S&P Global
Ratings

Global Debt Leverage:

How A 300bp Rise In Inflation And Interest Rates Could Hit Borrowers

Dec. 7, 2021

This report does not constitute a rating action

Key Takeaways

- **Risks from inflation and high debt.** Persistent inflation, tied to supply chain disruptions and energy prices, could trigger wage inflation and push the Fed and other central banks to hike rates faster. This could spark market volatility, amplified by elevated debt levels.

- **Vulnerable corporates.** In a stress scenario of a 300 basis point (bp) rise of both interest rates and inflation for a corporate sample (91% unrated), loss-makers could nearly double to 12% from an already-high 7%. By region, China's corporates are most sensitive. Transportation cyclical and leisure, yet to fully recover from COVID-19, are the most vulnerable sectors.

- **Sovereigns and households.** Advanced economy sovereigns are generally able to absorb a 300bp interest hike, but some emerging markets may be stressed. For households, some geographic and wealth cohorts may be vulnerable to rate rises.

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After a decades-long retreat, inflation is back. Prices are rising, often dramatically, for items such as oil, semiconductors, and vehicles. Inflation strains are prompting some central banks to tighten, raising funding costs. In a scenario analysis assuming a stress of a 300bp increase in prices and interest rates, S&P Global Ratings expects that the ratio of loss-making entities, or potential defaulters, could rise by 70%.

With global demand growth outrunning supply growth, inflation is rising quickly almost everywhere (see "Economic Outlook Q1 2022: Rising Inflation Fears Overshadow A Robust Rebound," Nov. 30, 2021). Central banks in the emerging markets of Brazil, Chile, Colombia, Mexico, Russia, Poland, and South Africa are hiking policy rates. While the Federal Reserve and the European Central Bank are still on hold, monetary authorities of other advanced economies have raised rates. These include Norway, Korea, and New Zealand, while Australia, England, and Sweden are tapering asset purchases. Persistent high inflation requiring an unanticipated policy adjustment is now the main macro risk for 2022.

Recent Fed signaling has prompted investors to speculate that the central bank may raise interest rates sooner and faster. On Dec. 1, 2021, Federal Reserve chairman Jerome Powell said that "the risks of higher inflation have moved up" and "we will use our tools to make sure that this high inflation we're experiencing is not entrenched."

Our stress scenario for a 300bp interest rate hike only assumes that rates would return to the levels that prevailed before the global financial crisis. Yet, we find that this increase would significantly alter the financials of corporate issuers. Entities with weak credit metrics may find themselves struggling to access credit markets (see "Global Credit Outlook: Aftershocks, Future Shocks, And Transitions," Dec. 1, 2021).

To quantify the potential effect of a high inflation and interest spreads scenario, we stress-tested a sample of over 24,000 nonfinancial corporates (91% unrated) for a 300bp rise in producer-price inflation, and for a similar rise in average interest rate spreads. This is a refresh of our stress scenario exercise in June 2021 (see "Global Debt Leverage: Spreads, Costs Shocks May Double Rate Of Loss-Making," June 22, 2021). We also updated our stress test of a flat 300bp interest rise for a sample of rated sovereigns (see "Take A Hike: Which Sovereigns Are Best And Worst Placed To Handle A Rise In Interest Rates," May 24, 2021). Supplementally, we also examine household indebtedness.

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Leverage Is Stabilizing…

COVID debt surge is ebbing. In response to the pandemic, governments loosened monetary policies and increased fiscal spending. Global government gross debt to GDP leverage was up 19% in 2020 while corporate debt to GDP rose 15%, and the ratio for households climbed 9% (see chart 1). Nonetheless, with economies recovering, we expect leverage to ease going into 2022. This recovery will be particularly constructive for corporates, leaving governments nearly as leveraged as companies (see chart 2).

Chart 1

Debt Leverage Surge Will Likely Ease…
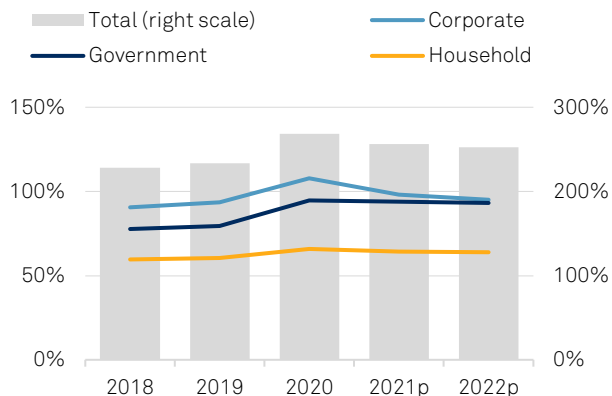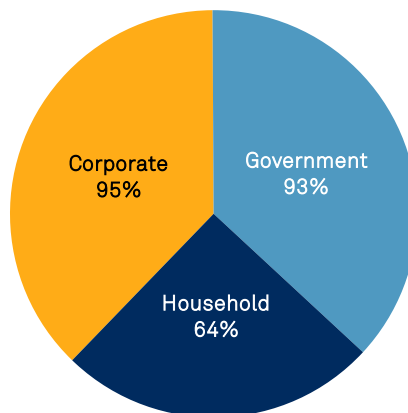Global debt to GDP trends, 2018-2022p

Chart 2

…With State And Corporate Leverage Balanced
Global debt to GDP sector mix, 2022p

Note: Corporates refer to nonfinancial corporates. p--Projected. Source: 2009-2020 corporate--International Institute of Finance; other--S&P Global Ratings.

Source: S&P Global Ratings.

…But Risks Are Rising

Interplay of risks. The intersection of pandemic-induced disruptions, government policies, and vulnerable production networks has had unexpected consequences (see chart 3). Consumption demand has surged while energy and goods are suffering shortages and delivery bottlenecks.

Too much money, too few goods. The recent wave of monetary and fiscal stimulus (see spending policy in chart 3) may be resulting in a lot of cash chasing limited goods. The risk of persistent inflation and, perhaps more perniciously, rising inflation expectations is driving some central banks to consider raising policy rates. In some emerging markets, such as Brazil, Chile, Colombia, Mexico, Poland, and Russia, policy rates are already trending up.

Consumption pattern changing. People retreating to their residences, either because they are unemployed or working from home, has altered consumption patterns. There is higher demand for some goods (see consumption demand box in chart 3) and lower demand for others. The former has contributed to inflation.

Labor, production, and supply disruption. COVID-triggered labor shortages and production-supply disruptions add to the inflationary pressure (see labor and production boxes in chart 3). The decades-long globalization of production has exposed the fragility of complex supply chains stretching from delays in parts production (for example, semiconductors) to transport flows (such as Los Angeles' congested seaport).

Government policies complicate. Governments' climate change policies and geopolitical positions complicate the situation. While well-intended, the decarbonization goals of major governments have resulted in energy supply disruptions (see energy box in chart 3), most notably in Europe and China. Nationalist economic actions compound this problem. Examples include Russian cuts to gas supply to Europe, and China's de facto ban on Australian coal.

Inflation, interest rates. This confluence of factors is creating inflationary pressures (see price box in chart 3) that have forced the hands of the central banks of some emerging markets. The factors have increasingly incentivized the central banks of other economies to raise policy interest rates (see interest rates box in chart 3) and lower monetary stimulus. Lenders and investors, who are now expecting rate hikes to come sooner, may preemptively demand higher returns to compensate for higher risks.

