

GLOBAL MANUFACTURING RISK INDEX

2020

ASSESSING MANUFACTURING'S
POST-PANDEMIC RECOVERY POTENTIAL

INTRODUCTION

The COVID-19 pandemic has now circled the globe both from East to West and from the Northern to the Southern hemisphere, highlighting how globally connected and dependent we really are. This is especially true for the manufacturing sector with its global production lines and supply chains. Just when workers are permitted to return to factories in Asia and goods can be moved out of the region, Europe and the U.S. find themselves only in the first phases of reopening factories and restarting their economies.

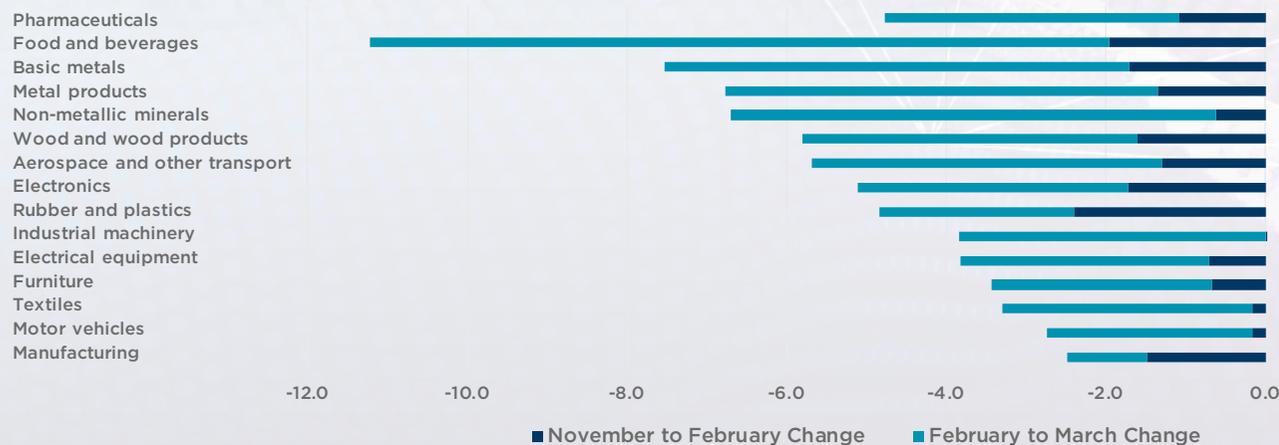
The COVID-19 pandemic has had severe consequences for the global manufacturing sector.¹ To demonstrate the impact of the COVID-19 pandemic on global manufacturing, the table below shows Oxford Economics' (OE) February and March downgrades

(not the actual forecasts) of its total and sector forecasts made last November. Prior to the COVID-19 pandemic, OE concluded that the worst impact of trade wars and geopolitical instabilities were over for both world trade and manufacturing, so no negative adjustments were made to its forecasts. That changed in February after the coronavirus outbreak had taken grip in China and the region. At this time, OE expected that weaker Chinese imports and tourism coupled with global supply chain disruptions would take a toll on the rest of the world, particularly in the Asia-Pacific region. Furthermore, the shock was expected to exacerbate an ongoing economic slowdown in Asia. In March, when the impact of the pandemic became more widespread, OE updated

its forecasts to account for the severe disruption to economic activity generated by the global spread of the virus beyond China.

Over the long-term, the same locational criteria that drives our Manufacturing Risk Index (MRI) model will remain important for manufacturers. Since the key parameters used in the MRI model may vary on an individual basis, ranking results are intended to be used only as a guide for locational decisions. This year's result for our baseline and risk scenarios show the impact of the U.S.-China trade dispute. Clearly, the U.S. and China are at the centre of the trade conflict, but other countries are feeling the impact, either positively or negatively.

OXFORD ECONOMICS PANDEMIC-BASED ADJUSTMENTS TO FORECASTS FOR MANUFACTURING*



Source: Oxford Economics²

¹ In the absence of data to quantify the full impact of the coronavirus on global manufacturing, Oxford Economics (OE) has relied on both historical macro-economic data from previous natural disasters along with real time data feeds and information to determine the estimated impact on each sector of production.

