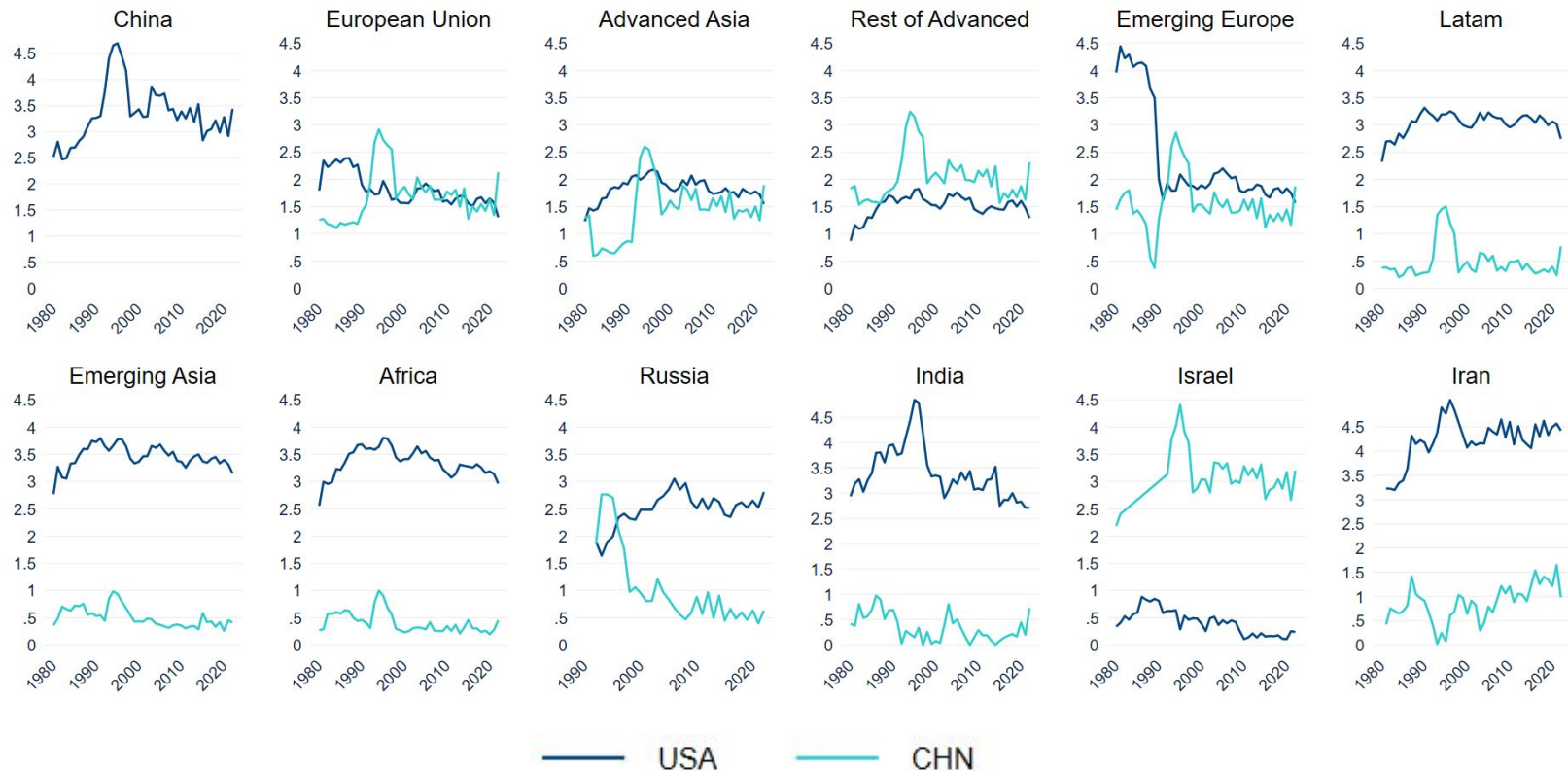
Relation between trade (exports) and ideological distance

- We include the ideological distance into a **traditional a gravitational model.**
- The **regression specification** is like the following:

$$\ln(exports)_{ijt}$$
$$= \beta_0 + \beta_1 * \ln(exports)_{ij,t-1} + \beta_2 * ideology_{ijt} + \beta_3 * RTA_{ijt}$$
$$+ \beta_4 * \ln(DifGDPpc)_{ijt} + \beta_5 * \ln(GDP)_{it} + \beta_6 * \ln(GDP)_{jt}$$
$$+ \beta_7 * \ln(POP)_{it} + \beta_8 * \ln(POP)_{jt} + \beta_9 * \ln(Distance)_{ij}$$
$$+ \beta_{10} * CommonColonizer_{ij} + \beta_{11} * CommonOfficialLanguage_{ij}$$
$$+ \beta_{12} * Contiguous_{ij} + \varepsilon_{ijt}$$

Where "i" stands for origin country, "j" for destination country and "t" for year. "Ideology" stands for ideological distance. "RTA" is a dummy variable indicating if the countries had at year "t" a Regional Trade Agreement while "*DifGDPpc*" is the difference of GDP per capita between countries for a particular year.

- The **estimations are conducted through various methods**, including Random Effects, Fixed Effects (comprising origin-time, destination-time, and country pair fixed effects), employing both dynamic and static approaches (lags of the dependent variable), with or without considering the difference in GDP per capita, and utilizing Local Projections.

Regressions of trade on ideological distance

- We found a **strong, significant and negative correlation between the ideological distance between two countries and the level of exports and trade** among them.
- The relationship is **robust** to several methodological alternatives