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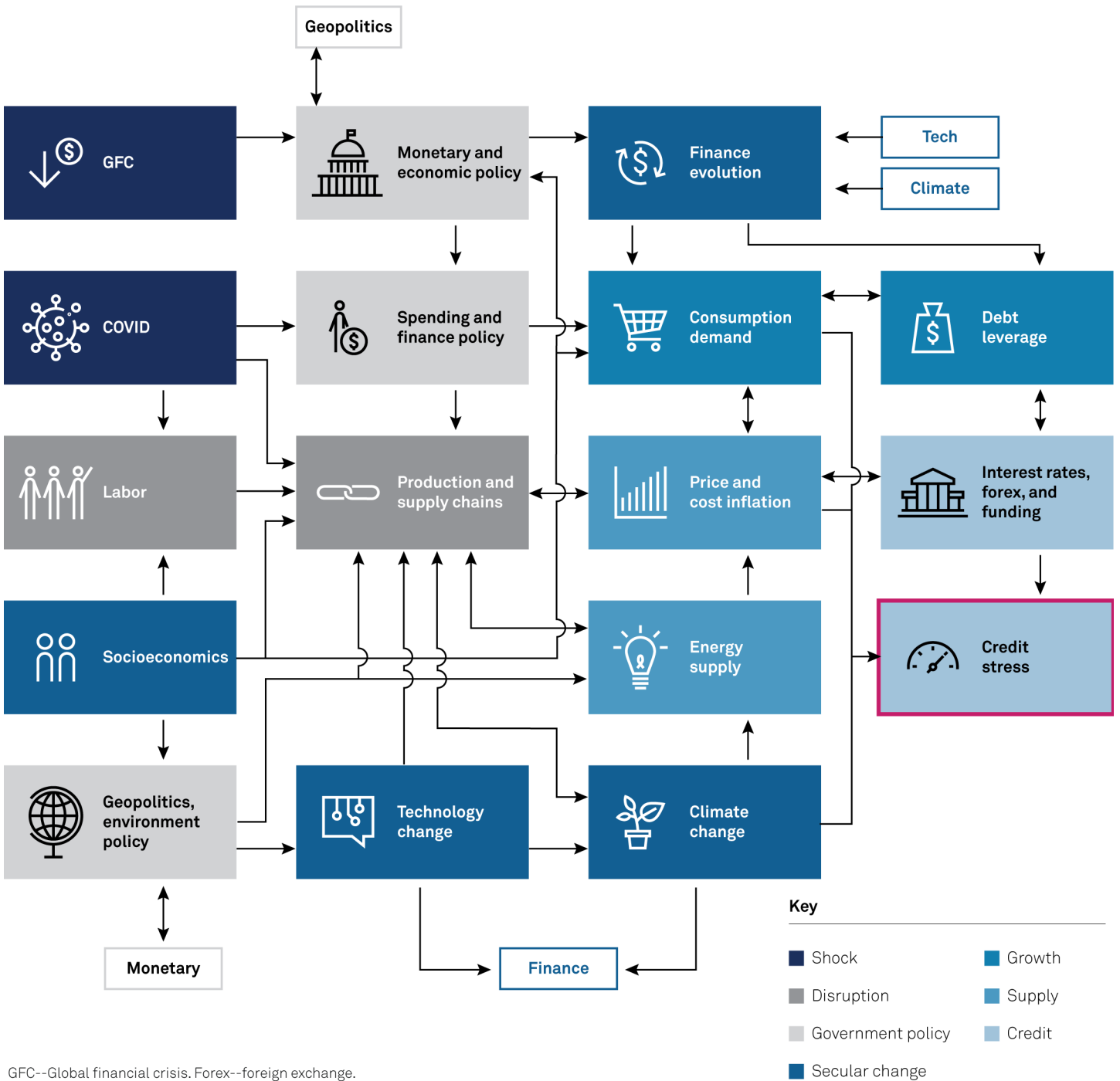alexandre.birry@spglobal.com

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Interplay Of Credit Stress Factors

The many factors contributing to credit stress, and how these factors affect each other

Key

- Shock
- Disruption
- Government policy
- Secular change
- Growth
- Supply
- Credit

GFC--Global financial crisis. Forex--foreign exchange.

Stress Scenario

To state the obvious, our exercise is a downside stress scenario and not the base case. In this exercise, we study the three borrower sectors of corporates, governments, and households.

Corporate scenario. For corporates, we apply scenario shocks of: (i) 300bp rise in cost-of-goods-sold (COGS) inflation rate above base-case producer price indices (PPI) by country for 2022 (see chart 4), and (ii) an upward shift of the interest spread curve averaging 300bp (see chart 5). The interest spread shock is applied on floating rate and maturing debt for 2022 and 2023 (see Appendix for more details on the scenario).

COGS stress. Our base case is for PPI inflation to ease. For the stress scenario, we added back (and rounded up) half the projected decline of global GDP-weighted PPI inflation between 2021 and 2022. We see 300bp as reasonable for the stress test. We simplistically presume 70% of the added cost is passed through to customers (which increases revenue commensurately). In actuality, the pass-through percentage would differ greatly by industry, geography, and borrower.

Interest spread stress. We apply stress tests that assume a sudden return to interest spreads levels that prevailed before the global financial crisis. The 300bp amount is roughly the difference in average U.S. corporate yields during 2003-2007 (pre-crisis) and year-to-date 2021.

COGS and interest spreads. We project that producer prices will increase 9.4% in 2021, and 4.2% in 2022. A 300bp increase in 2022 would still keep producer price rises well below that of 2021 (see chart 4). If 300bp of inflation is matched by 300bp of interest spread rises (a realistic scenario, in our view), entities with weak credit metrics would be hit hardest. We assume that firms with a "high" credit risk would pay about 400bp more in interest costs in this scenario. Firms with more solid financials would see their funding costs increase about 200bp. The increase across risk levels would be about 300bp (see chart 5).

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Chart 4

Corporate Scenario: Incremental COGS Inflation
Corporate stress scenario: Incremental PPI inflation (%)
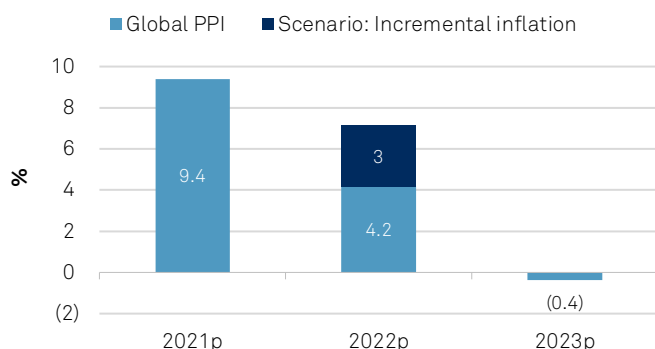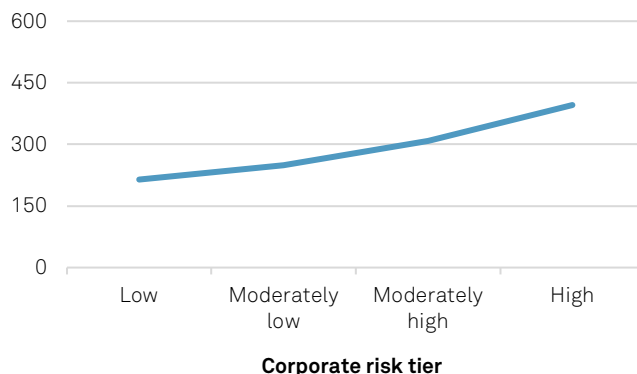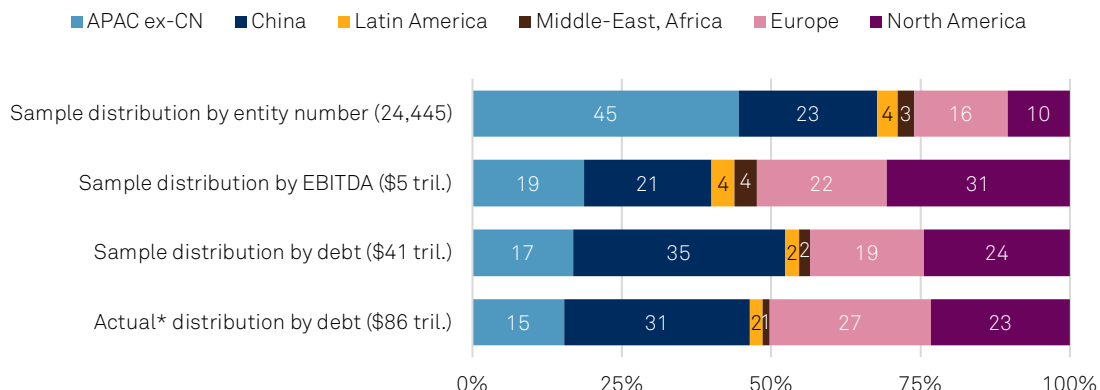

PPI--Producer price index. p--Projected. Base PPI data source: Oxford Economics. Source: S&P Global Ratings.

Chart 5

Corporate Scenario: Incremental Interest Spread
Corporate stress scenario: Increase in spread* in bp, over that paid in 2021p

Note: "corporate risk tier" is a rough calculation that references an entity's debt-to-EBITDA and ratio of funds from operations to debt. See discussion below in the main text for a fuller explanation of terms. *Spread is over the relevant risk-free rate. bp--Basis points. p--Projected. Source: S&P Global Ratings

Sovereign and household scenarios. For our sample of rated sovereigns, the scenario involves a flat 300bp rise in refinancing interest rates. For our sample of country household sectors, the scenario involves a flat 300bp rise in interest rates.

Corporate Sampling

Corporate sample covers half the world's debt. In our scenario exercise, we drew a sample of first fiscal half-year 2021 financials for 24,445 corporates (91% unrated, 86% listed) from S&P Global Market Intelligence's database. The regional mix is shown in chart 6. The sample debt of $41 trillion is equivalent to about half the global corporate population debt (based on International Institute of Finance data). The sample underweights Europe and overweights Asia-Pacific. Consequently, our whole-of-sample findings are more conservative than had the weights been in proportion.

Our corporate sample covers half the world's debt

Chart 6

Corporate Sample Debt Mix Underweights Europe, By Population
Global corporate sample: Mix by region

Legend: APAC ex-CN ■ China ■ Latin America ■ Middle-East, Africa ■ Europe ■ North America

Category	APAC ex-CN	China	Latin America	Middle-East, Africa	Europe	North America
Sample distribution by entity number (24,445)	45	23	4	3	16	10
Sample distribution by EBITDA ($5 tril.)	19	21	4	4	22	31
Sample distribution by debt ($41 tril.)	17	35	2	2	19	24
Actual* distribution by debt ($86 tril.)	15	31	2	1	27	23

(scale: 0% 25% 50% 75% 100%)

APAC ex-CN--Asia-Pacific excluding China. tril.—Trillion. *Data for actual distribution of all global debt comes from International Institute of Finance. Sample data source: S&P Global Market Intelligence. Source: S&P Global Ratings.