² Referring to the table above, the 'February to March change' for Manufacturing is -3.7, meaning that in the March forecast round, OE downgraded their manufacturing forecast by 3.7 percentage points (The growth forecast moved from 0.9% to -2.8% -- so, the calculation in the table is 0.9 - -2.8 = 3.7).

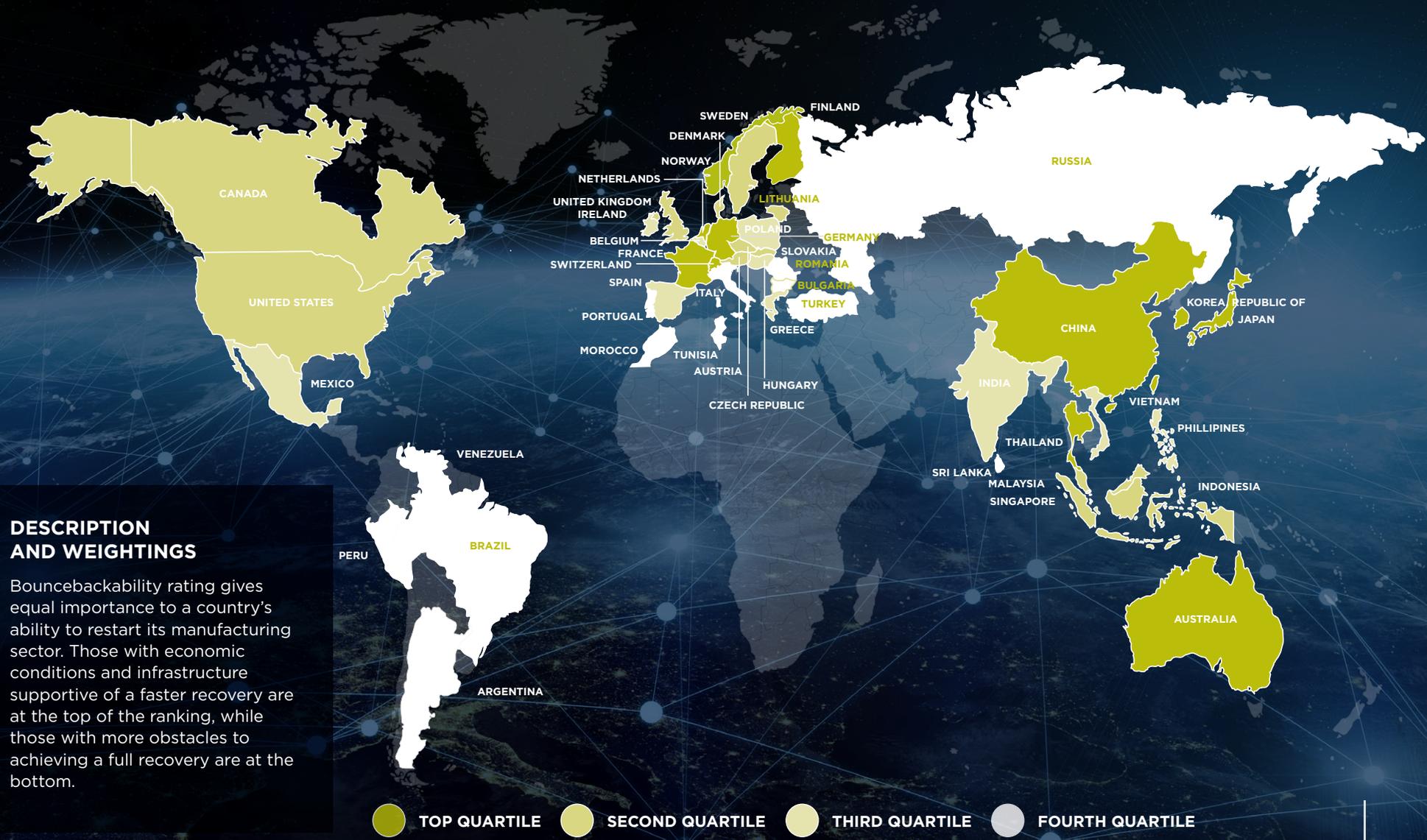
MEASURING “BOUNCEBACKABILITY”