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimator:	FE Dynamic	FE Dynamic	FE Static	FE Static	RE Dynamic	RE Dynamic	RE Static	RE Static
Lexports(t-1)	0.546*** [0.000]	0.553*** [0.000]	-	-	0.745*** [0.000]	0.745*** [0.000]	-	-
Ideological Distance	**-0.0758*** [0.000]**	**-0.0761*** [0.000]**	**-0.154*** [0.000]**	**-0.163*** [0.000]**	**0.000989 [0.770]**	**-0.00843** [0.011]**	**-0.0555*** [0.000]**	**-0.0657*** [0.000]**
RTA	0.0904*** [0.000]	0.0959*** [0.000]	0.199*** [0.000]	0.218*** [0.000]	0.0953*** [0.000]	0.0989*** [0.000]	0.205*** [0.000]	0.210*** [0.000]
Difference GDP pc	-0.0644*** [0.000]	-	-0.153*** [0.000]	-	-0.0271*** [0.000]	-	-0.126*** [0.000]	-
LogGDP (Origin)	-	-	-	-	0.204*** [0.000]	0.204*** [0.000]	0.663*** [0.000]	0.665*** [0.000]
LogGDP (Destiny)	-	-	-	-	0.141*** [0.000]	0.143*** [0.000]	0.474*** [0.000]	0.490*** [0.000]
Population (Origin)	-	-	-	-	0.0239*** [0.000]	0.0236*** [0.000]	0.0429*** [0.000]	0.0326** [0.009]
Population (Destiny)	-	-	-	-	0.0292*** [0.000]	0.0256*** [0.000]	0.118*** [0.000]	0.0917*** [0.000]
Distance	-	-	-	-	-0.00393*** [0.000]	-0.00393*** [0.000]	-0.0145*** [0.000]	-0.0146*** [0.000]
Common Colonizer	-	-	-	-	0.0725*** [0.000]	0.0784*** [0.000]	-0.0219 [0.658]	0.0105 [0.831]
Common Language	-	-	-	-	0.121*** [0.000]	0.118*** [0.000]	0.514*** [0.000]	0.497*** [0.000]
Contiguous	-	-	-	-	0.550*** [0.000]	0.570*** [0.000]	2.180*** [0.000]	2.291*** [0.000]
Constant	1.235*** [0.000]	1.092*** [0.000]	2.273*** [0.000]	1.979*** [0.000]	-5.878*** [0.000]	-5.922*** [0.000]	-19.33*** [0.000]	-19.53*** [0.000]
N	494211	510501	550417	569551	495405	495405	552225	552225
R^2	0.928	0.926	0.89	0.887	0.8989	0.8988	0.5791	0.5779
adj. R^2	0.922	0.921	0.882	0.879				

Note: p-values in brackets, * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Source: BBVA Research

Local projections: IRF graphs of a shock to ideological distance

- The I**mpulse Response Function (IRF) estimated through local projections** shows a negative and significant effect since the first years after a shock to the ideological distance
- The results also point to a **larger impact in the long-term**, between 7 and 8 years after the shock

EFFECT ON EXPORTS (%)
(Path of change in % exports per unit increase in ideological distance)

Fixed Effects

Random Effects

Dynamic   Static

Source: BBVA Research
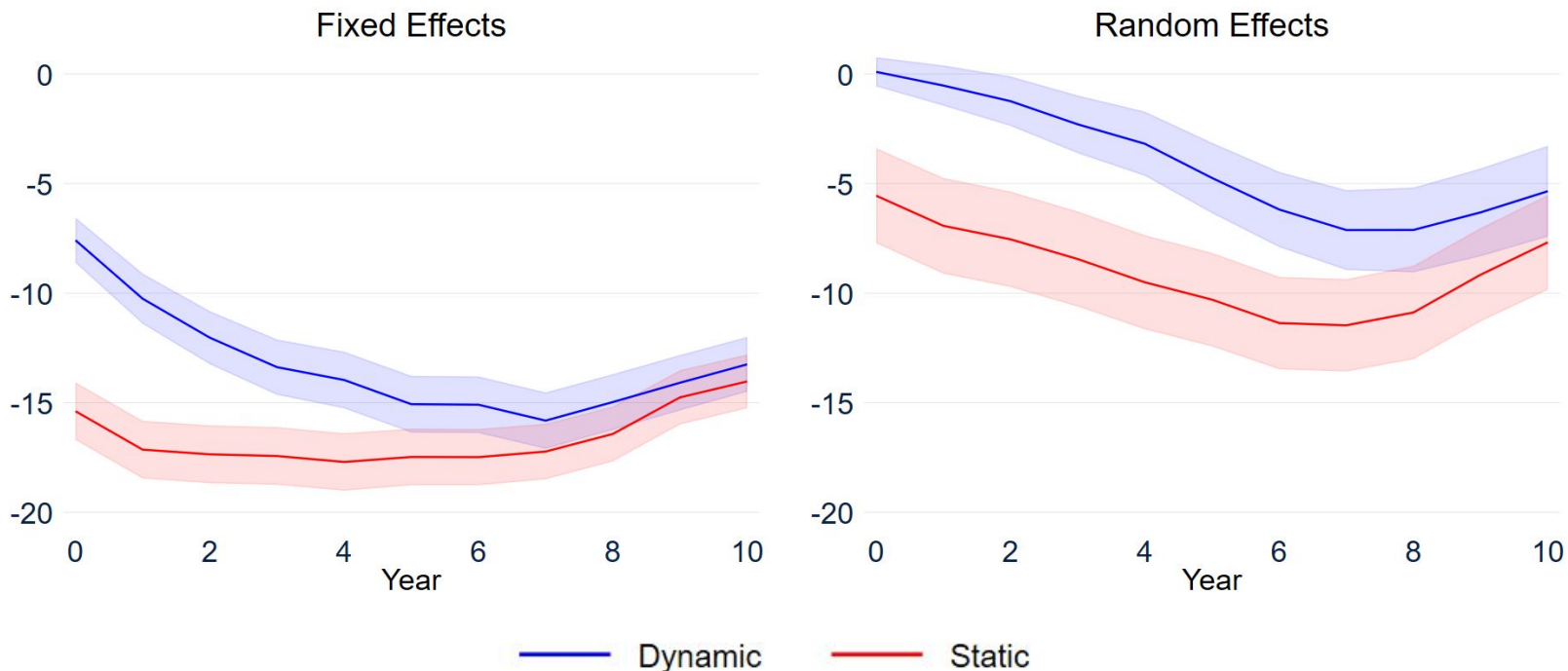
Scenarios definition

- We have simulated **three scenarios: Scenario 1: Completely separate blocks** with extreme ideological separation between them and absolute similarity within them. **Scenarios 2 and 3: Ideological distance jumps or falls (different intensity), closing or broadening the distance between/within each block.** The blocs are defined according to each country vote on the UN resolution about the suspension of Russia membership.

  - **Scenario 1**: **If two countries had the same vote**, their ideological distance falls to the average level observed between USA and UK **(0.8). If they had the opposite vote (Yes vs No)** their distance jumps to the highest level observed between USA and China **(4.8)**. If above or below those levels, ideology remains the same
  - **Scenarios 2 and 3**: Ideological distance within/between countries jumps or falls two standard deviation depending on whether they had the same or the opposite vote:
    - *Scenario 2*: full-sample standard deviation
    - *Scenario 3*: standard deviation by pair of countries relation (usually smaller)

- It's important to highlight that **we assume that voting 'Abstention' implies being closer to voting 'No'** than to voting 'Yes'.