Four corporate risk tiers. For each company we calculate the debt-to-EBITDA and funds from operations (FFO) -to-debt ratios. After adding in country and industry sector risks, we classify each corporate according to four risk tiers: "low," "moderately low," "moderately high," and "high." The high-risk tier is key. Within the "high" risk tier are entities classified as loss-makers. Our loss-maker ratio is calculated by averaging the negative EBITDA and negative FFO ratios. (FFO is EBITDA after by deducting net interest and tax expenses. Debt is gross debt after deducting 75% of cash equivalents. Ratios are debt-weighted).

Debt slows, earning grows. The debt growth and earnings trends (see charts 7 and 8) for the corporate sample aligns with that of the debt-to-GDP trend. A notable exception on debt growth is China--where corporate debt grew at an annualized 15% during first fiscal half-year 2021 over 2020, only marginally down from 16% in 2020 (see chart 7). With China's corporate debt of $27 trillion already equivalent to 31% of the global total (see chart 6), the Chinese government recently redoubled its efforts to curtail excessive credit growth to manage systemic risks (for further details, see "Global Debt Leverage: Can China Escape Its Corporate Debt Trap?" Oct. 19, 2021).

On the earnings side, EBITDA has more than recovered. On an annualized basis, the global sample's first half 2021 EBITDA is 18% over the full-year 2019 (see chart 8). Latin America and China are leading the charge at 30% and 28% respectively with North America, 18%; Europe, 16%; emerging markets (EM-15), 14%; and Asia-Pacific ex-China just 11%.

Chart 7

Surge In Debt Has Eased (Except China)…
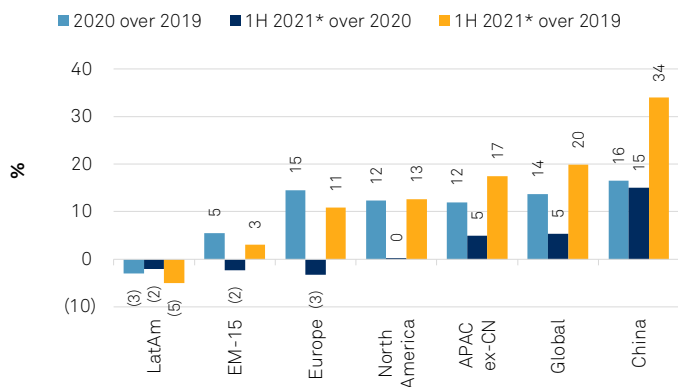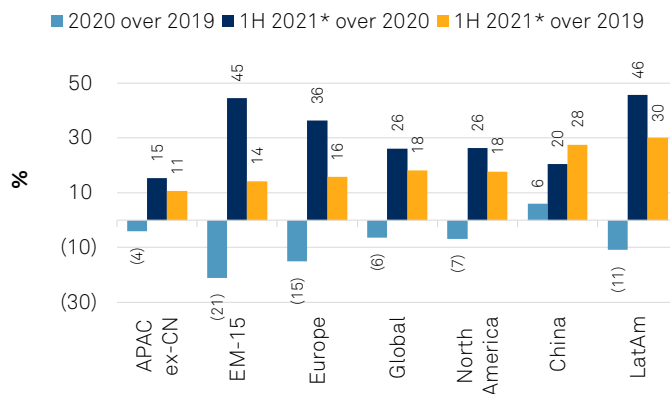Global corporate sample: debt growth in 2020 and 1H 2021*

Legend: ■ 2020 over 2019 ■ 1H 2021* over 2020 ■ 1H 2021* over 2019

	2020 over 2019	1H 2021* over 2020	1H 2021* over 2019
LatAm	(3)	(2)	(5)
EM-15	5	(2)	3
Europe	15	(3)	11
North America	12	0	13
APAC ex-CN	12	5	17
Global	14	5	20
China	16	15	34

Chart 8

…While Earnings Have More Than Recovered
Global corporate sample: EBITDA growth in 2020 and 1H 2021*

Legend: ■ 2020 over 2019 ■ 1H 2021* over 2020 ■ 1H 2021* over 2019

	2020 over 2019	1H 2021* over 2020	1H 2021* over 2019
APAC ex-CN	(4)	15	11
EM-15	(21)	45	14
Europe	(15)	36	16
Global	(6)	26	18
North America	(7)	26	18
China	6	20	28
LatAm	(11)	46	30

Note: As the data are in US$ equivalent, volatility in foreign exchange rates may affect findings. *annualized. 1H--first financial half-year. APAC ex-CN--Asia-Pacific excluding China. EM-15--15 emerging markets, namely Argentina, Brazil, Chile, Colombia, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, and Turkey. LatAm--Latin America. Source: S&P Global Market Intelligence, S&P Global Ratings.

Corporates Stress Scenario: 300bp Rates And Inflation Rise Could See Loss-Makers Rise To 12%

Loss-makers already double last decade's rate. We found that the percentage of loss-makers in the sample would be 6% for 2020 and 7% for first half 2021 (see chart 9), a level double that of the last decade's average. The calculation is debt weighted--we refer to volume of outstanding debt, not to the number of entities. We had similar findings in our sampling of earlier this year (see "Global Debt Leverage: Spreads, Costs Shocks May Double Rate Of Loss-Making," June 22, 2021).

Chart 9

Rate Shock Has Global Loss-Makers At 10%...
Global corporate sample: Effect of 300bp interest rate shock (% of debt)
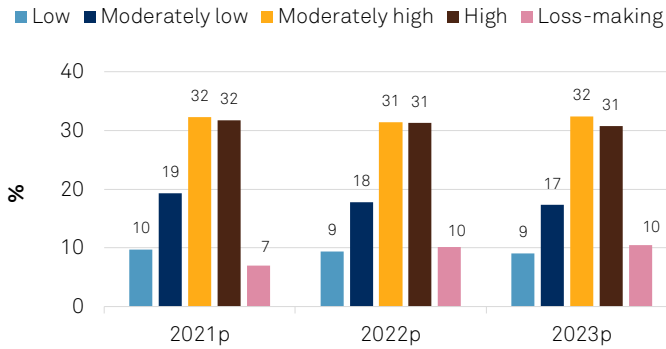
Chart 10

...With Twin Shocks Pushing The Ratio To 12%
Global corporate sample: Impact of interest and inflation rates twin shock (% of debt)
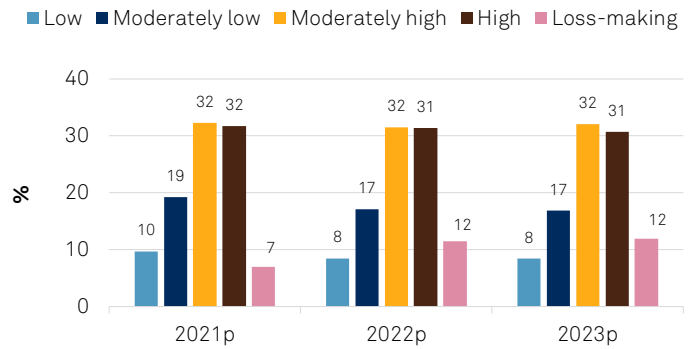
Note: Ratios are debt-weighted. p--Projected. Source: S&P Global Market Intelligence, S&P Global Ratings.

Global loss-makers to rise by 70%. In either the 300bp interest rate only (see chart 9) or 300bp COGS inflation-only shock scenarios, loss-makers would rise to 10% by 2023. In a "twin-shock" scenario where we stress for both interest rate and input inflation, the ratio is up 70% to 12% by 2023 from 7% (see chart 10). This worst-case scenario implies that potentially higher policy rates and monetary tightening by central banks will be insufficient to rein in inflation.

Global loss-maker ratio is already double that of last decade

Corporates: Scenario Outcomes For Geographic Samples

Regional loss-maker ratios are as expected. Drilling down into the regions (see chart 11), the projected 2021 distribution of loss-makers is pretty much as expected. The North America and Europe samples have about 6% loss-makers by end-2021, below the global average of 7%. Both China and the emerging markets (EM-15) are at 7% while Asia-Pacific ex-China has 8%. While Latin America has only 5%, we should caveat that there is a lumpiness of large borrowers in this sample. (We treat China as a separate region for this exercise because of the vastness of its debt volume).