In terms of the current pandemic, without data to input into our MRI model that would capture the short- and mid-term impact on global manufacturing and its eventual recovery, we have added a second step to our normal MRI methodology which ranks countries by their ability to restart their manufacturing sectors once confinement measures are relaxed and business starts to return to normal. An assessment of conditions necessary to bring the manufacturing back into full swing points to six key variables:

- 1** A country's share of small and medium sized enterprises captures vulnerability to the segment of business services and goods that has been most vulnerable during the lockdowns.
- 2** Moody's sovereign debt ratings capture a country's ability to access capital either through existing public funds or debt.
- 3** Oxford Economics' GDP growth forecast is a commonly referred to indicator of how quickly an economy is expected to recover.
- 4** The Economist Intelligence Unit's Global Health Security Index assesses national health security and related capabilities and quantifies countries' preparedness to fight pandemics or epidemics.
- 5** Johns Hopkins Coronavirus Resource Center data on new COVID-19 cases by country is a commonly referred to indicator of where each country is on the pandemic curve.
- 6** Johns Hopkins Coronavirus Resource Center data on total COVID-19 cases by country measures the severity of the pandemic in each country.

Each of the six variables above is weighted according to its estimated contribution to manufacturing sector recovery. Countries are then ranked and grouped according to their “bouncebackability” with the top 20 countries shown on the global map on the next page.

BOUNCEBACKABILITY



DESCRIPTION AND WEIGHTINGS

Bouncebackability rating gives equal importance to a country's ability to restart its manufacturing sector. Those with economic conditions and infrastructure supportive of a faster recovery are at the top of the ranking, while those with more obstacles to achieving a full recovery are at the bottom.



SAFEGUARDING PRODUCTION LINES AND SUPPLY CHAINS

Post-World War II, in response to expanding consumer markets in Europe and lower cost labour in Asia, globalisation of manufacturing fuelled a long wave of offshoring. Whereas in the early 1950s, the U.S. accounted for 40% of the world's manufactured goods, first a reconstructed Europe, then Japan, followed by the east-Asian countries (including Taiwan and South Korea) cumulatively took growing shares of worldwide manufacturing production. Since the late 1970s and accelerating through the 1990s and into the 2000s, China has been the recipient of the lion's share of offshoring production from developed countries. From 2000 to 2018, China's exports increased nearly fivefold to US\$1.2 trillion with its world share rising from 3.9% to 28.4%.

The COVID-19 pandemic has underscored the manufacturing sector's vulnerability rooted in its reliance on global production lines and supply chains. Hardest hit, the global automobile industry is facing an unprecedented crisis. In Europe, most automobile plants were temporarily closed due to falling demand, supply shortages, government measures, and cases of coronavirus infections and quarantines among their employees. A number are now beginning to reopen, but it will be a while before they are up to Pre-COVID-19 production levels.

