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Gauging geopolitics

A framework to assess and price geopolitical risks

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Introduction

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Geopolitical risks are on the rise, and the international environment is becoming increasingly complex. Recent years have seen the surprise outcome of the UK's Brexit vote, the unexpected election of U.S. President Donald Trump, a reemergence of great power rivalries, and intensifying global trade disputes. The number of volatile geopolitical situations looks to be at one of its highest points since the end of World War II. Such geopolitical events can have meaningful effects on the global economy, financial markets and investment portfolios.

Yet geopolitical risks are difficult to quantify, and notoriously hard to predict. BlackRock has launched an effort to better measure and monitor geopolitical risks and their market impact in a systematic way. Our approach marries qualitative and macroeconomic analysis with large-scale portfolio analytics and "big data" text mining. This piece presents our framework – and the early conclusions of this ongoing work. To be sure, macroeconomic fundamentals such as economic growth and corporate earnings are typically the major drivers of financial market returns, especially over longer investment horizons. Yet idiosyncratic risks, including those triggered by geopolitical events, can have an outsized impact on markets and individual securities when they occur.

A key conclusion from our historical analysis of asset price reactions to 68 risk events since 1962: The impact of geopolitical shocks has historically tended to be more acute when the economic backdrop is weak. This is one reason why we see geopolitical risk as a material market factor in 2019 and beyond, against a backdrop of slowing growth and elevated economic uncertainty.

BlackRock's framework for managing geopolitical risk leverages the firm's scale and global reach, its expertise in geopolitics, portfolio analytics and technological capabilities. The goal: to develop meaningful insights for investors to apply to portfolio management. See our ***geopolitical risk dashboard*** for our list of the top-10 geopolitical risks we see as posing a threat to markets and the global economy. In this piece we zoom in on one of these 10 risks – *Global trade tensions* – to illustrate BlackRock's methodology for assessing and quantifying geopolitical risk. Our work in this area is ever evolving. But we believe our current framework is an important step forward in helping investors analyze the potential impact of geopolitical risks – and how to guard against them in portfolios.

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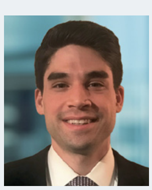
Summary

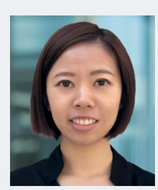
- **We illustrate the historical importance of geopolitical risk in markets, based on a study of 68 key events since 1962.** These ranged from wars and terror attacks to political events such as elections. Some of our findings are intuitive: The effect of geopolitical shocks on global markets often is modest but tends to be more acute – and can be longer-lasting – in markets closest to the epicenter of the event. Importantly, the impact of sudden geopolitical shocks on risk assets has historically been more severe when the economic backdrop is weak. This makes analysis of such risks very pertinent in today's late-cycle economic environment, we believe.

- **We detail our framework for identifying and analyzing geopolitical risk events.** Our process draws on experts across BlackRock in risk management, geopolitics, portfolio management and quantitative analytics, and underlies our assessment of the top-10 risks highlighted on our ***Geopolitical risk dashboard***. We illustrate our methodology with a timely risk: *Global trade tensions*. Key ingredients of our Market-Driven Scenarios (MDS) approach include a definition of the scenario, catalysts for its realization and estimated shocks to the prices of selected assets should the MDS play out. Our illustrative example assumes a near-double-digit hit to global equities, with disproportionate damage to emerging market assets, particularly in China. We apply these shocks to some 2,000 variables in BlackRock's risk model and use it to stress-test hypothetical portfolios.

- **We explain how our BlackRock Geopolitical Risk Indicators (BGRIs) can help assess to what extent geopolitical risks are priced in.** The BGRIs measure the degree of market attention to specific risks relative to their history. The tool scrapes analyst reports as well as traditional and social media for the frequency of key words related to each risk – and the sentiment (positive or negative) associated with it. The higher the BGRI level, the more we assume that risk is priced in. We use this insight to adjust our estimated market shocks for each risk according to its BGRI – and use it to pinpoint assets especially sensitive to the risk. Our efforts to analyze and price geopolitical risks are a work in progress. Challenges include teasing out the impact of geopolitical risks on markets from other forces such as broad sentiment swings and shifting economic fundamentals.

AUTHORS

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Setting the scene

We survey the history of geopolitical risk and markets – and summarize our high-level findings on their market impact.

Geopolitical risks are ever-present – and ever-evolving. How can investors best monitor these risks and their potential market impact? Experts from across BlackRock combined forces to find out. First step: Historical analysis of 68 key geopolitical risk events since 1962, as well as their market impacts. We define geopolitical shocks as wars, terrorist acts, and other events that increase tensions between states and affect the normal course of domestic politics and international relations.

Such shocks can impact economies and markets in myriad ways. Trade tensions, for example, can lead to the imposition of tariffs that disrupt global supply chains and the flow of commerce. Wars can lead to oil price shocks that boost inflation and hurt consumer spending. And sudden shocks such as terror attacks can hurt market confidence, prompting capital flows out of risk assets and into perceived safe havens.

We distinguish between three broad classes of geopolitical events: event risks with set dates (think of elections and referenda); exogenous risks (sudden and unanticipated events such as the 9/11 attacks on the U.S.); and thematic risks (risks that simmer for an extended period, such as tensions between the U.S. and North Korea). See the *A history of geopolitical crises* table for an abbreviated list of the events in our study. For event risks and thematic risks, markets likely reflected some probability of a destabilizing event before it actually occurred. By contrast, exogenous risks are bolts from the blue that were not priced in advance by markets.

Note that our event study compares historical episodes of starkly different character and market impact. The goal: to identify a set of loose patterns that inform our deeper research into geopolitical risk modeling. We supplemented this proprietary work with a review of the existing academic and private-sector literature on the effects of geopolitical risk on markets. Much of this literature is focused on emerging markets (EMs), which historically have been the epicenter of many geopolitical risks. Yet this may be changing.

A history of geopolitical crises

Selected key geopolitical events, 1962–2019

Event	Date
Event risks	
Russia declares independence from USSR	6/12/90
German reunification	10/3/90
Brexit referendum	6/23/16
Italy election	3/4/18
U.S. exits Iran nuclear deal	5/8/18
Exogenous risks	
Cuban missile crisis	10/16/62
First oil shock	10/19/73
Fall of Berlin wall	11/9/89
Iraq invades Kuwait	8/2/90
U.S. embassy bombings in Africa	8/6/98
Sept. 11 attacks	9/11/01
Russia invades Georgia	8/7/08
Arab Spring	1/24/11
Fukushima nuclear accident	3/10/11
Russia annexation of Crimea	2/26/14
WannaCry ransomware attack	5/12/17
Thematic risks	
Vietnam war	8/7/64
Six-day war	6/5/67
Iranian revolution/second oil shock	1/16/79
Iran-Iraq war	9/22/80
Gulf war	1/16/91
Yugoslav wars	6/26/91
Dissolution of Soviet Union	12/26/91
Iraq war	3/19/03
NAFTA renegotiation	5/18/17
U.S.-North Korea tensions	8/8/17
U.S. announces tariffs	2/8/18

Source: BlackRock Investment Institute, June. The table shows selected geopolitical events from BlackRock's historical study of 68 geopolitical risk events between 1962 and 2019. Risks are bucketed into three groups: event (such as elections); exogenous (sudden events such as the Sept. 11 attacks); and thematic (a prolonged event such as U.S.-North Korea tensions). Dates refer to the starting date of the event. For illustrative purposes only. Not all geopolitical events were analyzed or included.