SCENARIO 1

Destination country vote	Home country vote		
	Yes	No	Abstain
Yes	0.8	4.8	3.5
No	4.8	0.8	1.5
Abstain	3.5	1.5	0.8

SCENARIOS 2 & 3

Destination country vote	Home country vote		
	Yes	No	Abstain
Yes	- 2std	+ 2std	+1 std
No	+ 2std	- 2std	-1 std
Abstain	+1 std	-1 std	- 2std

Impact on bilateral exports under the three scenarios

- **As expected, the first scenario displays in general larger impacts on the bilateral trade against US and China** (and other countries). (AE denotes Advanced Economies and EE denotes Emerging Economies)

- Similarly, and also as expected, in most cases we can see an opposite impact on the exports to US vs. the exports to China, although there are regions, such as Latin America and Africa, where the impact on exports is negative in both cases.

IMPACT ON EXPORTS OF GIVEN REGION/COUNTRY TO USA (%)
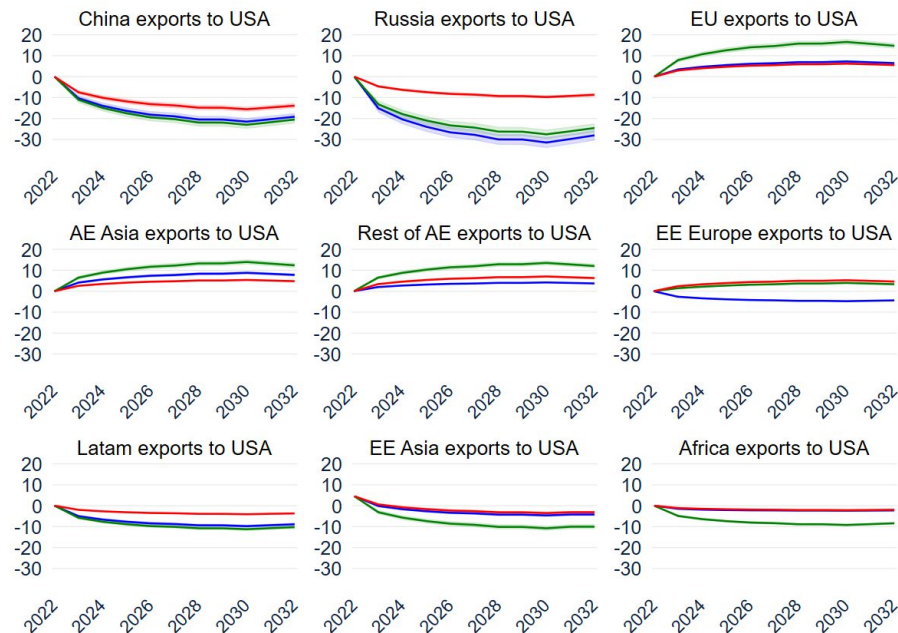
IMPACT ON EXPORTS OF GIVEN REGION/COUNTRY TO CHINA (%)

SCEN 1   SCEN 2   SCEN3

Source: BBVA Research
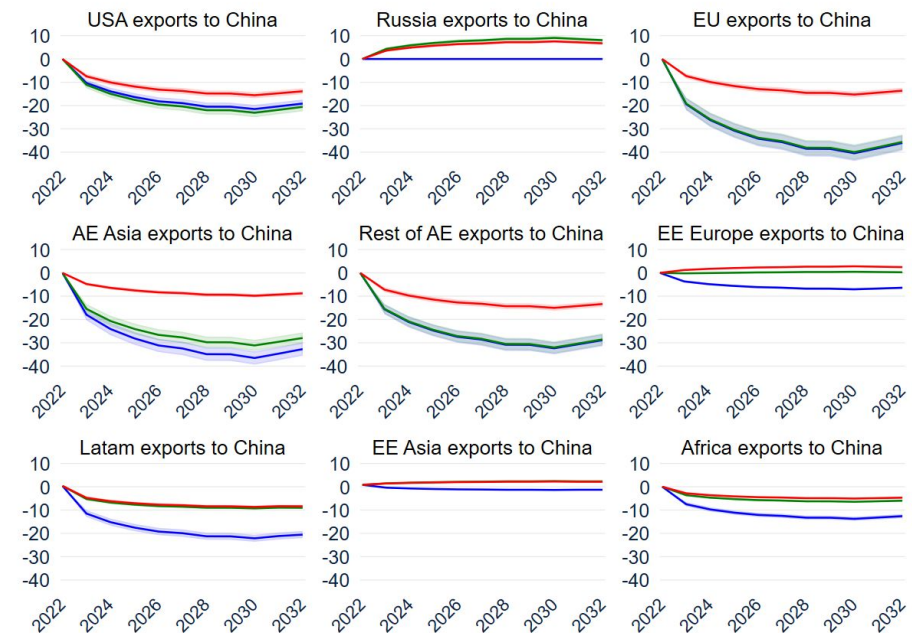
Impact on total exports and imports

- In the next graphs we can see whether the impact on exports to one block can be compensated by the effect on the other one for several regions and countries.

- It is clear that **the AE are the less affected in both exports and imports, with the exception of AE of Asia. On the other hand, China and Russia are the clear losers** in all the scenarios

LONG-TERM IMPACT ON TOTAL EXPORTS AND IMPORTS BY SCENARIO (%)