Chart 11

China's Corporates Are Most Sensitive...
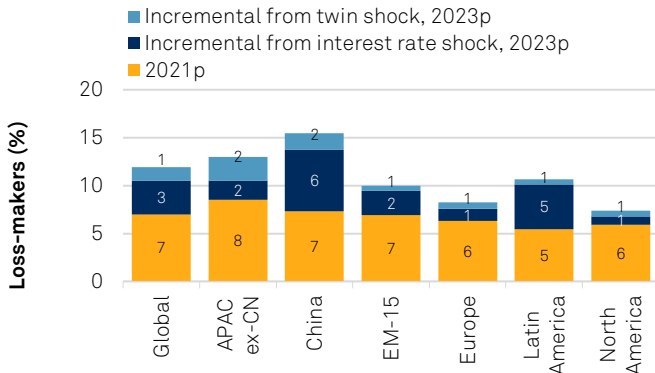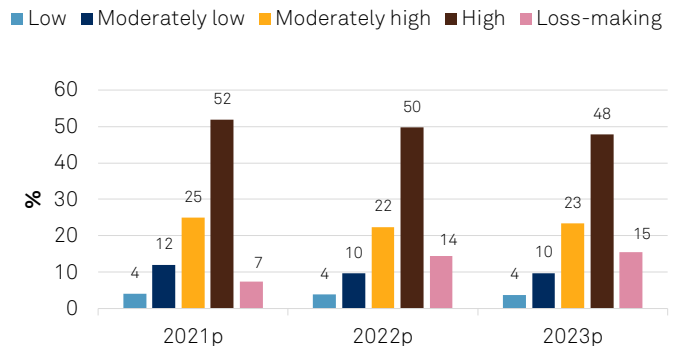Stress scenario: Loss-makers (% of debt) for corporate sample by region

Chart 12

...As Half Of China's Sample Is In The 'High' Risk Tier
China corporate sample: Impact of interest and inflation rates twin shock (% of debt)

Note: After each region name, bracketed numbers refer to sample debt amount and entity count. Ratios are debt weighted. p--Projected. tril.—Trillion. Source: S&P Global Market Intelligence, S&P Global Ratings.

How A 300bp Rise In Inflation And Interest Rates Could Hit Borrowers

Among the regions, we find that the **China sample is the most sensitive** to our shock scenarios, with the volume of loss-makers (by total debt) rising by over 8 percentage points to 15% in the dual shock scenario (see chart 11). This is explained by the China sample having nearly half its debt in the "high" risk tier (see chart 12). The rise in the Latin America sample's loss-maker ratio is explained by the interest shock tipping a Mexican state-owned electricity utility over into negative FFO. The utility debt alone makes up 5% of Latin America sample debt. (Note: As this exercise in in US$ equivalent, it does not account for foreign exchange rate changes, which may benefit the utility, whose debt is largely in domestic currency).
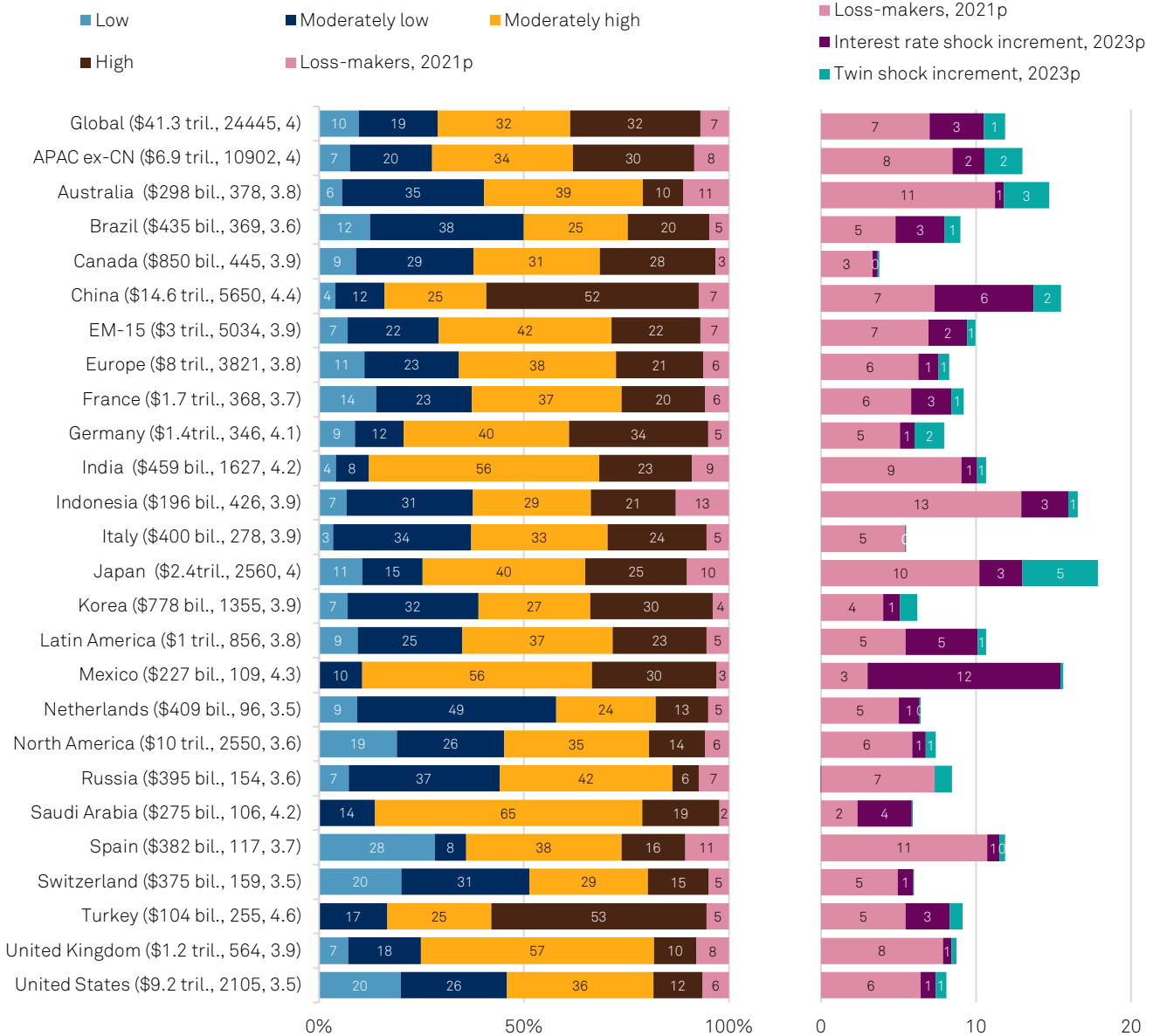
Chart 13 shows the stress scenario outcomes for the top 20 economies (as measured by GDP).

Chart 13

Asia-Pacific Has The Highest Sensitivity To Scenario Shock

China's corporates are more sensitive to rate shocks

Country corporate sample: Risk distribution (% of debt), 2021p

Stress scenario: Loss-makers, 2023p

Legend (left chart): ■ Low ■ Moderately low ■ Moderately high ■ High ■ Loss-makers, 2021p

Legend (right chart): ■ Loss-makers, 2021p ■ Interest rate shock increment, 2023p ■ Twin shock increment, 2023p

Note: After each geography name, numbers in parentheses refer to sample debt amount, entity count and numeric equivalent of average risk tier (where 1.5 = "low", 3 = "moderately low", 4 = "moderately high", 5.5 = "loss-makers"). This calculation is a rough ranking of credit risk that references an entity's debt-to-EBITDA and ratio of funds from operations to debt. Ratios are debt weighted. p--Projection. APAC ex-CN--Asia-Pacific excluding China. EM-15--15 emerging markets, namely Argentina, Brazil, Chile, Colombia, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, and Turkey. bil.--Billion. tril.--Trillion. Source: S&P Global Market Intelligence, S&P Global Ratings.

Generally, for geographic samples, the risk distribution (see chart 13 left) and the occasional presence of very large borrowers affects the loss-maker ratios (see chart 13 right):

- **Global sample.** The sample median (50th percentile) is in "moderately high". This is not surprising given the long-term trend of corporate leveraging increasing. As mentioned, the 7% loss-maker ratio, a fallout from the COVID crisis, is double that of the past decade's average. A twin-shock scenario of interest rates and input inflation raises this ratio to 12%.
- **Asia-Pacific ex-China (APAC ex-CN).** Australia, Indonesia and Japan contribute to the region's loss-maker ratio of 8%, which is slightly above global average.
- **Australia.** Its high loss-maker ratio is caused by a single large borrower--a government-related telecommunications company (unrated) that has recorded a large, negative FFO for a decade. Excluding it would reduce the ratio to 7%, more in line with other developed countries.
- **Brazil.** As for the rest of Latin America, the loss-maker ratio has benefited from the 2021 economic rebound.
- **Canada.** The sample is one of the more robust ones with a low loss-maker ratio of 3%.
- **China.** As can be seen in chart 13, the sample is heavily skewed in the "high" risk tier. Consequently, the twin-shock stress scenario doubles the loss-maker ratio to 15%.
- **Emerging markets (EM-15).** The EM-15 sample's loss-maker ratios is at about the global average, straddling the higher Asia-Pacific ex-China and lower Latin America results.
- **Europe.** The sample's risk distribution and, thus, loss-maker ratios are better than the global average.
- **France.** The sample's risk distribution and loss-maker ratios are similar to Europe's.
- **Germany.** Because of the presence of a handful of very large borrowers, the sample's risk distribution is more aggressive than Europe's. But its stress scenario results are similar.
- **India.** The sample's initial loss-maker ratios are slightly worse than Asia-Pacific ex-China's.
- **Indonesia.** A severe COVID outbreak hit Indonesia in the first half of 2021. The initial loss-maker ratio of 13% reflects this.
- **Italy.** The risk distribution is not far off that of Europe with loss-makers ratios slightly better.
- **Japan.** A substantial portion of the sample had weak earnings ratios pre-COVID. The pandemic shock has driven the loss-maker ratio to 10% in 2021.
- **Korea.** The risk distribution and, thus, loss-maker ratios are better than the global average.
- **Latin America.** The 2021 rebound in economic activity in the region has seen the loss-maker ratio ease to 5%. For the time being at least, this ratio is better than the global average. The high scenario outcome is explained by a sole Mexican borrower (see below).
- **Mexico.** As for Latin America, the loss-maker ratio has benefited from the economic rebound. As mentioned, the stress outcome is driven by a state-owned utility tipping into negative FFO.
- **The Netherlands**. Partly because a very large borrower classified as "moderately low," the sample's risk distribution is better than Europe's. The same holds for its loss-maker ratios.
- **North America.** This sample's outcome is driven large by the United States (see below).
- **Russia.** The sample's risk distribution is worse than Europe's and its loss-maker ratio in 2021 is slightly worse.
- **Saudi Arabia.** Two-thirds of the sample is in the "moderately high" risk tier. However its loss-makers ratios are the lowest among the countries.
- **Spain.** The sample's risk distribution has fatter tails than Europe. The sample has a higher than global average loss-maker ratio (11%) and so under twin stress performs worse to Europe (12% compared with Europe's 8%).
- **Switzerland.** The sample is almost the hypothetical balanced sample with almost half above and below the median. Consequently, risk is well spread out.
- **Turkey.** The sample's risk distribution is worse than Europe's but its stress scenario loss-maker ratios are similar.
- **United Kingdom.** The sample's risk distribution and, thus, its loss-maker ratios are slightly worse than Europe's.
- **United States.** This sample is close to being well-balanced albeit with a slight skew toward higher risk. Its loss-maker outcomes are slightly better than the global average.