Geopolitical risks emanating from developed markets – typified by the UK's Brexit vote in 2016 and the subsequent twists and turns of the UK's exit negotiations – are of rising market relevance and focus.

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Short and sharp

A key takeaway from our event study: The average market response to unexpected geopolitical shocks has historically been relatively modest and short-lived. Equity prices tend to take a hit and bonds rally in the immediate aftermath, but these moves often dissipate quickly. Example: The S&P 500 Index fell almost 12% in the first week of trading after the 9/11 attacks of 2001. Yet the stock market had recouped all of these losses by 25 business days after the event.

The average results of all the 31 exogenous geopolitical events we studied are shown in the chart on the left below. We use the S&P 500 stock index as a proxy for global risk sentiment. Equity markets show modest losses in the 30 trading days following an event.

The negative market reaction has historically been more severe if multiple shocks occur simultaneously or if the economic environment is weak to begin with. The chart on the right illustrates the latter. We show the average return for all exogenous geopolitical shocks that occurred when the economy was contracting (U.S. manufacturing PMIs were below 50). The key result: Equity market losses tended to be of greater magnitude in periods when the economy was contracting.

Shades of grey

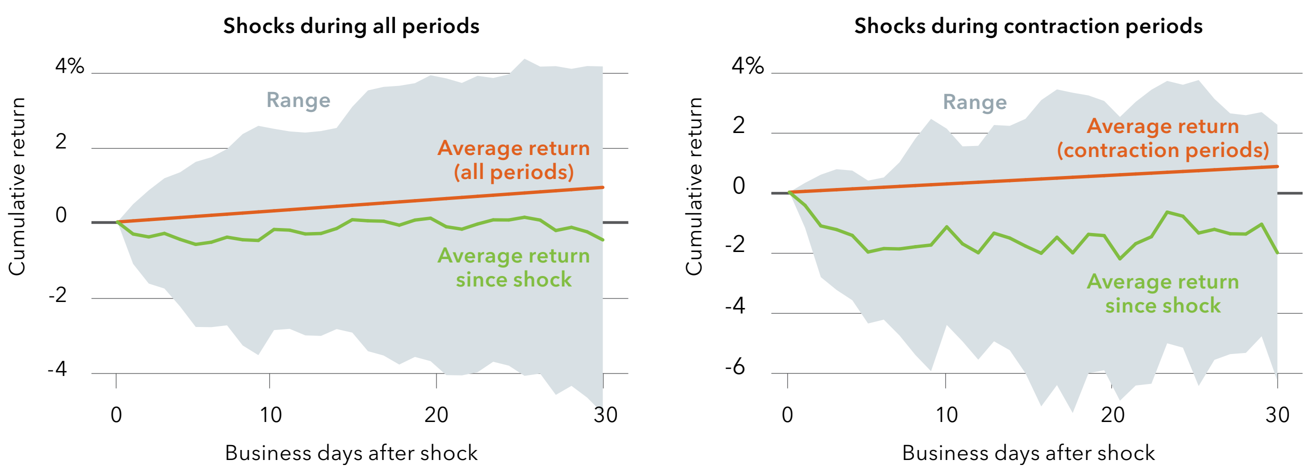
There are several caveats to this analysis. The average asset price responses obscure huge variation across historical events, as the gray error bands in the charts show. This reflects the wide variation in the character and implications of the events in our study. But our goal is to identify a few overarching patterns in the relationship between markets and geopolitical events.

It can be tough to tease out the impact of geopolitical events from other market forces. Case in point: The 1973 oil shock, when an OPEC embargo led to a near quadrupling of the price of oil, came against the backdrop of the Watergate scandal that rocked the administration of U.S. President Richard Nixon. The stock market was reeling and unemployment was on the rise. Another example: The 1998 bombings of two U.S. embassies in Africa came in the midst of the Asian financial crisis – and as Russia defaulted on its debt, precipitating the collapse of a major hedge fund.

Another qualifier: Some geopolitical risks may have muted overall market impact, but outsized effects on specific securities. This can create both risks and opportunities. Think of a financial institution's stock taking a hit after a major cyberattack; or a defense contractor benefiting from rising tensions in the Gulf.

Shock waves

U.S. equity returns after exogenous geopolitical shocks, 1962–2017



Past performance is not a reliable indicator of current or future results. It is not possible to invest directly in an index. Sources: BlackRock Investment Institute, with data from Thomson Reuters Datastream and Bloomberg, June 2019. Notes: The charts focus on 31 "exogenous" (unexpected) geopolitical shock events between October 1962 and January 2019. Examples include terrorist attacks and the Arab Spring. The chart on the left depicts average equity returns following the shocks. We use the S&P 500 as a proxy, given its longer available history than global equity indexes. The chart on the right shows equity returns following the eight shocks that occurred in months when the U.S. economy was contracting (ISM U.S. Manufacturing PMI was below 50). The "Average return" lines are calculated based on the closing price of the S&P 500 Index one day before the event date. One the left hand chart, the average return (all periods) line shows the cumulative average daily return between 1960 and 2019; on the right hand chart, the average return (contraction periods) line shows the cumulative average daily return between 1986 and 2015 when the U.S. PMI was below 50. The shaded gray "range" is the standard error, or standard deviation, of the historical distribution.

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Analyzing geopolitical risks

We detail BlackRock's framework for identifying geopolitical risks, analyzing them and assessing their potential impact across asset classes.

The first step in our process: selecting a geopolitical risk scenario, outlining its rationale, and considering what would happen to relevant financial assets if this scenario were to materialize.

What are the key ingredients of our Market-Driven Scenarios? A precise definition – and clear catalysts. We illustrate this with a deep dive on one of our top-10 geopolitical risks: *Global trade tensions*. We introduced the risk to our ***Geopolitical risk dashboard*** in June 2018. The backdrop: a U.S. administration that was shaking up the post-war system of global trade and international alliances.

The key rationale for this scenario:

- U.S. President Donald Trump has used protectionist rhetoric, both as a candidate for president and since his assuming office. A hawkish position on trade is one of Trump's longest-held views.
- The U.S. proposed tariffs on $50 billion of Chinese goods in May 2018, and threatened a further $200 billion (since implemented) if China retaliated.
- The U.S. invoked national security concerns to impose steel and aluminum tariffs globally, including on the EU, Canada, and Mexico, renewing fears of a global trade war.

OUR FRAMEWORK

It is one thing to show that historical geopolitical risks have had significant market implications. The greater challenge: how to assess the geopolitical landscape today – and how future risks could play out in markets. BlackRock's framework for assessing and managing geopolitical risks has four key pillars:

1. **Identify geopolitical risks:** First we identify the top risks across the geopolitical landscape, as well as potential escalation triggers – or catalysts that would cause the risk to materialize – based on the collective insights of experts across the firm. See BlackRock's ***Geopolitical risk dashboard*** for our current top-10 risks.