Source: BBVA Research
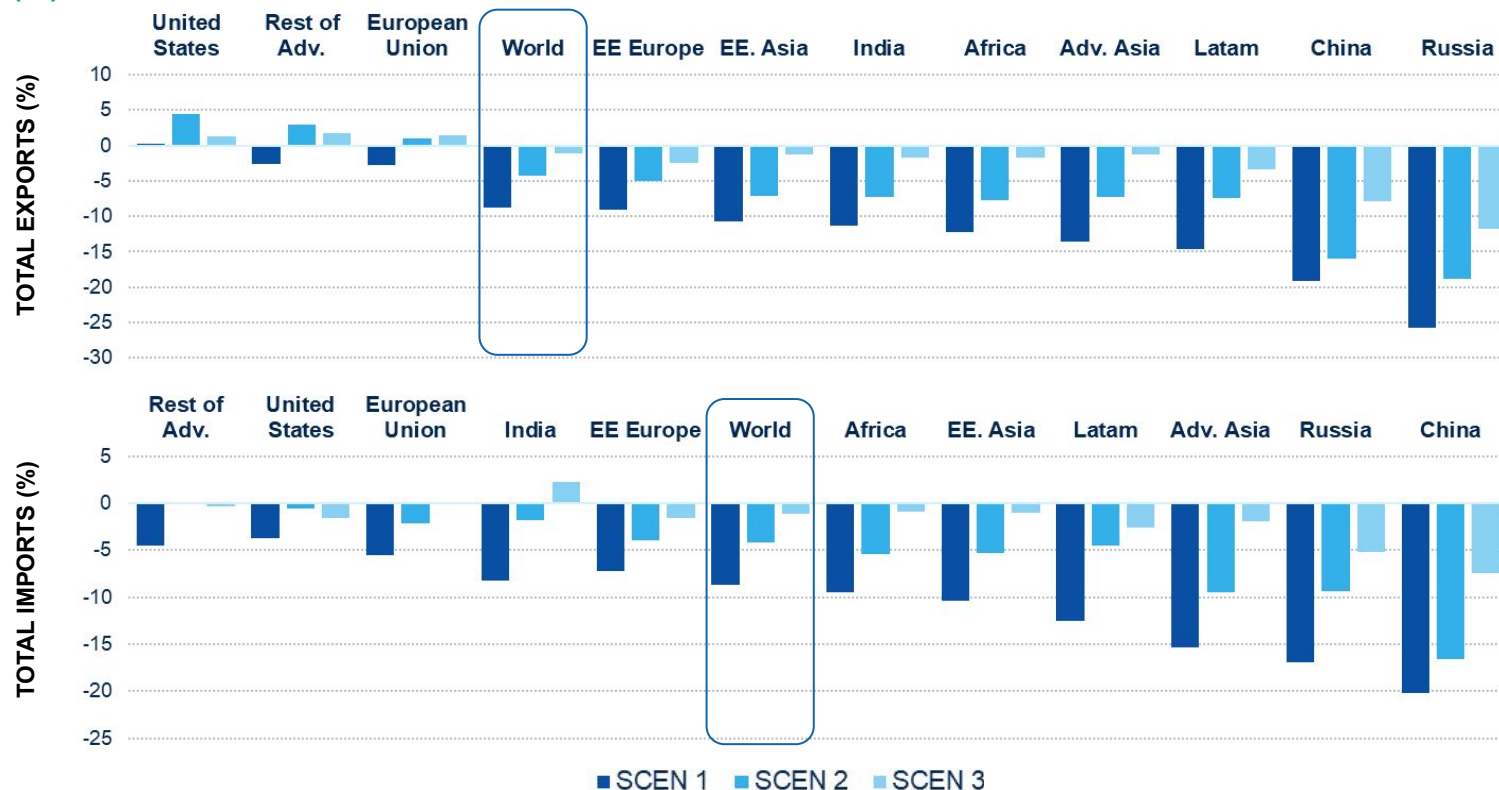
Impact on total trade and trade balance

- **World's trade would fall in all the scenarios with a maximum decrease of 4% of GDP in the extreme division scenario**. Again, it is clear that the Western bloc would be the clear winner: Not only would be hardly impacted, but it might improve its trade balance position

- It is also clear that the biggest loser would be Russia, since it might lose a large percentage of its trade (up until 9% of GDP), while damaging its trade balance

LONG-TERM IMPACT ON TOTAL TRADE AND TRADE BALANCE
(% OF GDP)