The global sample's median is in "moderately high" risk tier

Corporates: Scenario Outcomes For Industry Samples

Industry sample risk and loss-maker ratio. Not surprisingly, the industry samples show some correlation between the average risk tier and loss-maker ratios (see chart 14). The vertical scale of this chart describes the portion of corporates that are classified as loss-makers for a given sector. The horizontal scale is a desktop analysis of the average credit standing of entities in each sector

Chart 14

Correlation Between Industry Risk And Loss-Maker Ratios
Risk tier and loss-maker ratios of sample corporate industries, 2021p
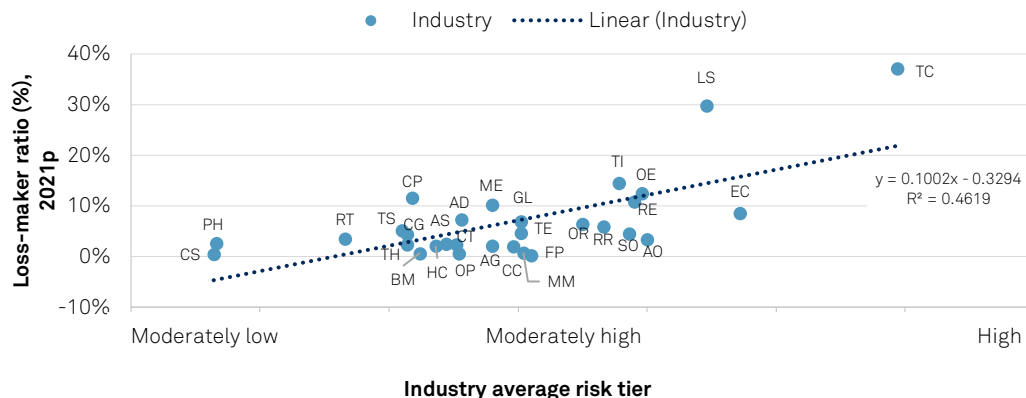
Note: Numeric equivalent of average risk tier is where 1.5 = "low", 3 = "moderately low", 4 = "moderately high", 5.5 = "high". Ratios are debt weighted. p--Projection. GL--Global. AD--Aerospace, defense; AG--Agribusiness; AO--Auto OEM; AS--Auto suppliers; BM--Building materials; CG--Capital goods; CC--Chemicals, commodity; CS--Chemicals, specialty; CP--Consumer products; CT--Containers, packaging; EC--Engineering, const.; FP--Forest, paper products; HC--Health care services; LS--Leisure, sports; ME--Media, entertainment; MM--Metals, mining; OE--Oil & Gas equipment; OP--Oil & Gas production; OR--Oil & Gas refining; PH--Pharmaceuticals; RE--Real estate; RT--REITs; RR--Retail, restaurants; SO--Services, other; TH--Tech hardware; TS--Tech software; TE--Telecoms; TC--Transportation cyclical; TI--Transportation infra; UT--Utilities. Source: S&P Global Market Intelligence, S&P Global Ratings.

Worst cluster. As expected, the worst performing industry sectors are transportation cyclical (TC bubble in chart 14) and leisure and sports (LS) both of which were hard hit by COVID. Fully 37% of the transportation cyclical sample are projected to be loss-makers in 2021, while for leisure it is 30%. In the twin-shock scenario, the ratio rises to 43% and 34%, respectively (see chart 15).

Worse cluster. The next cluster of industries tends to have a worse-than-global risk distribution and loss-maker ratios:

− Although **engineering and construction** (EC) has only a 9% loss-maker ratio in 2021, four-fifths of the sample is in the "high" risk tier implying high vulnerability. Consequently, the twin-shock scenario doubles the loss-maker ratio to 22%.
− Similarly, **retail and restaurants** (RR) has only a 6% loss-maker ratio in 2021. But with three-fifths of the sample in "high" risk, the twin-shock scenario more than triples the ratio to 20%.
− The twin-shock scenario increases in loss-maker ratio for these are less than the first two: **transportation infrastructure** (TI), 19% from 14%; **real estate (**RE) to 19% from 11%; **oil and gas equipment** (OE), 18% from 13%; consumer products (CP), 14% from 12%; **oil and gas refining (OR**), 12% from 7%; and **media and entertainment** (ME), 12% from 10%.

Better cluster. The next cluster of industries that have better than global average risk and loss-maker ratios are aerospace and defense (AE); real estate investment trusts (RT); health care services (HC); capital goods (CG); business and consumer services (SO); auto original equipment manufacturer (AO); technology software and services (TS); agribusiness and commodity foods (AG); and telecommunications (TE). The twin-shock scenario loss-maker outcomes for these industries range from 5% to 8%, below the global 12%.

Best cluster. This cluster of industries, with loss-maker ratios just a fraction of global's, have benefited from the recent resurgence of consumer goods demand and commodity prices. They include technology hardware and semiconductors (TH); forest and paper products (FP); auto suppliers (AS); commodity chemicals (CC); pharmaceuticals (PH); building materials (BM), metals and mining (MM); containers and packaging (CT); oil and gas production (OP); utilities (UT); and specialty chemicals (CS). The twin-shock scenario loss-maker outcomes for these industries range from 1% to 4%, far below the global level of 12%.

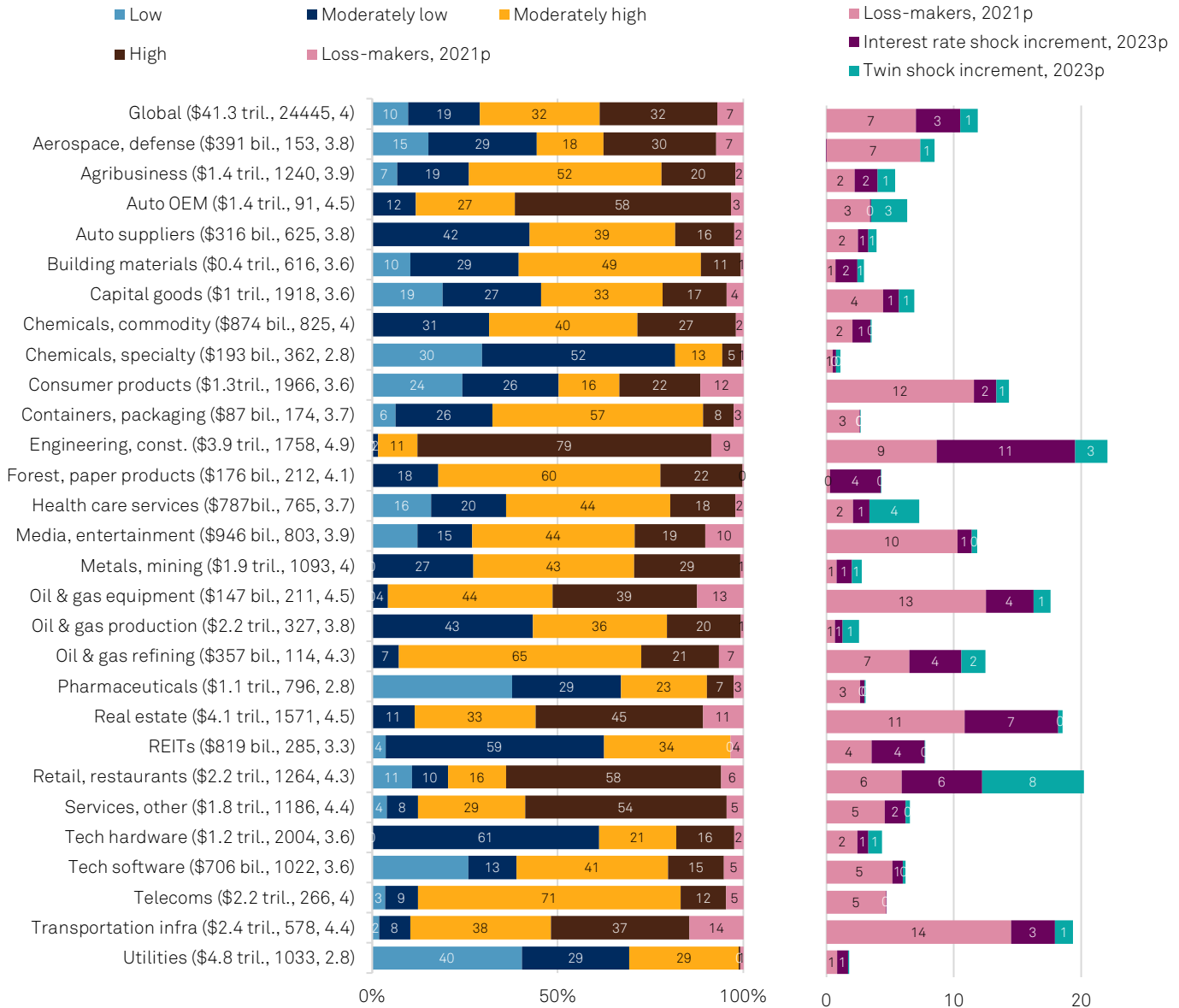Transportation cyclical and leisure are in the worst cluster