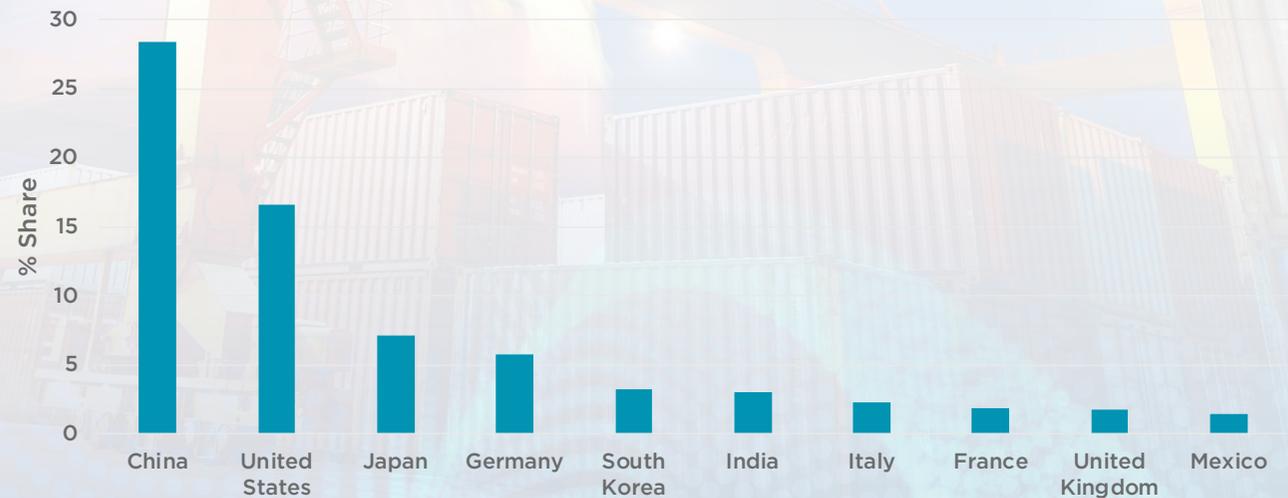


ACCORDING TO THE GUARDIAN, IN APRIL, NEW VEHICLE SALES IN THE UK PLUNGED BY **97% -THE LOWEST LEVEL** SINCE THE END OF THE SECOND WORLD WAR.



ACROSS THE EU, VEHICLE MANUFACTURERS OPERATE SOME 229-VEHICLE ASSEMBLY AND PRODUCTION PLANTS, DIRECTLY EMPLOYING **2.6 MILLION WORKERS** IN MANUFACTURING. THE WIDER AUTOMOBILE SECTOR PROVIDES INDIRECT AND DIRECT JOBS FOR 13.8 MILLION PEOPLE IN THE EU.

SHARE OF GLOBAL PRODUCTION, 2018



Source: United Nations Statistics Department

MOST LIKELY MEASURES TAKEN BY MANUFACTURERS IN REACTION TO THE COVID-19 PANDEMIC:

- **Immediate- to short-term:** Holding more product and component inventories.
- **Medium-term:** Diversifying component sourcing including an emphasis on localising or “nearshoring” components to be closer to plants while holding more inventories.
- **Long-term:** Reshoring for some sectors, locating plants and component sources closer to each other as well as supply chain and production line restructuring that would make just-in-time inventory management possible again.

DUE TO RISING FOREIGN WAGES, RISING TARIFFS ON STEEL, ALUMINIUM, AND ELECTRIC COMPONENTS, AND RECONSIDERATIONS OF TOTAL COST OF OWNERSHIP, THE RESHORING INSTITUTE PREDICTS THAT COMPANIES WILL INCREASINGLY BE **MOTIVATED** TO PARTICIPATE IN **RESHORING EFFORTS** IN COMING YEARS.

The most likely immediate response from manufacturers will be to revert to holding more inventory. Moving away from “just-in-time” inventory management until supply chains and production lines can be restructured will provide more flexibility and less vulnerability to disruptions in the event of a second pandemic wave or extended lockdown periods.

Leading into the current challenge, new trade agreements (e.g., BREXIT, NAFTA) and trade wars, that were already increasing trade tariffs for both finished goods and raw materials, were stripping away some of the cost advantages of offshoring. With global manufacturing significantly disrupted by the current pandemic, conditions are now ripe for global manufacturers of finished goods and parts to move forward with ongoing pre-COVID-19 reshoring discussions and plans.

Reshoring would shorten supply chains, effectively reducing long lead times, thereby giving manufacturers more control over production quantities to allow for greater flexibility in response to demand. Furthermore, automation, robotics and 3D printing make reshoring a viable solution in terms of cost which was already a pre-pandemic concern for manufacturers in response to rising wages in China and other Asian countries.