■ SCEN 1   ■ SCEN 2   ■ SCEN 3

Source: BBVA Research
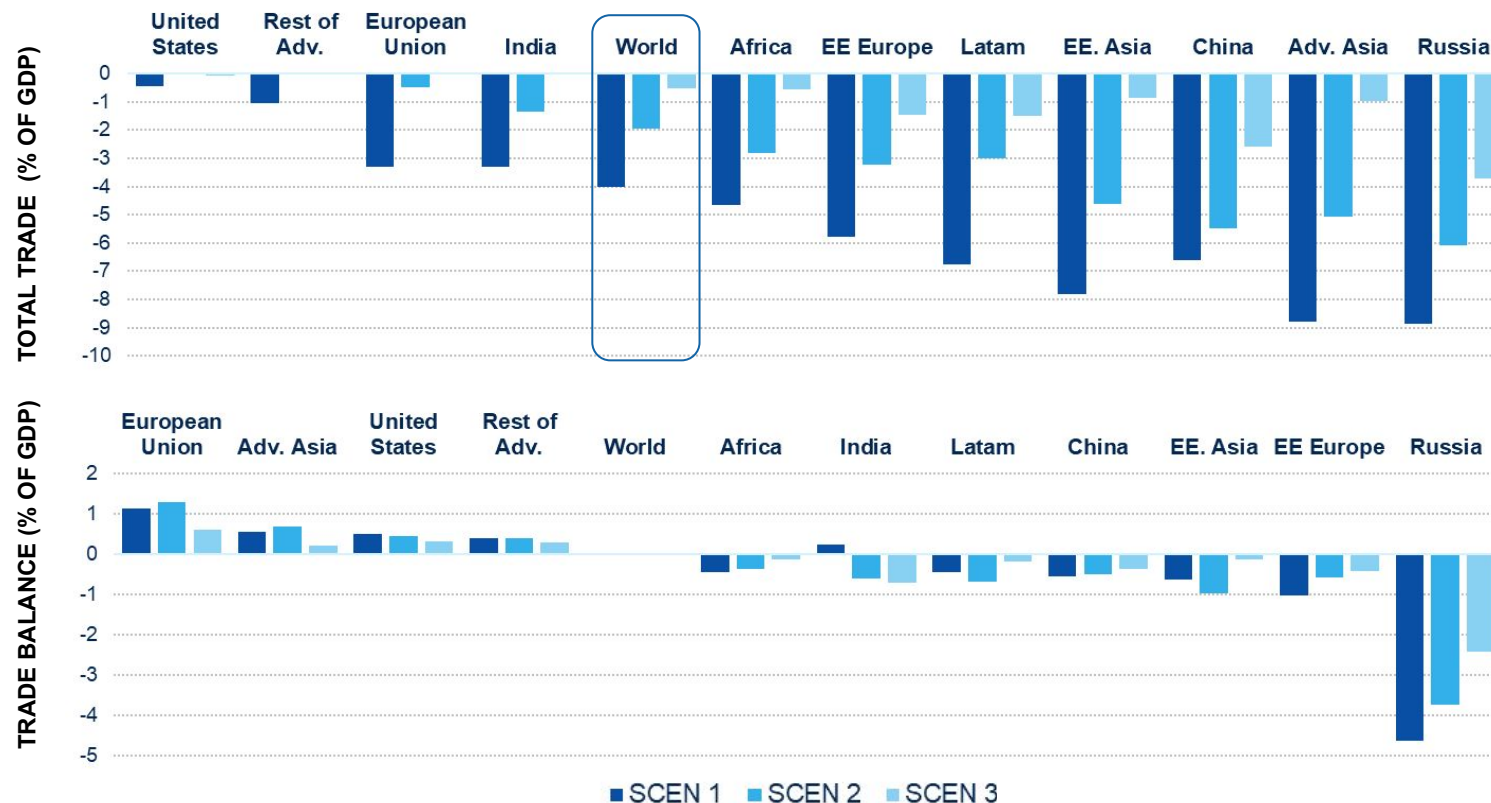
Conclusions

- In this section we are able to estimate the impact of these scenarios on different variables related to trade: **1. bilateral trade between all countries/regions in the world (%). 2. total exports (%), total imports(%), total trade (% of GDP) and trade balance (% of GDP)** of each country/region.

- According to our results, total World trade would suffer in all the scenarios, with a maximum fall of 4% of GDP in the extreme division scenario and **total trade decreasing in the vast majority of countries**.

- It is clear that the western bloc would be the clear winner: Not only would the impact on its trade would be small, but it might improve its trade balance position.

- On the other hand, the biggest losers would be Russia and China, since they might lose a large percentage of its trade (up until 9% of GDP), while Russia would also see a considerable worsening of its trade balance.

- **Latin America and both EE Asia and AE Asia would be strongly impacted, given their close relationship with China**

Vulnerability Indicators Table

VULNERABILITY INDICATORS* 2023: ADVANCED ECONOMIES

	Fiscal sustainability			External sustainability			Liquidity management			Macroeconomic performance			Credit and housing			Private debt			Institutional		
	Fiscal balance (1)	Interest rate GDP growth differential 2024-29	Gross public debt (1)	Current account balance (1)	External debt (1)	REER 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 gap (4)	Real housing prices gap (4)	Equity markets gap (4)	HH debt (1)	NF corporate debt (1)	Financial liquidity (6)	WB political stability (7)	WB control corruption (7)	WB rule of law (7)
United States	-8.2	-1.0	123.3	-3.0	94.5	6.2	30.0	16.7	26.6	2.4	4.1	3.7	24.3	12.3	-2.0	72.4	78.1	53.9	0.0	-1.1	-1.4
Canada	-0.7	-0.5	106.4	-1.0	129.7	-2.3	9.3	11.2	19.6	1.3	2.7	6.0	21.7	29.6	-3.2	102.4	121.9	105.8	-0.8	-1.7	-1.6
Japan	-5.6	-2.6	255.2	3.3	104.3	-20.7	34.1	16.5	13.9	2.0	2.7	2.6	10.0	-0.9	13.4	66.1	113.6	47.6	-1.1	-1.5	-1.6
Australia	-1.4	-0.4	51.9	0.6	88.7	-1.0	2.5	4.2	31.9	1.8	4.7	3.9	13.1	1.1	-4.9	111.0	61.3	115.8	-0.9	-1.8	-1.5
Korea	-1.2	-2.4	54.3	1.3	40.3	-2.1	3.0	7.3	16.3	1.4	2.9	2.9	-15.4	-27.0	-8.7	101.1	120.2	102.9	-0.6	-0.7	-1.2
Norway	15.1	-1.1	37.4	26.2	138.3	-6.6	-8.7	8.0	62.6	2.3	4.8	3.6	32.3	31.8	12.6	88.3	130.0	226.3	-0.9	-2.1	-1.8
Sweden	-0.4	-2.9	32.3	5.4	174.7	-6.7	2.9	10.1	14.4	-0.7	5.8	8.1	41.8	14.8	-5.2	85.5	174.5	172.3	-0.9	-2.1	-1.7
Denmark	1.8	0.3	30.1	11.4	129.7	-0.5	0.7	16.1	22.0	1.7	2.5	2.9	-21.0	1.8	21.0	83.3	115.1	227.2	-0.9	-2.4	-1.9
Finland	-2.6	-1.5	73.6	-1.7	236.7	0.3	8.8	9.9	46.4	-0.1	4.5	7.4	17.4	-16.0	-19.3	63.2	117.7	124.5	-0.9	-2.2	-2.0
UK	-4.5	-1.6	104.1	-3.7	290.6	3.9	8.3	7.6	25.8	0.5	5.2	4.2	6.0	12.6	-2.2	77.5	64.8	55.0	-0.5	-1.6	-1.4
Austria	-2.4	-2.4	74.8	0.1	154.5	3.2	6.3	8.4	59.3	0.1	5.6	5.3	-13.4	8.2	-5.1	47.1	95.1	92.9	-0.6	-1.3	-1.7
France	-4.9	-1.8	110.0	-1.2	262.2	-1.1	10.6	8.0	45.8	1.0	4.0	6.9	2.8	4.1	7.8	62.9	161.6	97.1	-0.3	-1.3	-1.2
Germany	-2.9	-2.5	65.9	6.0	156.3	1.5	6.5	8.8	38.7	-0.5	4.1	5.8	-1.9	-10.5	0.1	53.4	69.8	85.7	-0.6	-1.8	-1.5
Netherlands	-2.1	-2.0	49.5	7.6	375.9	1.1	3.9	15.7	39.4	0.6	1.4	3.6	-5.0	11.2	-1.6	87.5	130.5	83.4	-0.7	-1.9	-1.7
Belgium	-4.9	-1.4	106.0	-2.7	251.3	1.0	16.3	16.5	51.3	1.0	0.4	5.6	-26.9	-1.6	6.5	59.0	123.0	62.1	-0.6	-1.5	-1.3
Italy	-5.0	-0.5	143.7	0.7	132.3	1.7	23.0	14.9	25.9	0.7	1.1	7.8	6.7	-22.5	9.0	39.5	63.7	69.7	-0.4	-0.5	-0.3
Spain	-4.1	-1.9	107.2	2.8	174.5	0.6	7.7	14.5	39.9	2.4	3.6	12.2	-19.4	-0.6	3.7	49.3	88.7	74.9	-0.3	-0.7	-0.8
Ireland	1.7	-3.7	42.7	7.8	532.1	1.1	-1.7	11.4	53.0	2.0	3.4	4.3	-167.1	-6.2	3.5	25.3	136.6	28.7	-0.9	-1.7	-1.5
Portugal	-0.2	-1.8	108.4	1.3	163.6	-0.1	4.8	10.6	45.2	2.1	5.3	6.5	-37.7	29.6	2.6	57.0	84.2	82.9	-0.9	-0.7	-1.1
Greece	-1.6	-0.9	168.0	-6.9	268.9	1.4	14.5	5.7	81.5	2.5	2.9	10.3	24.6	6.6	26.1	43.6	52.0	53.6	-0.1	0.0	-0.3