Chart 15

COVID Hit The Transportation Cyclical And Leisure And Sports Sectors The Hardest

Industry corporate sample: Risk distribution (% of debt), 2021p   Stress scenario: Loss-makers, 2023p

Legend:
- Low
- Moderately low
- Moderately high
- High
- Loss-makers, 2021p
- Loss-makers, 2021p
- Interest rate shock increment, 2023p
- Twin shock increment, 2023p

Industry	Low	Mod. low	Mod. high	High	Loss-makers 2021p		Loss-makers 2021p	Int. rate shock	Twin shock
Global ($41.3 tril., 24445, 4)	10	19	32	32	7		7	3	1
Aerospace, defense ($391 bil., 153, 3.8)	15	29	18	30	7		7		1
Agribusiness ($1.4 tril., 1240, 3.9)	7	19	52	20	2		2	2	1
Auto OEM ($1.4 tril., 91, 4.5)		12	27	58	3		3	0	3
Auto suppliers ($316 bil., 625, 3.8)		42	39	16	2		2	1	1
Building materials ($0.4 tril., 616, 3.6)	10	29	49	11	1		1	2	1
Capital goods ($1 tril., 1918, 3.6)	19	27	33	17	4		4	1	1
Chemicals, commodity ($874 bil., 825, 4)		31	40	27	2		2	1	0
Chemicals, specialty ($193 bil., 362, 2.8)	30	52	13	5	1		1	0	
Consumer products ($1.3 tril., 1966, 3.6)	24	26	16	22	12		12	2	1
Containers, packaging ($87 bil., 174, 3.7)	6	26	57	8	3		3		
Engineering, const. ($3.9 tril., 1758, 4.9)	2	11	79	9			9	11	3
Forest, paper products ($176 bil., 212, 4.1)		18	60	22	0		4	0	
Health care services ($787 bil., 765, 3.7)	16	20	44	18	2		2	1	4
Media, entertainment ($946 bil., 803, 3.9)	15	44	19	10			10	1	0
Metals, mining ($1.9 tril., 1093, 4)		27	43	29	1		1	1	1
Oil & gas equipment ($147 bil., 211, 4.5)	4	44	39	13			13	4	1
Oil & gas production ($2.2 tril., 327, 3.8)		43	36	20	1		1	1	1
Oil & gas refining ($357 bil., 114, 4.3)	7	65	21	7			7	4	2
Pharmaceuticals ($1.1 tril., 796, 2.8)		29	23	7	3		3	0	
Real estate ($4.1 tril., 1571, 4.5)	11	33	45	11			11	7	0
REITs ($819 bil., 285, 3.3)	4	59	34	0	4		4	4	0
Retail, restaurants ($2.2 tril., 1264, 4.3)	11	10	16	58	6		6	6	8
Services, other ($1.8 tril., 1186, 4.4)	4	8	29	54	5		5	2	0
Tech hardware ($1.2 tril., 2004, 3.6)		61	21	16	2		2	1	1
Tech software ($706 bil., 1022, 3.6)	13	41	15	5			5	1	0
Telecoms ($2.2 tril., 266, 4)	3	9	71	12	5		5		
Transportation infra ($2.4 tril., 578, 4.4)	2	8	38	37	14		14	3	1
Utilities ($4.8 tril., 1033, 2.8)	40	29	29	1			1	1	

Note: After each geography name, numbers in parentheses refer to sample debt amount, entity count and numeric equivalent of average risk tier (where 1.5 = "low", 3 = "moderately low", 4 = "moderately high", 5.5 = "loss-makers"). This calculation is a rough ranking of credit risk that references an entity's debt-to-EBITDA and ratio of funds from operations to debt. Ratios are debt weighted. p--Projection. APAC ex-CN--Asia-Pacific excluding China. EM-15--15 emerging markets, namely Argentina, Brazil, Chile, Colombia, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, and Turkey. bil.--Billion. tril.--Trillion. Source: S&P Global Market Intelligence, S&P Global Ratings.

Sovereigns: Emerging Markets Vulnerable To 300bp Hike

Weaker fiscal position. All sovereigns are in a weaker fiscal position compared to before the pandemic (see "Global Credit Outlook 2022: Sovereigns | Can The Books Be Balanced Without Toppling Growth?" Dec. 1, 2021). Some have used up a large share of their fiscal buffers and were able to sustain ratings levels. Others' pre-pandemic creditworthiness was not able to withstand the crisis. The larger share, however, is somewhere in the middle of these two groups. Between January 2020 and September 2021, about one-quarter of our sovereign portfolio had at least one downgrade, and seven sovereigns defaulted.

Interest hike vulnerability. A 300bp rate shock scenario on maturing debt of rated sovereigns (see "Take A Hike: Which Sovereigns Are Best And Worst Placed To Handle A Rise In Interest Rates," May 24, 2021) found that nearly all developed sovereigns should be able to digest the first-round effects of such a rise (see chart 16, data as of Nov. 23 2021). However, five out of 20 of the emerging market sovereigns would see at least a 1 percentage point GDP increase in interest costs by 2023. In the case of Egypt and Brazil, it would be twice that.

The "why" behind a rate rise matters. What ultimately matters for sovereigns and their ratings is why rates rise: If they do so reflecting recovering growth and normalizing monetary policy, amid accelerating productivity, they will represent little threat to public finances. On the other hand, if rate hikes are aimed at choking off runaway inflation against a backdrop of stagnating productivity, the fiscal and ratings fallout could be substantial.

Chart 16

Emerging Markets' Central Governments Are Vulnerable

Stress scenario: central governments' interest expense/GDP, 2023p
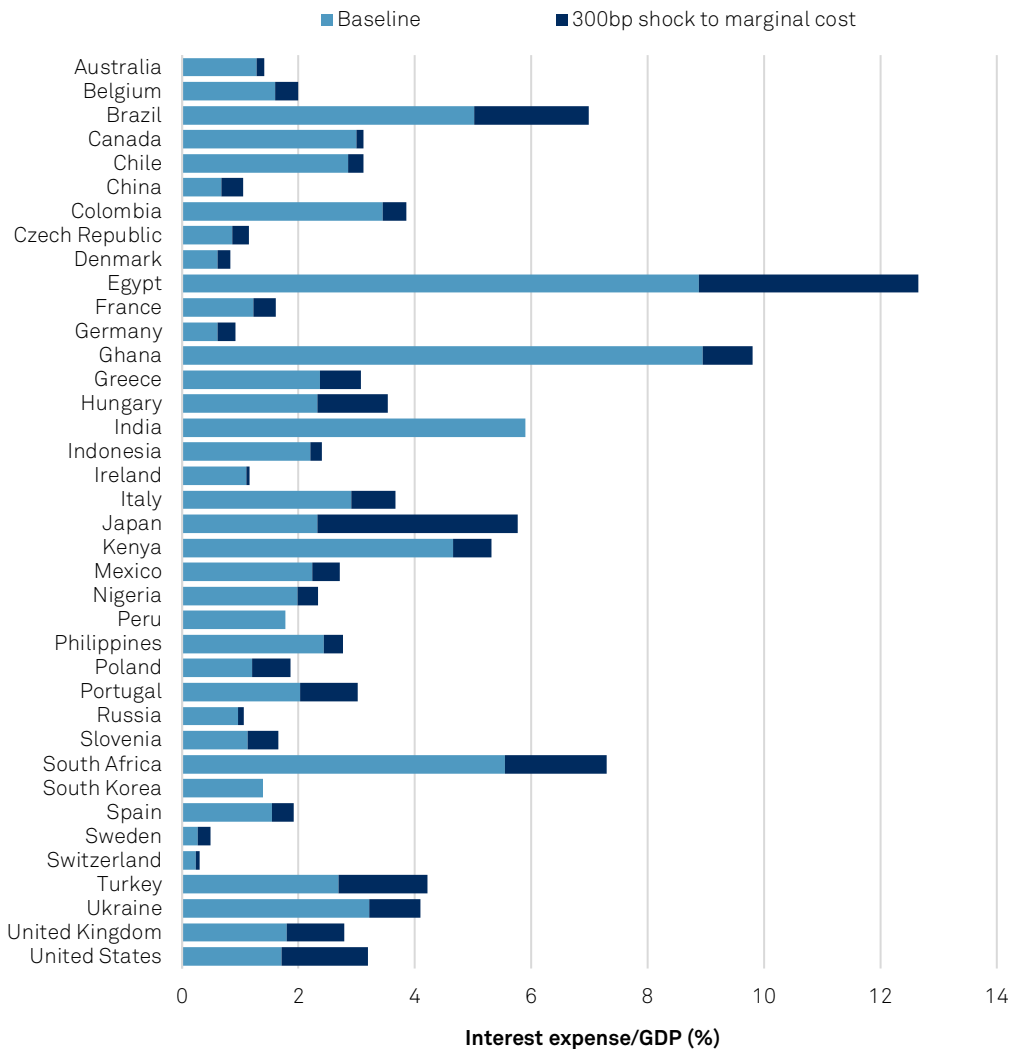
Source: S&P Global Ratings.