Most countries want to have a strong manufacturing sector that will generate jobs in a variety of ways. Not only are direct manufacturing jobs generally higher paid than the service sector, but since manufacturing firms tend to spend more on research and development, there is the potential to generate higher-value jobs in innovation and intellectual property.

However feasible the solution, reshoring on a mass scale is not realistic and will not happen in the immediate term as a safeguard against production line and supply chain disruptions. For some production sectors like robotics, microprocessors and electric cars, if reshoring is done too precipitously, reshoring could pose even more risks to production because recreating reliable supply chains is difficult. Rather, to enhance resilience in the event of a second pandemic wave or extended country/regional-level lockdown periods, in the medium-term, manufacturers are more likely to address the two most pressing vulnerabilities: component sourcing and supply chain disruptions.

The fastest and least costly way to tackle these problems is to diversify raw materials and component sourcing. Moreover, since proximity to consumers is an essential to factory location decisions, to the extent that it is possible, localising component sourcing could be one way to shorten supply chains as a defence against global disruptions. Localising component sourcing in the form of either reshoring or if, not feasible, even “nearshoring” to countries that are closer geographically.



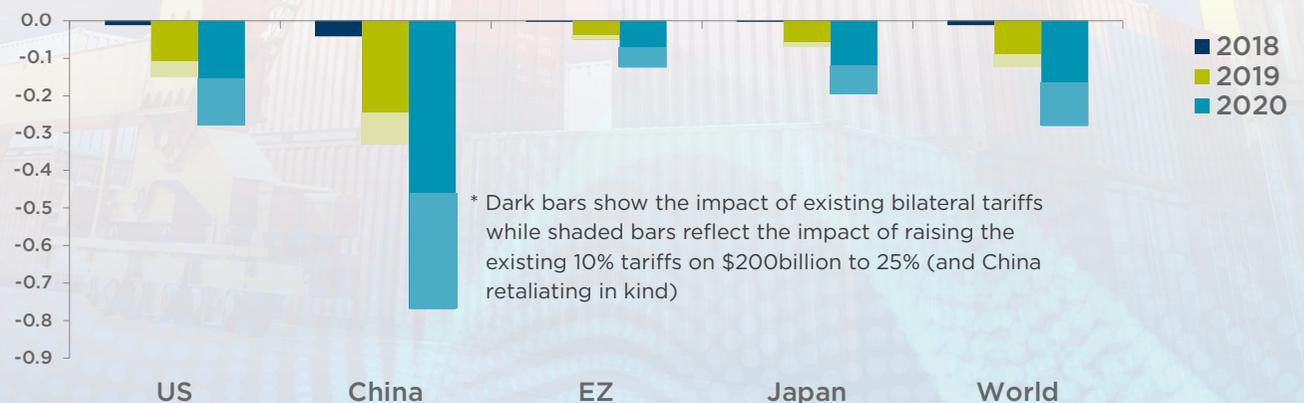
HIGHLY AUTOMATED MANUFACTURING CAME INTO ITS OWN DURING THE EARLY STAGES OF THE COVID-19 OUTBREAK IN CHINA, WHERE SOME SEMI-CONDUCTOR AND FLAT PANEL FACTORIES IN WUHAN WERE ABLE TO MAINTAIN RELATIVELY **NORMAL PRODUCTION** THANKS TO **HIGH LEVELS OF AUTOMATION**, WHILE LABOUR-INTENSIVE INDUSTRIES LIKE 3D MANUFACTURING COMPLETELY SHUT DOWN.



THE MANUFACTURING SECTOR TODAY PROVIDES **32 MILLION** DIRECT AND **20 MILLION** INDIRECT **JOBS** IN EUROPE ACCORDING TO BUSINESSEUROPE.