2. **Analyze the risks:** Second, we identify potential adverse outcomes for each risk, and determine the relative likelihood and potential broad market impact of each scenario. This includes determining the extent to which each geopolitical risk event is priced in by markets. We do this via a gauge that measures how much market-related discussion is focused on the risk. See ***page 10*** for further details.

3. **Assess potential market impacts:** Third, we translate events into potential market moves for each scenario. These estimates are based on our analysis of current market conditions and historical data. We can then apply these scenarios to portfolios and measure their potential profit and loss impact. See ***Market-Driven Scenarios: an approach for plausible scenario construction*** for further details on how we do this.

4. **Take action:** The final step is applying this knowledge to portfolios. Risk-taking needs to be deliberate, diversified and appropriately scaled. Our geopolitical risk scenarios and estimated asset price responses can be used to help guard against adverse portfolio outcomes.

Our process is a blend of qualitative and quantitative analysis. We draw on geopolitical risk experts across the firm to formulate and analyze scenarios. Asset class experts across regions, as well as quantitative, portfolio and risk management experts contribute their expertise.

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Global trade deep dive

We identified the following potential catalysts for the *Global trade tensions* scenario to materialize:

- The U.S. imposes sweeping tariffs against China as trade talks break down.
- U.S. allies impose retaliatory tariffs on U.S. steel and agricultural products while airing grievances at the World Trade Organization.
- In response, the U.S. administration announces plans to overhaul trade agreements globally, further undermining stability in the global trading system.

Next, we identified markets most likely to be impacted by the scenario's realization. We then estimated one-month price shocks to a selected group of financial assets in these relevant markets. These calculations were informed by our analysis of market conditions at the time – including correlations and volatility – and the behavior of asset prices during similar past events (see ***page 9***).

How did this play out for *Global trade tensions*? We began by identifying sensitive assets in U.S. and Chinese markets, given our view that rising tensions emanated primarily from the contentious U.S.-China relationship. These included equities (S&P 500 and MSCI China), bond spreads (China high yield credit), inflation (U.S. 10-year inflation-linked debt), and currencies (Chinese yuan). See the table below. As an example, we estimated a 20% hit to Chinese equities. We added granularity by including other risky assets such as EM equities, global high yield and the Mexican peso. This was to reflect the knock-on effects we would expect a surge in protectionism to have on risky borrowers and EMs.

Bottom line: We expected a global sell-off in equity markets, with EM and Chinese equities underperforming over a one-month horizon. Credit spreads would widen, and economically sensitive commodities such as copper would take a hit. Reflecting a flight to quality, U.S. Treasuries and gold would rally under the scenario.

A what-if scenario

Estimated one-month reactions of selected asset classes to rising *Global trade tensions* scenario, June 2018

Asset class	Sub-asset class	Shock (size)	Shock(standard deviations)	Comments
Equities	China equities	-20%	-3.3	Markets sell off as protectionist rhetoric from the U.S. escalates, increasing the risk of trade wars with key U.S. trading partners. Chinese stocks suffer the most, and EM assets underperform.
	U.S. equities	-8%	-2.1	
	EM vs. DM equities	-5%	-1.9	
Government bonds	Mexico 10-year government bond	80 bps	3.1	Treasuries rally in a flight-to-quality, and EM yields rise as central banks address currency weaknesses.
	U.S. 10-year Treasury	-35 bps	-1.8	
Inflation-protected securities	U.S. 10-year Treasury Inflation-Protected Security	20 bps	2.8	Inflation expectations rise on higher import prices.
Credit	EM debt	80 bps	3.5	Credit spreads widen with global risk-off; China and EM spreads are hit hardest
Currencies	Mexico peso	-8%	-2.2	EM currencies suffer, while China allows its currency to depreciate. The U.S. dollar strengthens in a flight-to-quality and expectations of a reduction in the U.S. current account deficit.
	U.S. dollar	3%	1.7	
	Chinese yuan	-2%	-1.9	
Commodities	Copper	-10%	-2.3	Industrial metals such as copper fall on expectations of slower global growth. Gold rallies as investors seek safe-haven assets.
	Gold	6%	2.2	

For illustrative purposes only. It is not possible to invest directly in an index. Source: BlackRock Investment Institute, with data from BlackRock's Aladdin Portfolio Risk Tools application, April 2019. Notes: The table shows BlackRock analysis regarding how various assets could react over a one-month timeframe (represented by the "shock (size)" column) to a hypothetical scenario of rising global trade tensions. We estimate the severity of each shock based on analysis of similar historical events and current market conditions such as volatility and cross-asset correlations. In line with market convention, fixed income shocks are expressed as changes in benchmark yields (basis points) and other asset classes as percentage price changes; See the "implied stress testing framework" section of the 2018 paper *Market-Driven Scenarios: An Approach for Plausible Scenario Construction* for details. Indexes used: MSCI China Index for China equities; S&P 500 for U.S. equities; MSCI Emerging Market (EM) Index and MSCI World Index for EM vs. developed (DM) equities; J.P. Morgan EMBI for EM debt; and the U.S. Dollar Index. The Chinese yuan and Mexico peso are represented by their respective exchange rates with the U.S. dollar (USD). Gold and copper are represented by benchmark futures contracts. Scenarios do not reflect all possible outcomes as geopolitical risks are ever-evolving. This material represents an assessment of the market environment at a specific time and is not intended to be a forecast or guarantee of future results. There is no guarantee that stress testing will eliminate the risk of investing in any asset class.

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Calibrating the shocks

Estimating asset price shocks under different geopolitical risk scenarios is a highly judgemental process. In our *Global trade tensions* example, sweeping protectionist actions initiated by the world's largest economy (and erstwhile champion of free trade) would have significant implications for global growth expectations and financial market returns.

As such, we designed our selected asset price shocks to be more extreme relative to certain historical market events, such as the 2013 "taper tantrum," when then Federal Reserve chair Ben Bernanke precipitated a global market sell-off by signaling the end of quantitative easing. We also studied the 2015 Chinese market crash for a historical comparison. Back then, global equities and credit markets – led by China and the broader EM complex – sold off sharply, while perceived safe havens such as U.S. Treasuries and the yen rallied.

To be sure, this scenario required distinct flavors to differentiate it from any historical episode. For example, we specified a shock to EM interest rates (with an 80 bps rise in Mexican 10-year yields) to express a view that EM central banks would have to intervene to stave off currency depreciation in a global trade war environment. Similarly, we modeled a 0.2 percentage point rise in 10-year U.S. inflation expectations, to reflect the impact of higher tariffs feeding through to U.S. import prices.

Next step: selecting the market regime and volatility/ correlation structure to apply in the scenario. This helps us calculate the implied shocks on related asset classes and sectors. In this case, we decided the market environment at the time of analysis in June 2018 was the most accurate reflection of a period of rising trade protectionism. Lastly, we apply a reality check to assess how plausible our estimated shocks are. We do this using the current market structure and historical episodes of market volatility as a guide. For example, the 20% fall to the MSCI China index represented a move 3 standard deviations below the asset class's monthly average return. Overall, the analysis showed that our *Global trade tensions* scenario was slightly more extreme than the China market crash experienced in 2015, but less severe than the 2008 global financial crisis. This result matched our expectations and research.