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What ultimately matters for sovereigns is why rates rise

Households: Generally Able To Absorb A 300bp Rise

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In the aggregate, global households are generally not more leveraged (as measured by debt-to-GDP) in 2021 than during the global financial crisis. While most households will be able to absorb a 300bp rise, new, highly leveraged borrowers in the current low-rate environment will be more vulnerable.

Leverage clusters. There are broadly three leverage and servicing clusters among the major economies. Australia, Canada, Korea, the Netherlands, and Switzerland are in the relatively high leverage and servicing cluster. China, France, Germany, Japan, Spain, United Kingdom and United States are in the middle cluster; and Brazil, India, Indonesia, Italy, Mexico, Russia and Turkey, the low cluster (see chart 17). A uniform exercise of a 300bp interest rate shock would push households back to the debt servicing positions they held in 2008 (during the global financial crisis). The 2021 and shocked positions are shown by the solid and hollow bubbles in chart 17.

Chart 17

300bp Rise Would Be Like Servicing In 2008...
Household debt-to-GDP versus debt servicing
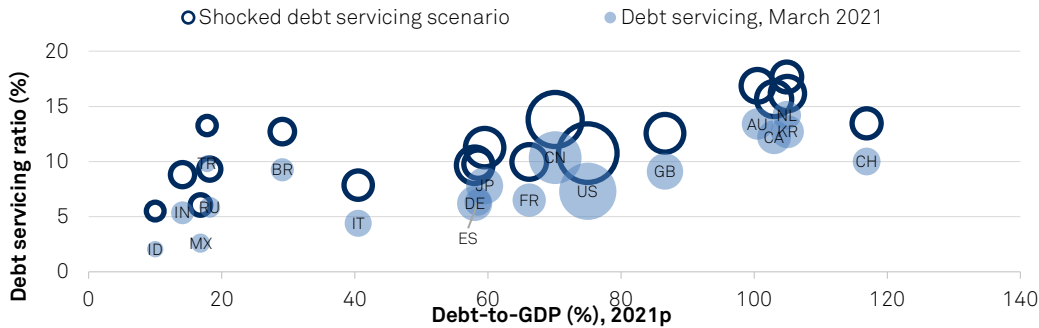
Note: Size of bubbles are in proportion to debt size ($).p--Projection. Country code key: AU--Australia, BR--Brazil, CA--Canada, CH--Switzerland, CN--China, DE--Germany, ES--Spain, FR--France, GB--United Kingdom, ID--Indonesia, IN--India, IT--Italy, JP--Japan, KR--Korea, MX--Mexico, NL--Netherlands, RU--Russia, TR--Turkey, US--United States. Debt-to-GDP data: S&P Global Ratings' Banking Risk Indicators; debt service ratio (March 2021): Bank for International Settlements; other--S&P Global Ratings.

Fixed rate. We should caveat that in some geographies a substantial portion of household debt are fixed rate mortgages. For example, such mortgages are dominant in Belgium, France, Germany, Netherlands and U.S., while adjustable rate mortgages are prevalent in Austria, Greece, Italy, Portugal and Spain. Consequently this exercise overstates the situation.

Income inequality may pose problems. That said, there would be challenges in the event interest rates spike dramatically. There would be borrower cohorts that are less liquid or more vulnerable than they were in 2008. For example, looking at U.S. households by wealth cohorts (see chart 18), the balance sheets (implied by liability-to-asset ratio, see left part of chart) of all cohorts look better in the second quarter of 2021 than in the second quarter 2008. However, the bottom 50% has a much higher proportion of consumer credit-to-total credit in 2021 (see middle part of chart) implying the cohort is relatively more dependent on short-term debt. While U.S. households now hold more absolute cash than they did pre-pandemic, the bottom 50% holds a relatively smaller share (represented by checkable deposits and currency) than in 2008 (see right part of chart).

There are borrower cohorts that are less liquid or more vulnerable

Chart 18

...But Bottom Wealth Cohort May Be Less Liquid
U.S. households' liability ratio, credit and deposit share mix (%) by wealth cohort
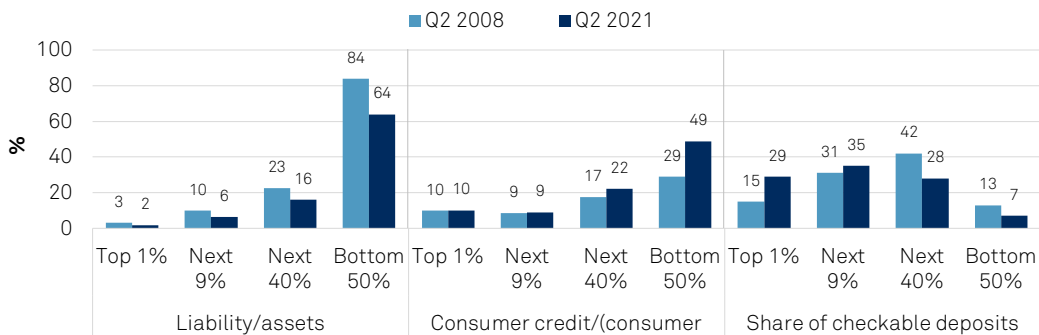
Data source: Board of Governors of the Federal Reserve System. Source: S&P Global Ratings.

Related Research

– Global Credit Outlook: Aftershocks, Future Shocks, And Transitions, Dec. 1, 2021.
– Global Credit Outlook 2022: Sovereigns | Can The Books Be Balanced Without Toppling Growth?, Dec. 1, 2021.
– Economic Outlook Q1 2022: Rising Inflation Fears Overshadow A Robust Rebound, Nov. 30, 2021.
– Global Debt Leverage: Can China Escape Its Corporate Debt Trap?, Oct. 19, 2021.
– Global Debt Leverage: Spreads, Costs Shocks May Double Rate Of Loss-Making, June 22, 2021.
– Take A Hike: Which Sovereigns Are Best And Worst Placed To Handle A Rise In Interest Rates, May 24, 2021.
– Global Debt Leverage: Near-Term Crisis Unlikely, Even As More Defaults Loom, March 10, 2021.
– Global Debt Leverage: Risks Rise, But Near-Term Crisis Unlikely, Oct. 27, 2020.

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Appendix: Data and Approach

This appendix lists the data sources and approach adopted in this article for: (1) debt of corporate, government and household sectors, (2) scenario analysis on corporate financials, (3) scenario analysis on rated sovereigns, and (4) scenario analysis on household debt servicing.

1. Debt of corporate, government and household sectors	
Definition	Debt refers to gross debt.

Debt data sources	– **Corporates:**
	   – Corporates refer to nonfinancial corporates.
	   – Historical data are sourced from International Institute of Finance (IIF), *Global Debt Monitor Database*, Nov. 17, 2021.
	   – Debt growth projections are those assumed in our "Global Debt Leverage: Near-Term Crisis Unlikely, Even As More Defaults Loom," published March 10, 2021.
	– **Governments:** Historical and projected data are sourced from our "Sovereign Risk Indicators," published Oct. 12, 2021.
	– **Households:** Historical and projected data are sourced from our "Banking Risk Indicators: May 2021 Update," published May 12, 2021.

Sample geographic scope	The global sample covers 53 geographies, which is estimated to represent over 90% of world GDP: – **Asia-Pacific:** Australia (AU), mainland China (CN), Hong Kong (HK), India (IN), Indonesia (ID), Japan (JP), Korea (KR), Malaysia (MY), New Zealand (NZ), Philippines (PH), Singapore (SG), Thailand (TH), Vietnam (VN). – **Europe:** Austria (AT), Belgium (BE), Cyprus (CY), Czech Republic (CH), Denmark (DK), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Luxembourg (LU), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Russia (RU), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), Ukraine (UA), United Kingdom (UK). – **Latin America**: Argentina (AR), Brazil (BR), Chile (CL), Colombia (CO), Mexico (MX), Peru (PE). – **Middle-East, Africa**. Egypt (EG), Israel (IL), Kenya (KE), Nigeria (NG), Saudi Arabia (SA), South Africa (ZA). – **North America**: Canada (CA), United States (US).