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

Vulnerability Indicators Table

VULNERABILITY INDICATORS* 2023: EMERGING ECONOMIES

	Fiscal sustainability			External sustainability			Liquidity management				Macroeconomic performance			Credit and housing		Private debt			Institutional		
	Fiscal balance (1)	Interest rate GDP growth differential 2024-29	Gross public debt (1)	Current account balance (1)	External debt (1)	Reserves to ARA Metric	Gross financial needs (1)	Reserves to short-term external debt (3)	Reserves to Imports	Debt held by non-residents (3)	GDP growth (4)	Consumer prices (4)	Unemployment rate (5)	Private credit to Gap (4)	Real housing prices Gap (4)	HH debt (1)	NF corporate debt (1)	Financial liquidity (6)	WB political stability (7)	WB control corruption (7)	WB rule of law (7)
Bulgaria	-2.8	-3.3	21.0	0.0	49.7	1.8	3.5	2.8	11.3	48.5	1.7	4.7	5.0	-43.1	-21.1	22.3	54.7	66.5	-0.2	0.2	0.1
Czech Rep	-4.1	-2.2	45.4	0.5	64.7	12.2	7.7	1.4	12.7	22.1	0.2	8.3	4.0	-18.7	6.7	32.0	50.7	74.1	-0.8	-0.7	-1.1
Croatia	-0.8	-3.4	63.8	-0.2	82.0	1.5	9.1	1.6	9.9	36.3	2.7	6.2	6.4	-30.8	-0.9	28.8	50.4	69.9	-0.6	-0.1	-0.4
Hungary	-5.5	-2.1	68.7	-0.9	150.5	1.2	15.5	0.5	3.9	31.1	-0.3	8.2	4.3	-18.7	-1.5	17.6	81.8	99.2	-0.6	0.1	-0.4
Poland	-5.3	-3.7	49.8	1.0	54.8	1.6	9.7	1.6	5.7	28.9	0.6	7.4	5.3	-28.2	-3.1	24.2	78.5	84.9	-0.5	-0.5	-0.4
Romania	-6.3	-3.7	51.0	-7.3	53.6	1.1	12.8	1.6	5.3	40.4	1.8	10.2	5.6	-21.8	-34.2	13.3	30.5	68.7	-0.5	0.0	-0.4
Russia	-3.7	-0.1	21.2	3.4	17.4	..	4.6	3.9	18.0	10.9	2.2	5.7	3.3	-45.1	-27.4	16.8	83.3	104.4	0.9	1.0	1.2
Turkey	-5.5	-17.2	33.1	-4.4	46.5	0.7	11.3	0.5	2.6	33.4	4.5	54.3	9.7	-7.6	55.1	9.5	53.7	77.3	1.0	0.5	0.5
Argentina	-5.1	-7.2	116.2	-3.6	42.5	0.7	16.0	0.4	8.2	30.1	-3.0	132.0	7.5	-6.5	-28.9	4.2	18.9	35.8	0.0	0.4	0.5
Brazil	-7.1	2.8	88.1	-1.9	35.6	1.4	19.1	3.0	18.0	10.4	3.1	4.9	8.1	9.8	-3.8	34.6	51.8	110.9	0.3	0.6	0.3
Chile	-1.6	-2.3	38.4	-3.5	72.4	0.8	3.6	1.2	6.9	36.0	-0.5	4.5	8.9	11.9	-24.8	46.3	91.0	143.0	-0.1	-1.0	-0.7
Colombia	-4.2	0.1	56.6	-3.2	56.1	1.2	5.0	2.7	13.5	35.3	1.2	11.8	9.7	-6.4	10.6	26.9	31.1	101.6	0.6	0.4	0.4
Mexico	-3.3	2.9	46.4	-1.3	37.1	1.2	12.3	2.7	5.6	25.0	3.4	5.5	2.8	3.6	10.3	16.2	23.6	77.2	0.7	1.0	0.9
Peru	-3.0	-1.3	34.0	-0.4	35.8	2.5	4.1	7.1	20.7	41.1	-0.4	6.3	6.9	0.1	-4.4	17.2	36.2	96.2	0.4	0.8	0.6
China	-7.1	-3.6	90.1	1.5	14.1	..	4.4	3.2	16.3	..	5.2	0.4	5.0	35.5	13.7	63.6	169.4	101.4	0.4	0.0	0.0
India	-8.8	-3.0	81.9	-1.8	18.5	1.8	13.0	3.8	13.4	4.7	6.3	4.9	8.2	-9.7	-11.4	36.9	49.6	81.7	0.6	0.3	-0.1
Indonesia	-2.2	-1.5	39.0	-0.3	30.9	1.1	4.0	3.1	9.4	35.2	5.0	2.3	5.5	-12.6	-29.5	16.9	23.9	92.4	0.4	0.4	0.2
Malaysia	-4.7	-1.9	66.9	2.7	61.9	1.1	9.7	1.2	6.8	21.9	4.0	2.9	3.5	-29.6	11.9	88.4	89.3	113.6	-0.1	-0.2	-0.6
Philippines	-4.8	-4.1	57.6	-3.0	28.1	1.9	12.6	5.3	9.9	25.7	5.3	3.6	4.5	2.6	-10.2	5.0	40.8	65.7	0.7	0.5	0.5
Thailand	-2.9	-2.0	61.4	-0.2	40.1	2.0	10.0	2.6	12.9	11.3	2.7	0.6	1.1	18.2	-11.6	91.3	82.7	95.5	0.4	0.5	-0.1

*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. ARA Metric: see https://www.imf.org/external/np/pp/eng/2011/021411b.pdf
Source: BBVA Research, Haver, BIS, IMF and World Bank

Methodological Appendix

Methodological Appendix

Methodology: indicators and maps

- **Financial Stress Map:** It stresses levels of stress according to the normalized 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 & Poor's and Fitch) to numerical positions from 20 (AAA) to default (0). The index shows the average of the three rescaled numerical ratings

- **Sovereign Spreads Maps:** It shows a colour map with six different ranges of sovereign spreads (darker >500, 300 to 500, 200 to 300, 100 to 200, 50 to 100 and the lighter below 50 bp). For European countries the spread corresponds to the difference of the local 10-year bond yield vs. Germany.