More shocks

Implied asset-price shocks under trade tensions, June 2018

Asset class		Shock (size)	Shock (standard deviation)
Equity regions	Japan	-7.1%	-1.84
	Europe	-5.5%	-1.76
	UK	-4.3%	-1.38
Equity sectors	Technology	-11.1%	-2.22
	Materials	-8.4%	-2.16
	Financials	-6.5%	-1.81
	Utilities	-1.5%	-0.50
	Implied volatility	11.4%	1.48
Government bonds	UK 10-year	-30 bps	-1.71
	Germany 30-year	-24 bps	-1.63
	Japan 10-year	-4 bps	-0.98
	Spain five-year	15 bps	0.81
	Italy five-year	59 bps	0.86
Inflation-protected securities	Japan 10-year	4 bps	0.62
	Eurozone 10-year	8 bps	1.43
Credit	Euro IG	-0.1%	-0.22
	U.S. IG	0.5%	0.45
	U.S. high yield	-1.9%	-2.40
Currencies	Euro	-3.3%	-1.60
	UK pound	-3.2%	-1.31
	Australian dollar	-2.7%	-1.17
	Japanese yen	-1.7%	-0.82
Commodities	Brent crude oil	1.1%	0.18

For illustrative purposes only. It is not possible to invest directly in an index.
Sources: BlackRock Investment Institute, with data from BlackRock's Aladdin Portfolio Risk Tools application, April 2019. Notes: The table shows BlackRock estimates of how various assets could potentially react to a hypothetical scenario of rising global trade tensions, as defined in our *Geopolitical risk dashboard*. These shocks represent implied one-month moves from the specific shocks to the assets highlighted on page 7, based on cross-asset correlations and market conditions as of the scenario's inception in June 2018. Calculations assume instantaneous shocks across all risk factors. The shock (standard deviation) column shows the shock size in one-month volatility terms. Shocks are expressed as price returns for equities, credit, currencies and commodities; and changes in benchmark yields for non-credit fixed income sectors. We use benchmark futures contracts for commodities as gauges of market reaction. The indexes for regional equity markets are MSCI World Index, S&P 500 Index, MSCI Emerging Market Index, MSCI Japan Index, MSCI Europe Index and FTSE 100 Index. MSCI World sector indexes represent the sectors. Implied volatility is represented by the VIX Index. For credit we use the following Bloomberg Barclays indexes: U.S. Corporate High Yield, U.S. Credit and European Credit. Scenarios do not reflect all possible outcomes as geopolitical risks are ever-evolving. This material represents an assessment of the market environment at a specific time and is not intended to be a forecast or guarantee of future results. There is no guarantee that stress testing will eliminate the risk of investing in any asset class.

After finalizing our selected asset price shocks, we apply them against some 2,000 variables in BlackRock's risk model. Selected results for *Global trade tensions* at the time are summarized above. Negative shocks on U.S. and Chinese equities would transmit to global equity markets, while preceived safe-haven assets would rally.

What's priced in?

We explain how we gauge the market's attention to our geopolitical risks – and show how this can affect our assumed market impact of each.

Markets may or may not be paying attention to a given geopolitical situation at a given point in time. To assess the extent to which risks are priced in, we need a short-term estimator. Enter the BlackRock Geopolitical Risk Indicator (BGRI). Our BGRIs seek to gauge how much market-related discussion is focused on geopolitical risk generally – and each of our top 10 risks specifically. Each BGRI tracks the relative frequency of analyst reports, financial news stories and tweets – the one million most popular each week from Twitter-verified accounts – associated with geopolitical risks. We assign a much heavier weight to brokerage reports than to the other data sources because we want to measure the market's attention to any particular risk, not the public's. The higher the index, the more financial analysts and related media are referring to geopolitics versus history.

BGRI attention: The first component of the BGRI measures how frequently geopolitical topics are discussed in our source material. We identify specific words related to geopolitical risk in general and to our top-10 risks. We then use text analysis to calculate the frequency of their appearance in analyst reports and other media. We identify anchor words specific to the risk for each BGRI (e.g., trade) as well as related words (e.g., conflict, protectionist or tariffs). A cross-functional group of portfolio managers, geopolitical experts and risk managers agrees on key words for each risk and reviews them regularly to ensure their relevance.

BGRI sentiment: The second component of the BGRI measures whether the tone of geopolitical discussion is positive or negative. We use a proprietary dictionary of about 150 "positive sentiment" words such as "strong" or "improve" and 150 "negative sentiment" words such as "dip" or "decline." We then compare the relative frequency with which positive and negative words are used near references to geopolitical topics. A weighted moving average puts more emphasis on recent articles (see right column for details).

BGRI total score: This is BGRI attention – (0.2 * BGRI sentiment). We want the indicator to fundamentally measure market attention, so we put a much greater weight on the attention score. We assign a 20% weight to the sentiment score. This can help mitigate spikes in the BGRI at times when market attention is high but positive sentiment indicates that the risk of a particular scenario may actually be receding.

Conversely, the sentiment component can accentuate gains in the index when sentiment takes a turn for the worse. Example: The rise in our *U.S.-China competition* BGRI in 2019 has been exacerbated by worsening sentiment as both countries escalated their rhetoric around trade and strategic tensions.

Interpretation of the score: A zero score represents the average BGRI level over its history. We measure the score relative to its history, because otherwise it would be difficult to assess what constitutes a "high" or "low" level of market attention to a particular risk.

A score of one means the BGRI level is one standard deviation above the historical average, or "baseline." Negative scores indicate that market attention is below this historical baseline. We caution against drawing conclusions from small changes in the BGRI (such as moves of 0.1 or less, which we regard as immaterial).

The average is exponentially weighted: We weigh recent readings more heavily than those further in the past. This is based on the intuition that markets respond most to *shocks* in attention and high levels of attention eventually become "priced in." In other words, the effects of elevated BGRIs wash out over longer periods as investors become more accustomed to the risk.

We recently lengthened this historical baseline, comparing market attention with a longer historical period, as part of a tweak to how the index is calculated. See ***page 10*** for further details.

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Half lives

We recently recalibrated the BGRIs as part of our ongoing commitment to refine our tools based on new learnings. The key change: a lengthening of the historical window, or baseline, against which we compare today's level of market attention to a given geopolitical risk. This has the effect of slowing the evolution of the BGRI's baseline over time, making the indicator less volatile and reflecting the longer horizon of many of the thematic geopolitical risks that we track.

Our original BGRI had a 12-month historical baseline such that readings from one year ago were half as important to our comparison as yesterday's. This one-year "half life" meant the historical baseline shifted quickly over time, reflecting the concept that a consistently high level of market attention eventually becomes "normal." Yet this feature at times made changes in the index difficult to interpret. When the BGRI reached extreme levels, a moderate portion of its subsequent change was driven by the comparison with its recent history pulling the indicator back toward zero. Our new five-year historical window ensures that the baseline moves more slowly. This gives us greater confidence that meaningful short-term changes in the BGRI reflect new information about market attention, rather than changes in the baseline.