2. Scenario analysis on corporate financials	
Corporate financials data source and sample	We drew our global sample of nonfinancial corporate financial data from S&P Global Market Intelligence's Capital IQ database. Financials are for first fiscal half year 2021 except for Australia, India and Japan, which, because of their non-December year-end dates, full fiscal year 2021 financials were drawn instead. The sample comprises 24,445 corporates, of which 91% are unrated and 86% are listed. The sample total debt of US$41 trillion is equivalent to half of estimated global corporate debt at end-September 2021 (as reported by the International Institute of Finance).
Caveat	The data have a statistical bias toward nonfinancial corporates that are listed and had reported their latest financials at the date of sample extraction. Consequently, some industry sectors or geographies may be over or under represented, on a debt-weighted basis, in the sample compared with the actual global population.
Sample industry coverage	The global sample contains 27 industry sectors and sub-sectors: aerospace and defense; agribusiness; auto original equipment manufacturer (OEM); auto suppliers; building materials; capital goods; chemicals, commodity; chemicals, specialty; consumer products; containers and packaging; engineering and construction; forest and paper products; health care services; media

2. Scenario analysis on corporate financials

and entertainment; metals and mining; oil and gas equipment; oil and gas production; oil and gas refining; pharmaceuticals; real estate; real estate investment trusts (REITs); retail and restaurants; services, other (i.e. business and consumer services); technology hardware; technology software; telecommunications; and utilities.

The engineering and construction sector includes commercial construction and engineering, construction support services, heavy construction, prefabricated buildings and components and specialty contract work subsectors.

The real estate sector includes real estate development, real estate operating companies and real estate services subsectors.

Sample geographic coverage

The global corporate sample covers 60 geographies, which is estimated to represent over 90% of world GDP:

- **Asia-Pacific:** Australia (AU), mainland China (CN), Hong Kong (HK), India (IN), Indonesia (ID), Japan (JP), Korea (KR), Malaysia (MY), New Zealand (NZ), Pakistan (PK), Philippines (PH), Singapore (SG), Taiwan (TW), Thailand (TH), Vietnam (VN).
- **Europe:** Austria (AT), Belgium (BE), Cyprus (CY), Czech Republic (CH), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Russia (RU), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), Ukraine (UA), United Kingdom (UK).
- **Latin America:** Brazil (BR), Chile (CL), Colombia (CO), Mexico (MX), Peru (PE).
- **Middle-East, Africa**. Egypt (EG), Ghana (GH), Israel (IL), Kenya (KE), Nigeria (NG), Saudi Arabia (SA), South Africa (ZA), United Arab Emirates (AE).
- **North America**: Canada (CA), United States of America (US).

Growth assumptions

Debt growth projections

For each corporate, we assume debt growth from 2022-2023 by geography as those assumed in "Global Debt Leverage: Near-Term Crisis Unlikely, Even As More Defaults Loom," published March 10, 2021.

EBITDA growth projections

For each corporate, we assume EBITDA (earnings before interest, tax, depreciation and amortization) growth from 2021-2023 as a multiple of nominal GDP growth across geographies, and where the latter is sourced from "Sovereign Risk Indicators," published Oct. 12, 2021.

In 2021, we apply a multiple of 1.5 on nominal GDP growth to reach EBITDA growth, based on our expectation that EBITDA will rise faster than nominal GDP for the year, as it is a rebound of EBITDA's decline in 2020, which was sharper than the drop in nominal GDP. We then assume an exact one-to-one correspondence between EBITDA and nominal GDP growth rates for 2022-2023.

Notional credit risk tiers

For this exercise, we determined notional credit risk tiers for each corporate in the sample. In this respect, our evaluation of the country, industry, and financial risks of the corporate sample is partially, but incompletely, borrowed from our Corporate Ratings methodology (see "Criteria/ Corporates/ General/ Corporate Methodology," Nov. 19, 2013). It is important to note that information limitations do not permit full application of such methodology.

We categorized the corporates into four notional credit risk tiers--"low indebtedness", "moderately low indebtedness", "moderately high indebtedness" and "high indebtedness" as a proxy for credit risk. The sub-tier of "loss-makers" (entities returning negative EBITDA or negative FFO) is extracted from the "high indebtedness" tier.

Key ratios and thresholds

In this exercise, we assess financial risk based on the following ratios: debt-to-EBITDA and FFO-to-debt.

- EBITDA is earnings before interest, tax and depreciation and amortization expenses.
- FFO is funds from operations, which is calculated by deducting net interest expense and tax expense from EBITDA.

2. Scenario analysis on corporate financials

– Debt here is adjusted debt, for which we deduct 75% of cash equivalents from gross debt.

All sectors except for real estate and utilities

Tier	FFO to debt (%)	Debt to EBITDA (x)
Low indebtedness	Greater than 45	Less than 2
Moderately low indebtedness	30-45	2-3
Moderately high indebtedness	20-30	3-4
High indebtedness	Less than 20	Greater than 4

Real estate

Tier	FFO to debt (%)	Debt to EBITDA (x)
Low indebtedness	Greater than 15	Less than 4.5
Moderately low indebtedness	> 9-15	> 4.5-7.5
Moderately high indebtedness	> 7-9	> 7.5-9.5
High indebtedness	Less than 7	Greater than 9.5

Utilities

Tier	FFO to debt (%)	Debt to EBITDA (x)
Low indebtedness	Greater than 23	Less than 3
Moderately low indebtedness	13-23	3-4
Moderately high indebtedness	9-13	4-5
High indebtedness	Less than 9	Greater than 5

Stress scenario

We shock the sample financials for rises in input cost-inflation for the year 2022 and interest rates (on floating rate and refinancing debt) for each year 2022 and 2023. We don't attempt to identify the catalyst ("black swan" event) of such shocks.

Our framework attempts to test the extent of the generalized presumption that input cost inflation and higher interest spreads are detrimental to corporate credit quality. Essentially, this study only considers the effects of such shocks on the financial risk profiles of corporates, taking account of their presumed debt-maturity profiles.

Shock calibration

Interest rate shock

We assume that the additional risk premium demanded by investors for a given credit risk tier is the same regardless of industry sector, geography, or currency of debt. We introduce a **non-parallel increase in interest rates**, applying larger increments in interest spreads towards the lower credit risk tier:

Tier	Additional spreads (basis point)
Low indebtedness	189 to 265
Moderately low indebtedness	250 to 294
Moderately high indebtedness	308 to 353
High indebtedness	384 to 615

Input inflation shock

We use Producer Price Index (PPI) as a proxy for input cost. We source historical and projected PPI from Oxford Economics for the geographies covered by the sample.

We assume an input cost pass-through rate of about 70% to arrive at net inflation at both geography- and sector-level, and any increase in cost of goods sold (COGS, inclusive of labor cost) absorbed by each corporate is the simple average of the two. Implicitly the passed-through amount increases revenue. For this exercise, we don't assume any changes with demand volumes despite the input inflation shock.

The scenario cost-inflation rate is the sum of our projected base case PPI year-over-year change for the year plus 300 basis points, applied to the corporate's projected gross COGS for 2022 (which then rolls over into 2023).

3. Scenario analysis on rated sovereigns	
Methodology	We assess 18 developed sovereigns and 20 of the most active emerging-market sovereigns on their vulnerability over a three-year time horizon to an interest rate shock of 300 bps increase in the cost of **refinancing maturing** debt. We define budgetary sensitivity as the increase in general government interest spending as a percentage of GDP. For the purposes of this exercise, we look only at the gross cost of commercial debt, without considering that the net cost of debt for many sovereigns is even lower, reflecting significant dividend payments to governments from central banks on the back of their interest earnings from government bonds purchased under quantitative easing programs. We exclude official financing from our calculations, and we ignore cash positions. However, faced with a rate shock, most G-20 governments would respond by drawing on cash balances, rather than by locking in higher rates. In a few cases, where public finances are highly devolved (for example, Nigeria), we use central government budgetary data rather than general government data.
	In our scenario, we assume a shock across the curve rather than a shock that would steepen the curve. That's because under the latter situation, the projections of interest costs would be over-reliant on assumptions about how treasuries would manage the maturity of their portfolio in the face of more expensive longer-dated financing. This decision penalizes issuers with higher short-term debt, such as Japan and the U.S., but given that our focus in this exercise is rollover risk, we see that as unavoidable. This exercise focuses only on first-order effects of higher market rates. It does not consider second-order effects on growth or financial stability.

4. Scenario analysis on household debt servicing	
Debt service ratio data source	Bank for International Settlements, Sept. 20, 2021. Defined as the ratio of interest payments, plus amortizations, to income.
Stress scenario	Debt service ratio is computed as the sum of interest servicing payment and amortizing debt repayment divided by debt. For this exercise, we simply add 300bp as a shock to the interest servicing payment component.