- **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 Economies). 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

- **Equity Prices Gap:** Equity Prices Indexes are first transformed to real prices using the CPI index. The gap is estimated as the deviation of the current value of the logarithm of real equity prices vs. its corresponding 4-year moving average.

Methodological Appendix

Methodology: indicators and maps

Risk Thresholds Table
* (ARA Metric = 10% × Exports + 10% × Broad Money + 30% × Short-term Debt + 20% × Other Liabilities)

Vulnerability Dimensions	Risk Thresholds Developed Economies	Risk Thresholds Emerging Economies	Risk Direction	Source
Macroeconomics				
GDP	1.0	3.0	Lower	BBVA Research (based on historical percentiles)
Inflation	4.0	10.0	Higher	BBVA Research (based on historical percentiles)
Unemployment	10.0	10.0	Higher	BBVA Research (based on historical percentiles)
Fiscal Vulnerability				
Government fiscal balance (% GDP)	-4.0	-4.0	Lower	Baldacci et Al (2011). Assesing Fiscal Stress. IMF WP 11/100
Expected Interest rate GDP growth differential 5 years ahead	0.8	0.0	Higher	Baldacci et Al (2011). Assesing Fiscal Stress. IMF WP 11/100
Gross Public Debt (%GDP)	60.0	40.0	Higher	IMF Public Debt Sustainability Analysis (DSA) in Market-Acess Countries, 2013
External Vulnerability				
Current Account Balance (% GDP)	-5.0	-3.0	Lower	BBVA Research (based on historical percentiles)
External Debt (% GDP)	200.0	60.0	Higher	BBVA Research (based on historical percentiles)
Real Exchange Rate (Deviation from 4 yr average) (Developed)	5.0		Higher	EU Commission (2012) and BBVA Research (based on historical percentiles)
Reserves to ARA Metric (Emerging)		0.8	Lower	Baldacci et Al (2011). Assesing Fiscal Stress. IMF WP 11/100
Liquidity Problems				
Gross Financial Needs	25.0	15.0	Higher	IMF Public Debt Sustainability Analysis (DSA) in Market-Acess Countries, 2013
Debt Held by Non Residents	55.0	45.0	Higher	IMF Public Debt Sustainability Analysis (DSA) in Market-Acess Countries, 2013
Short Term Debt Pressure				
Public Short-Term Debt as % of Total Public Debt (Developed)	15.0		Higher	Baldacci et Al (2011). Assesing Fiscal Stress. IMF WP 11/100
Reserves to Imports (Emerging)		3.0	Lower	BBVA Research (based on historical percentiles)
Reserves to Short-Term Ext. Debt (Emerging)		1.0	Lower	Baldacci et Al (2011). Assesing Fiscal Stress. IMF WP 11/100
Private Balance Sheets				
Household Debt (% GDP)	84.0	54.0	Higher	BBVA Research (based on historical percentiles)
Non Financial Corporate Debt (% GDP)	120.0	80.0	Higher	BBVA Research (based on historical percentiles)
Financial liquidity (Credit/Deposits)	130.0	110.0	Higher	EU Commission (2012) and BBVA Research
Excess Credit and Assets				
Private Credit to GDP (annual Change)	12.0	12.0	Higher	BBVA Research
Real Housing Prices growth (% yoy)	12.0	12.0	Higher	BBVA Research
Equity prices gap (%)	20.0	20.0	Higher	BBVA Research (based on historical percentiles)
Institutions				
Political Stability	1 (9th percentil)	-0.6 (8th percentil)	Lower	World Bank Governance Indicators
Control of Corruption	1 (9th percentil)	-0.6 (8th percentil)	Lower	World Bank Governance Indicators
Rule of Law	1 (8th percentil)	-1 (8 th percentil)	Lower	World Bank Governance Indicators

Methodological Appendix

Methodology: Sovereign Rating Index Model

The dependent variable is the average of the three rating agencies (Moody's, Standard & Poor's and Fitch) translated to numerical positions from 20 (AAA) to default (0).

The determinants of the sovereign ratings are estimated using a ordered-logit model with quarterly data from 51 countries and from 2000Q1 to the most recent quarter. The main determinants are the following:

- GDP per capita (real USD)
- Inflation
- Fiscal Balance to GDP
- Public Debt to GDP (local holders)
- Public Debt to GDP (external holders)
- Institutional Index (Rule of Law, Regulation Quality and Government Effectiveness)
- Composite indicator summarizing the *Number of Years since last Sovereign* Default (squared root) and the *Number of Historical Defaults* (over number of years since last default)
- Individual country dummies
- Time-specific dummies for 2020

The effects of the GDP per capita, inflation, and of Local and External Public Debts are decomposed into a global component (median of all 51 countries) and an idiosyncratic component (the deviation against the global component), allowing each component to have a separate effect on the rating.

Additionally, the effect of the fiscal balance is interacted with a categorical variable indicating different Public Debt levels, allowing different sensibilities depending on how indebted a country is.

Methodological Appendix

Methodology: Private Debt Equilibrium & Gaps (Debt-to-GDP)

Debt Gaps (Debt-to-GDP): The Debt-to-GDP gaps are the difference between the observed debt ratio and an estimated equilibrium level for every country.

The equilibrium level is estimated through non-linear regression that adjust a Gompertz-curve type of relationship between the debt ratio and income per capita, with a saturation level at the highest levels of income. The regression is estimated using a panel data model with annual data from 88 countries and from 1980 to the most recent available year

The determinants are the following:

- GDP per capita (in PPP adjusted USD)
- Short-term interest rate
- Investment-to-GDP ratio
- Inflation
- Bank spread (loans minus deposit interest rates)
- Index of quality of legal framework
- Gini index
- Regulatory capital to assets ratio
- Index of Information Sharing
- Banking Concentration

We finally combine our own estimated gaps with the gaps estimated following the BIS methodology (trend based on a HP filter), assigning a weight of 075 to our own gaps and 0.25 to the gaps estimated through the BIS methodology.

The full description of our methodology can be found in https://goo.gl/LTeTHD and https://goo.gl/r0BLbl

Methodological Appendix

Methodology: Housing Prices Equilibrium & Gaps (1)

The housing price gaps are the difference between the observed real price and an estimated equilibrium level for every country. The equilibrium model is estimated through a panel data model in which the dependent variable is an index of real property prices, with annual data from 59 countries and from 1990 to the most recent available year, using a random-effects GLS model allowing for heteroscedasticity and autocorrelation, allowing also for a country-wise autocorrelation coefficient.