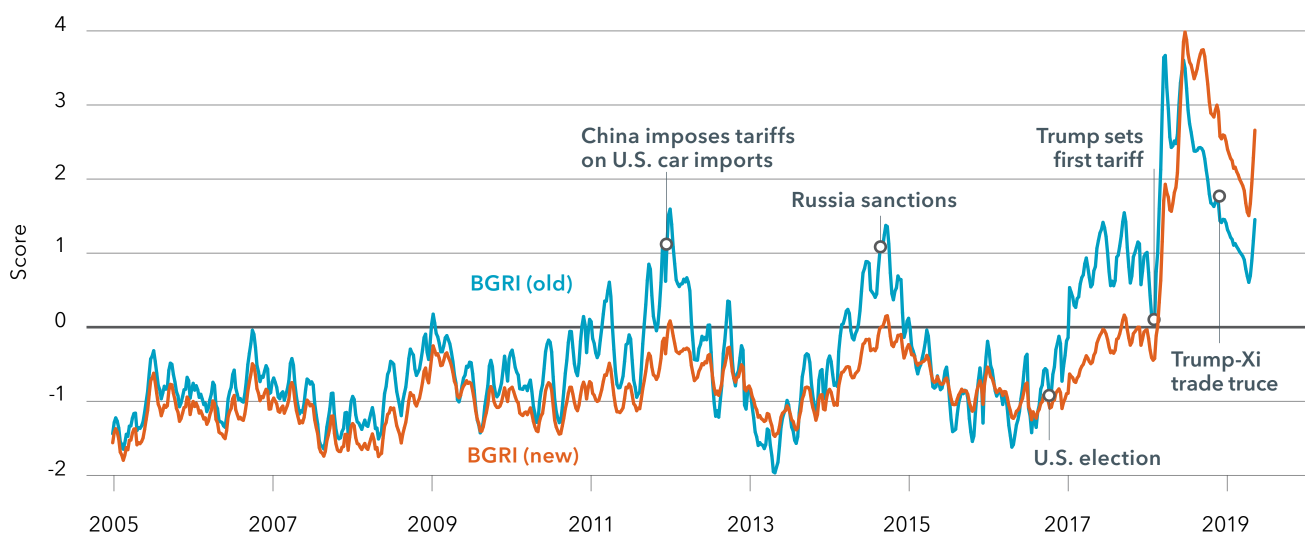
Here is an example to illustrate the impact of our new, slower-moving baseline: If the market attention's to our *Global trade tensions* risk were to remain constant at today's levels, we estimate our original BGRI would decay to near zero (0.1) in about 7 years. By contrast, it would take our updated index some 34 years to reach the neutral level because of its longer historical comparison period. In other words, the mechanical decay plays a much smaller role in the new BGRI.

In practice, the two versions have told a similar story for our top risks. The *Two flavors* chart below illustrates this for our *Global trade tensions* risk. The two versions track each other closely for much of the period since 2005. The new BGRI (the orange line) shows attention to the risk peaking at a slightly higher level than the original BGRI (blue line) in late 2018, after an extended spike that followed the U.S. tariffs on steel and aluminum imports from most countries. Both versions declined in early 2019 before rebounding sharply, leaving market attention to the risk at an elevated level as of midyear.

We see *Global trade tensions* as a good example of a thematic geopolitical risk that has potential to linger long in the market's consciousness. Many of the consequences, such as disruptions to global corporate supply chains, could take years to play out.

Two flavors

BlackRock Geopolitical Risk Indicator for *Global trade tensions*, 2005–2019



Sources: BlackRock Investment Institute, with data from Thomson Reuters, June 2019. Notes: We identify specific words related to this geopolitical risk and use text analysis to calculate the frequency of their appearance in the Thomson Reuters Broker Report and Dow Jones Global Newswire databases as well as on Twitter. We then adjust for whether the language reflects positive or negative sentiment, and assign a score. A zero score represents the average BGRI level over its history. A score of one means the BGRI level is one standard deviation above the average. We weigh recent readings more heavily in calculating the average. The BGRI's risk scenario is for illustrative purposes only and does not reflect all possible outcomes as geopolitical risks are ever-evolving.

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Priced in?

Our BGRI scores illustrate the need to address a key fact: Geopolitical risk scenarios can become partially or fully priced into markets. The higher the BGRI reading for a particular geopolitical risk, the more financial analysts and media are referring to it, and the more we assume that risk has been priced in by the market.

The implication: Our estimated asset price shocks need to take into account the level of the BGRI. As such, we have developed an approach for adjusting our scenario impact projections for geopolitical risks, using each risk's BGRI. How does this work? We illustrate in the charts below. The bottom-right chart shows how our estimates for the impact of a *Global trade tensions* scenario on global equity markets have changed over time. The "unadjusted" line does not take into account the level of our BGRI. The "adjusted" line does. We assume both are equal on the scenario's release date, as each scenario is calibrated to reflect what is not already priced in the market by investors. We then apply a multiplier to the scenario results through time (the blue line) to either dampen the estimated impact if market attention toward the risk is elevated versus the release date, or to amplify it if the BGRI suggests market participants may be focusing less on the risk.

Adjusted impacts

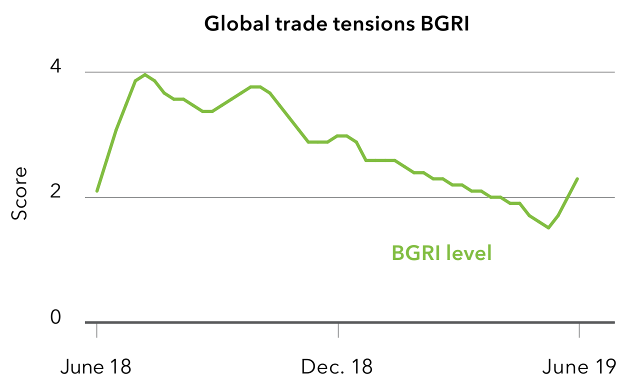
How has this played out in practice? Market attention toward *Global trade tensions* quickly rose above the BGRI level observed on the scenario's launch (June 11, 2018). See the chart to the left. This implied the risk became more priced in by financial markets. Reflecting this, our BGRI-adjusted scenario impact rose above the unadjusted figure, pointing to less severe potential losses in global equities should the scenario occur.

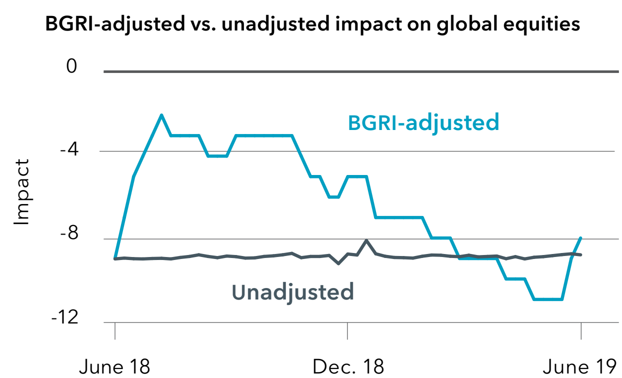
Yet this trend ultimately reversed. Market attention to the *Global trade tensions* risk steadily waned from its July 2018 peak, before an eventual rebound in mid-May 2019. In the latter stage of this prolonged decline, the BGRI-adjusted scenario impact temporarily became more severe than the unadjusted figure, at one point signaling potential double-digit losses in global equities from a trade-related shock.

Note that even the unadjusted impact shown in our chart can change moderately over time. This is due to changes in underlying market conditions such as volatilities and cross-asset correlations. Bottom line: The less attention markets are paying to a particular geopolitical risk, the greater the potential market impact may be should it materialize – and vice versa.

Pricing in and out

Global trade tensions BGRI and estimated global equity impact illustration, 2018–2019





The figures shown relate to past performance and are not a reliable indicator of current or future results. Forward-looking estimates may not come to pass. It is not possible to invest directly in an index. Sources: BlackRock Investment Institute, with data from Thomson Reuters, June 2019. Notes: The chart on the left shows our BlackRock Geopolitical Risk Indicator (BGRI) for *Global trade tensions*. To generate it, we identify specific words related to this geopolitical risk and use text analysis to calculate the frequency of their appearance in the Thomson Reuters Broker Report and Dow Jones Global Newswire databases as well as on Twitter. We then adjust for whether the language reflects positive or negative sentiment, and assign a score. A zero score represents the average BGRI level over its history from 2003 up to that point in time. A score of one means the BGRI level is one standard deviation above the average. We weigh recent readings more heavily in calculating the average. The chart on the right shows our estimates of the potential market impact of rising trade tensions on the MSCI ACWI Index, a proxy for global equities. The unadjusted line shows our original estimate not adjusted for our *Global trade tensions* BGRI and based on the scenario analysis run on June 11, 2018. The adjusted line shows the potential equity impact based on the level of the BGRI. For example, an elevated BGRI level would suggest increased investor attention and therefore a lower BGRI-adjusted market impact. We determine a factor that scales the size of the BGRI move since the date of our original market impact estimate to calculate the BGRI-adjusted market impact. We use a sigmoid function to do so, or a statistical technique that is characterized by an S-shaped curve. We then multiply our original estimate of the market impact by (1 – scaling factor) to reach the BGRI-adjusted market impact score. See the "How it works" section of our geopolitical dashboard at *blackrockblog.com/blackrock-geopolitical-risk-dashboard*. The scenarios and charts are for illustrative purposes only and do not reflect all possible outcomes as geopolitical risks are ever evolving.

Assessing likelihood

We combine our estimates of the likely impact of a given geopolitical risk with an assessment of its relative likelihood. Our geopolitical experts – including former policy makers, investors and strategists on the ground across regions – identify escalation triggers for each risk and assess how likely they are to play out over the next six months, relative to the other risks we monitor.

We also show our overall gauge of geopolitical risk. Its likelihood score is based on a simple average of our top-10 risks; the market impact is a weighted average by likelihood score. The *Risks and impacts* chart shows our estimate of the relative likelihood of each of our top-10 risks – against the expected one-month impact on global equities (at the time the scenario was conceived) should it come to pass. The likelihood scores can help provide a measure of when markets may be over- or underappreciating a particular risk. Example: We kept our *Global trade tensions* likelihood score at an elevated level in early 2019 – even as market attention to the risk was sharply declining. Why? We saw tensions between the U.S. and China as structural and likely to persist beyond any short-term disagreements over the bilateral trade deficit. This pointed to rising potential for market volatility should the risk flare up, as it did in May.

Takeaways

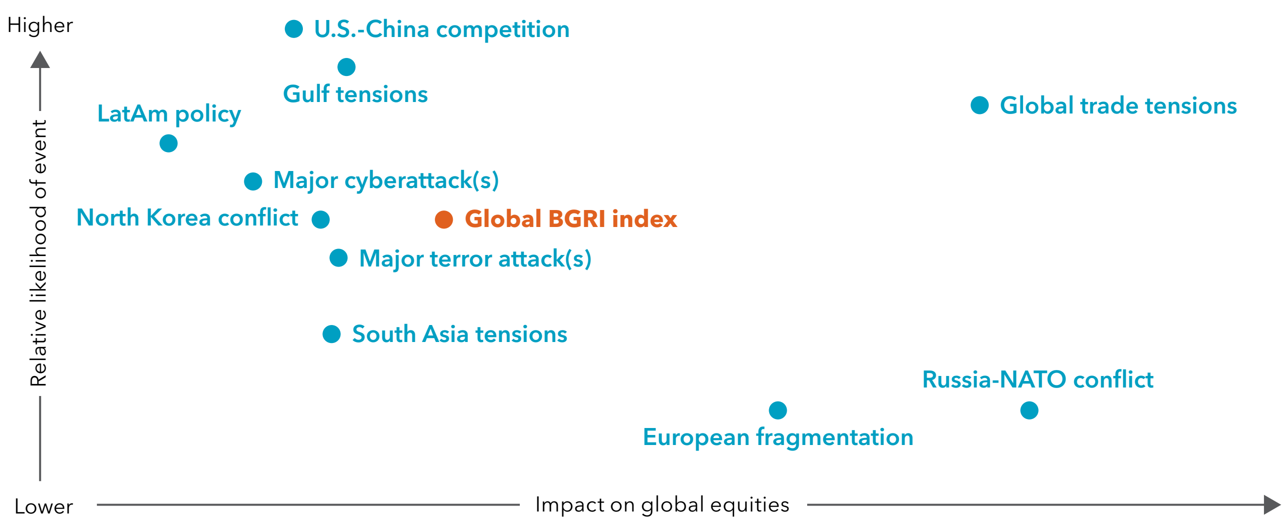
The three geopolitical risks in our top-10 list with the greatest potential market impact at the time the scenarios were conceived were *European fragmentation*, *Russia-NATO conflict* and *Global trade tensions*. We saw *Global trade tensions* as the most likely of these risks to actually play out in the near term.

Note: The impact estimates below are unadjusted. The BGRI-adjustment process described on the previous page means the estimated market impacts change over time. Example: Our *European fragmentation* BGRI has spiked since mid-2018, suggesting the risk is more priced in today – and dampening its expected market impact relative to the estimate displayed in the chart.

One of the risks that we saw as most likely to play out – *Gulf tensions* – had a relatively modest expected market impact. We upgraded the likelihood of this risk in May 2019, against a backdrop of increasing tensions between the U.S. and Iran and heightened pressure on the U.S.-Saudi Arabia relationship. *Major cyberattacks* (a major cyberattack that disrupts key physical or financial system infrastructure) is an example of a risk with relatively high likelihood – but lower expected market impact. See our ***Geopolitical risk dashboard*** for detailed descriptions of the scenarios.

Risks and impacts

Relative likelihood and estimated market impact of selected geopolitical risks, 2019



Forward-looking estimates may not come to pass. Source: BlackRock Investment Institute, June 2019. Notes: The graphic depicts BlackRock's estimates of the relative likelihood (1–10 scale, with 10 most likely) of the risks over the next six months and their potential market impact on the MSCI ACWI Index. Market impact estimates are as of the time of creation of each scenario. See the "how it works" section of our Geopolitical risk dashboard for details. The Global dot represents our overall assessment of geopolitical risk. Its likelihood score is based on a simple average of our top-10 risks; the market impact is a weighted average the likelihood scores. Some of the scenarios we envision do not have precedents – or only imperfect ones. The scenarios and the chart are for illustrative purposes only and do not reflect all possible outcomes as geopolitical risks are ever-evolving.