Some of the explanatory variables are decomposed into two components: a trend (10-years moving average) and a cyclical component (deviation from the trend). The contribution of the trend components is the one that adds to the estimated equilibrium price level:

- GDP real or GDP real per household
- Bank Credit-to-GDP
- Short-term real interest rates (as a deviation from US Libor interest rates)
- US Libor interest rates
- Unemployment rate

Other variables are not decomposed into cycle and trend components but also add to the equilibrium level:

- Households growth rate (%)
- Population between 25 and 44 years old growth rate
- Change in urban population

We finally combine our own estimated gaps with the gaps estimated following the BIS methodology (trend based on a HP filter), assigning a weight of 0.8 to our own gaps and 0.2 to the gaps estimated through the BIS methodology.

Methodological Appendix

Methodology: Housing Prices Equilibrium & Gaps (2)

In order to perform any type of cross-country analysis/comparison we need to have comparable data for all the countries included in the analysis. Therefore, we have mainly relied on the BIS Housing Prices Database that includes about 322 series for about 70 countries and regions classified by 6 different characteristics.

However, we have regrouped the original BIS series into a more comparable set of 42 variables according to only 3 characteristics:
● Geographical coverage (whole country, urban areas, large cities, etc.)
● Type of property (all types, single-family houses, apartments)
● "Vintage" (i.e. all properties, new, existing).

Additionally, since we also need to use other sources of data (Dallas FED, Haver) to complement the BIS database, we have tried to classify/organize them, if possible, according to the same criteria. If the most generic series is not available we chose the second "most generic" one. e.g. if there is no series that includes the whole country we would use the one that includes urban areas.

Importantly, since the dependent variable is defined as an index (2016=100), we now also transform all independent variables into indexes, making it much easier for the data to adjust to changes in the dependent variable

Finally, in order to use the number of households as part of our explanatory variables (e.g. GDP/income per household, etc.), we needed to smooth and carefully treat some of the very noisy original data.

Methodological Appendix

METHODOLOGY: EARLY WARNING SYSTEMS

EWS Banking Crises:

The complete description of the methodology can be found at https://goo.gl/r0BLbI 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 the most recent year. 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):

- Debt-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 the most recent quarter, 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

Methodological 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

Methodological Appendix

Methodology: Sovereign CDS Model

The dependent variable is the 5-year Sovereign CDS. The determinants of the sovereign CDS are estimated using a panel data model with quarterly data from 48 countries and from 2004Q1 to the most recent quarter, using a random-effects linear model with an AR(1) disturbance. The main determinants are the following:

- BAA Spread
- GDP per capita (real USD)
- Inflation
- Fiscal Balance to GDP
- Public Debt to GDP (local holders)
- Public Debt to GDP (external holders)
- Institutions Index (Rule of Law, Regulation Quality and Government Effectiveness)
- Composite indicator summarizing the *Number of Years since last Sovereign* Default (squared root) and the *Number of Historical Defaults* (over number of years since last default)
- Percentage change in FED's and ECB's Balance Sheets.
- Reserves to Import Ratio
- Specific Default and time-specific dummies for 2020

Some variables (BAA Spread, GDP per capita, Inflation, Fiscal Balance and Public Debt levels) are decomposed into two different components, a long-term component (using a 5-years moving average) and a cyclical component (deviation from 5-y MA), allowing each component to have a different effect. The effects of the long-term components are the ones that determines the equilibrium level, together with the effect of the rest of variables which are not decomposed.

Moreover, the final CDS equilibrium level is estimated by leaving the BAA spread unchanged at its long-term median level (2003-last quarter).

Methodological Appendix

Stochastic DSA: distribution of debt paths from historical shocks

- Stochastic projections seek to demonstrate how **various potential shocks** affecting primary deficit, economic growth, interest rates, and inflation impact the **dynamics of debt** in comparison to a **central scenario (BBVA & IMF Oct. 2023)** (deterministic DSA).

- **Debt law motion** following **European Commission** model:

$$d_t = \alpha^n \left(\frac{1 + i_t - \pi_t}{1 + g_t} \right) d_{t-1} + \alpha^f \left(\frac{1 + i_t - \pi_t}{1 + g_t} \right) \frac{e_t}{e_{t-1}} d_{t-1} - \rho_t + dda_t \tag{1}$$

- **Assumption**: debt is **fully denominated** in national currency ($\alpha^n = 1$ and $\alpha^f = 0$). d_t: debt-to-GDP ratio, i_t: implicit nominal interest rate of debt, g_t: real GDP growth rate, π_t: inflation growh rate (GDP deflator) (such that $\gamma_t \equiv g_t + \pi_t$: nominal GDP growth rate) & ρ_t: primary balance over GDP.

- **Data**: short and long-term interest rates, inflation rate (GDP deflator), primary balance, real GDP growth (**quarterly**) (1999q1-2023-q1) (SCA)

- Adaptation of European Commission **Historical Variance Covariance (VCV) Matrix** methodology (based on Berti, K. (2013)).
  1. Eliminate **extreme outliers** ($\overline{x}_t \pm sd(x)$) & calculate **historical quarterly shocks**: $\delta_q^x = x_q - x_{q-1}$, where $x \in (i^s, i^l, g, \pi, \rho)$.
  2. Compute **VCV Matrix** $\hat{\Omega}$ (5x5) of the deviation of historical shocks
  3. **Montecarlo** simulation of **N=40000** to extract N **random vectors of quarterly shocks** over the projection period (44 quarters). Such shocks are obtained by pseudo-random functions assuming a **multivariate joint normal** distribution: $\hat{\epsilon}^x{}_q \sim \mathcal{N}(0, \hat{\Omega})$
  4. **Aggregation** of quarterly shocks to **annual** frequency (short and long-term interest rates are added by maturity debt stock weights):

$$\epsilon_t^x = \sum_{q=1}^{4} \epsilon_q^x, \qquad \epsilon_t^i = \alpha^{st} \sum_{q=1}^{4} \epsilon_q^{i^s} + \alpha^{lt} \sum_{q=1}^{4} \epsilon_q^{i^l} \tag{2}$$

  5. Apply stochastic annual shocks to **central scenario**, compute debt paths and calculate **debt distribution percentiles**:

$$x_t = \overline{x}_t + \epsilon_t^x, \tag{3}$$

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