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Taking action

We show how we apply our geopolitical risk scenarios to portfolios, in an effort to make them more resilient. And we highlight improvements we aim to make to our process.

The primary goal of our geopolitical risk framework is to provide investors with insights on those risks with the greatest potential to affect the global economy, financial markets and portfolio outcomes.

We see this analysis as an important input for stress testing portfolios. In some cases, the probability of a negative geopolitical event may point to potential losses that are excessively high relative to a portfolio's return targets. This may require hedging or risk-reduction strategies to mitigate downside risk. The portfolio construction challenge: Hedging typically comes with a cost. Geopolitical risks need to be weighed against fundamental views, and the need to meet return targets.

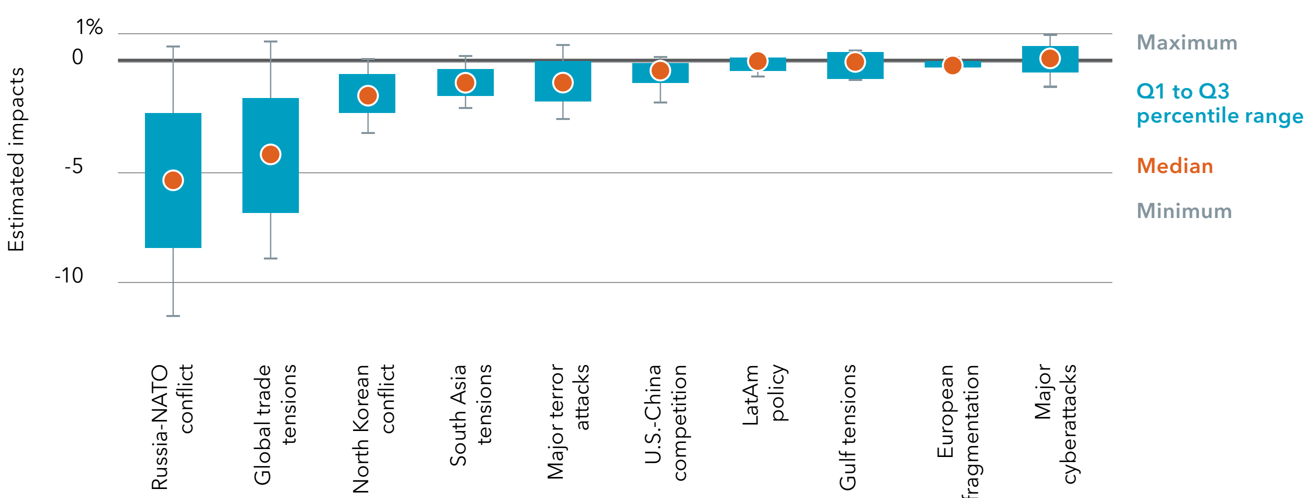
Our scenario results can be used to help identify potential impacts on different portfolios. We illustrate with a series of hypothetical portfolios, ranging from a high risk portfolio (100% global equities) to an ultra conservative one (100% bonds), with various blends in between, such as a "60/40" split of the two asset classes.

The *Stress test* chart below illustrates the estimated range of portfolio impacts under various geopolitical scenarios. See our ***Geopolitical risk dashboard*** for details on each of the scenarios. Key takeaways:

- The scenario impact figures mostly tilt modestly to the downside, with the adverse results for two risks – *Global trade tensions* and *Russia-NATO conflict* – standing out. These two scenarios also showed the widest dispersion in results across the hypothetical multi-asset portfolios we analyzed.
- A handful of risks, including *LatAm policy* and *Major cyberattacks*, have little projected impact on multi-asset portfolios and a narrow dispersion in results. A caution: In the real world, there may be outliers to these results. Think of a concentrated portfolio with heavy exposure to financials under *Major cyberattacks*; or an emerging market fund with heavy exposure to Latin America disproportionately harmed by the *LatAm policy* scenario.

Stress test

Distribution of estimated BGRI-adjusted impact of geopolitical risk scenarios on hypothetical multi-asset portfolios



Sources: BlackRock Investment Institute and RQA, June 2019. The charts show the distribution of BGRI-adjusted impact estimates on 11 hypothetical multi-asset portfolios. The portfolios range from conservative (100% bonds) to aggressive (100% equities) with ten percentile shifts in asset class composition between these extremes. Example: 90% bonds; 10% equities, 80% bonds; 20% equities and so on. Bonds are represented by the Bloomberg Barclays Global Aggregate Index (USD-hedged); equities by the MSCI All Country World Index. We show the impacts (estimated one-month performance in U.S. dollar terms following the shock) for each of the top geopolitical risks highlighted on our Geopolitical risk dashboard. For illustrative purposes only. Estimated impacts do not reflect any management fees, transaction costs or expenses. Scenarios do not reflect all outcomes as geopolitical risks are ever-evolving. This material represents an assessment of the market environment at a specific time and is not intended to be a forecast or guarantee of future results. There is no guarantee that stress testing will eliminate the risk of investing in any asset class.

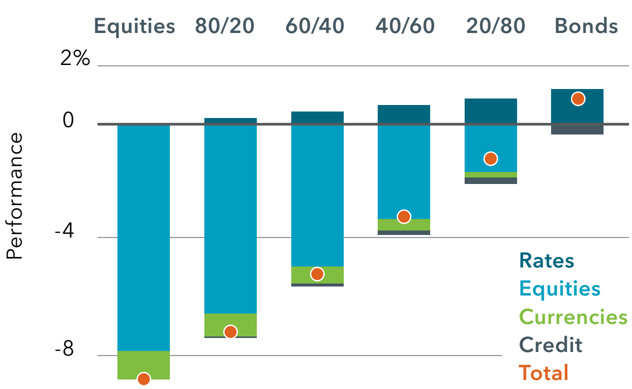
Key drivers

Our scenario analysis is a key input for risk management and can be used to stress test portfolios. It allows us to break down the key drivers of portfolio outcomes under different geopolitical risk scenarios. We illustrate again with the *Global trade tensions* risk and apply our estimated asset price shocks to a selected group of hypothetical equity/bond portfolios of varying risk levels, ranging from 100% equities to 100% bonds. The *Under water* chart below shows the estimated performance breakdown by asset class.

The key takeaway: Multi-asset portfolio losses under a *Global trade tensions* scenario are driven primarily by their global equities exposure. See the teal-colored shading in the chart. In some portfolios, these losses were partially offset by bond exposure ("rates" or the dark blue shading), reflecting our expectation that the scenario would cause a flight into perceived safe-haven assets. Currency exposures (green shading) embedded in global equity positions, as well as credit positions within the global bond allocations, detracted from performance. This illustrates the importance of diversification and the search for effective hedges that can help offset losses under differing risk scenarios.

Under water

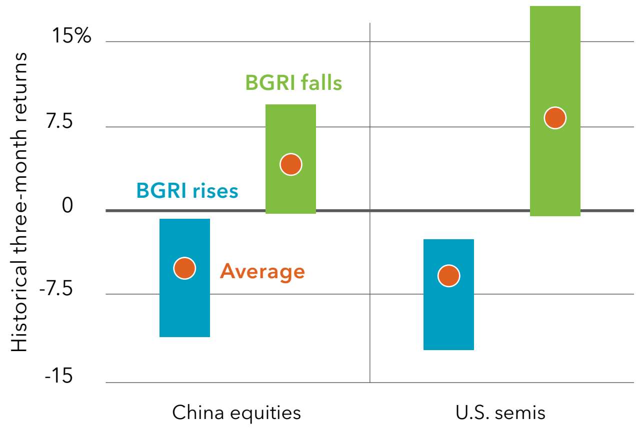
Hypothetical portfolio impacts under *Global trade tensions*



Sources: BlackRock Investment Institute, with data from MSCI and Bloomberg Barclays, June 2019. Notes: We present the estimated one-month performance impact in U.S. dollar terms of our *Global trade tensions* scenario on six hypothetical portfolios: 1) 100% global equities (MSCI ACWI index); 2) 80% global equities; 20% global bonds (Bloomberg Barclays Global Aggregate index); 3) 60% global equities; 40% global bonds; 4) 40% global equities; 60% global bonds; 5) 20% global equities; 80% global bonds; and 6) 100% global bonds. The BGRI-adjusted estimates are broken down by asset class. Asset class references are for illustrative purposes only and should not be interpreted as a recommendation. Indexes are unmanaged. Returns do not reflect any management fees, transaction costs or expenses. Scenarios do not reflect all outcomes as geopolitical risks are ever-evolving. This material represents an assessment of the market environment at a specific time and is not intended to be a forecast or guarantee of future results. There is no guarantee that stress testing will eliminate the risk of investing in any asset class.

Tied to trade tensions

Selected assets' hypothetical reaction to *Global trade tensions* BGRI



The figures shown relate to past performance and are not a reliable indicator of current or future results. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise – or even estimate – of future performance. Sources: BlackRock Investment Institute, with data from Thomson Reuters, June 2019. Notes: The chart shows the 25%–75% percentile ranges (bars) and average three-month returns (dots) for selected assets during rolling three-month periods when the *Global trade tensions* BGRI has historically risen or fell by more than 0.75 standard deviations. The MSCI China Index (China equities) and the semiconductor sector subcomponent of the S&P 500 Index are used to calculate returns. Scenarios do not reflect all outcomes as geopolitical risks are ever-evolving. This material represents an assessment of a market environment at a specific time and is not intended to be a forecast or guarantee of future results. There is no guarantee that stress testing will eliminate risk in investing any asset class.

BGRI-specific assets

A recent enhancement to our approach: We are working to pinpoint assets that have moved significantly along with big changes in individual BGRIs, based on statistically meaningful relationships between them.

The *Tied to trade tensions* chart examines what happened to selected assets when the *Global trade tensions* BGRI rose (the blue bars) or fell (the green bars) by more than 0.75 standard deviation over a three-month period. We show average three-month returns and their historical ranges. The analysis focused on three dozen assets we saw as closely related to the *Global trade tensions* risk.

Risk assets such as China equities on average were hit hard when the *Global trade tensions* BGRI was on the rise, but rallied when the BGRI registered large downward moves, we found. Equities in the highly cyclical semiconductor sector showed a similar, and magnified, response. This work can help tease out assets that may be most sensitive to spikes in market attention to particular scenarios, potentially helping to mitigate portfolio risks.

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The path forward

As geopolitics is ever-evolving, we continuously search for ways to improve our framework. The sidebar below lists some of the limitations that we are grappling with. Among the enhancements we are considering adding:

- **Multi-period scenario analysis:** Our current approach assumes geopolitical shocks are instant. We are working on an improvement to our model that would allow for multi-period analysis, or scenarios that would be realized over a time period.
- **Worst-case outcomes:** What happens when multiple tail risk scenarios strike markets at the same time? We are in the early stages of attempting to answer this question, via modeling a series of worst-case outcomes.

Our multi-disciplinary group of in-house experts continuously reviews our list of top-10 geopolitical risks. We refresh scenarios as existing risks evolve and new ones emerge. Example: We recently took a deep dive on *U.S.-China-competition*, a risk that we see as structural as both countries vie for global technological supremacy. See our ***Geopolitical risk dashboard*** for further details.

BlackRock's research to quantify geopolitical risks is part of a broader effort to go beyond traditional financial metrics when thinking about risk. Another example: our efforts to better measure climate-related risks on portfolios. See ***Getting physical*** of April 2019 for details.

Bottom line: Geopolitical risks can have a large impact on portfolios, especially in the short term. Investors would do well to keep tabs and diversify portfolios.

CAVEATS AND CAUTIONS

We have made significant progress in quantifying geopolitical risks. Yet estimating the impact of geopolitical risks on asset prices and portfolio returns remains a challenging endeavor. Key hurdles:

Fast-moving events: Geopolitical situations can change fast. Keeping on top of the developments can require a significant commitment of time and resources. Example: Tariff levels between major economies can rise in a step-wise fashion in response to incremental news flow or a sudden breakdown in trade talks. And scenarios can quickly become obsolete – or morph into different risks. After binary events such as elections, for example, the risk scenario for markets may shift from one in which outsider candidates rise to power, to another in which new leaders implement populist policies.

Time horizon: There can be a disconnect between the time horizons of investors – and those of geopolitical risk events. To be sure, the timing of certain geopolitical risk events, such as elections or referenda, is certain. Yet the vast majority are of uncertain duration. The persistence of a market shock also depends on the nature of the event. Example: The negative market impact of a trade war may be quickly unwound in the case of a deal that resolves tensions. Yet an extended trade conflict could have longer-lasting and wider-ranging implications.

Multiple outcomes and triggers: Geopolitical situations can have multiple outcomes, each with wide ranging impacts. Military conflicts, for example, can have many escalation triggers – some hard to foresee. The broad market impact is likely to depend on the extent to which the conflict is contained, or if it draws in major powers.

Attribution: Geopolitical risks are just one of many factors that can impact asset valuations. Broad "risk-on" and "risk-off" shifts in market sentiment – due to changing perceptions around growth, policy expectations and other fundamental variables – can swamp the impact of geopolitical events on asset prices. Another challenge: We evaluate geopolitical risks independently of each other. Yet multiple events can occur simultaneously, complicating the analysis.

Early warning: Markets often move ahead of geopolitical risk events. This can dampen any reactions to the eventual realization of the scenario, at times making for counter intuitive asset price fluctuations. We attempt to address the challenge of markets partially or fully pricing in geopolitical risk events in advance via our BGRI adjustment methodology (see ***page 11***). Yet we are cognizant that our work in this area is an imprecise science. Our market attention indicators, for example, may fail to capture certain relevant keywords.

The ***BlackRock Investment Institute (BII)*** provides connectivity between BlackRock's portfolio managers; originates economic, markets and portfolio construction research; and publishes investment insights. Our goals are to help our fund managers become even better investors and to produce thought-provoking investment content for clients and policymakers.

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