US-CHINA 25% TARIFFS TO WEIGH ON GLOBAL ACTIVITY

Real GDP impact, level, %*



2020 MRI RANKING RESULTS

BASELINE SCENARIO

China retains top position on our baseline scenario ranking that does not consider impact from the current pandemic. Diversification combined with a move up the value chain in order to focus on telecom, hi-tech (40% of robots produced globally are made in China), and computers have helped the Chinese manufacturing sector remain somewhat resilient to trade wars. Key manufacturing regions in China include Guangdong and Jiangsu which focus on electronic components and automotive, whilst Zhejiang and Liaoning focus on chemicals and natural resources.

Despite also being at the centre of current trade wars, the U.S. has retained second place on this year's baseline ranking. Like China, the U.S. offers a large consumer market, ample labour supply, incentives at both the federal and state level as well as an established infrastructure network (though less modern than China). With the rapid adoption of technology into production processes, the U.S. and its higher cost workforce could start to be better aligned to compete with China for manufacturing jobs. The volume of manufacturing activity in the U.S. is primarily driven by oil & gas, chemicals and automotive industries in Louisiana, Texas and South Carolina respectively.

This year, on our baseline ranking, India moved up to 3rd place from 4th place last year. Already established in pharmaceuticals, chemicals and engineering, that are the focus of the U.S.-China trade wars, India stands to benefit from any plant relocations from

China to other parts of Asia. However, reforms to both land and labour laws are critical to India's success as a global manufacturing location. While India accounts for only a small share of global manufacturing (1.68%), its pharmaceutical industry supplies over half of the world's vaccine demand, and 25% of medicine in the UK, according to a July 2019 report from the India Brand Equity Foundation. Key regions in India with high manufacturing activity include Andhra Pradesh with a focus on agribusiness and paper & packaging, whilst more recently regions such as Gujarat and Uttar Pradesh have experienced a significant influx of investment in electronic components and communication technology.

The Czech Republic rose in our baseline ranking to 4th place. Strong foreign direct investment into Czech's manufacturing sector has made it possible to develop a modern infrastructure network with strong links to Germany. More specifically, leading up to the pandemic, labour markets in Katowice (Southwest Poland), northern Czech Republic and Slovakia had been very tight with almost a zero unemployment rate, significant wage inflation, and high employee turnover. The economic shock caused by lockdowns could potentially ease labour market conditions that, up until now have put pressure on many manufacturers to consider locations further East. In addition to a well-developed infrastructure, the CEE region is part of the EU and has one of the highest densities of blue-collar workers in Europe.

COST SCENARIO

This year's MRI cost scenario rankings reflect the broad impact of the US-China trade war on regional positioning. While China retains its lead position, Vietnam and India jumped to second and third positions respectively. The manufacturing shift towards Vietnam has been a long time in the making. As minimum wages in China grew, more orders for labour intensive products such as clothes, toys and shoes shifted to less expensive locations in India, Bangladesh, Myanmar and Vietnam.

However, despite government initiative to attract manufacturers, Vietnam and India have not been able to make investments on the scale of China to build and modernise their infrastructure networks. An ample labour supply, a large and expanding domestic consumer market, low currency value and government incentives including inexpensive land, free infrastructure and generous financial incentives help secure China's top position on our cost ranking.

2020 MRI RANKING RESULTS

RISK SCENARIO

At the top of our risk scenario ranking, the U.S. and Canada are well positioned to fuel an acceleration in reshoring. Natural resources, ample labour pools, federal and state incentives, large consumer markets and infrastructure make these countries competitive, especially in a less predictable and less secure global environment.

However, the domestic focus and anti-trade stance of the current US administration bumped the US from first place on last year's ranking to second place this year behind Canada. Transparency, investments in infrastructure networks and the absence of geopolitical concerns contributed to higher ranking positions for both Singapore and Germany, third and fourth respectively. Though not yet accounted for in this year's data, increased tariffs on German exports that account for 47% of GDP caused a marked economic slowdown in 2019, ahead of the current pandemic.

Despite its trade conflict with the U.S., China was still ranked number 5 under the risk scenario. Given the possible post-pandemic shift in sourcing and supply chain strategies and evolving geo-political risks its ranking may fluctuate in the future. However, it is too early to predict with accuracy how fast these developments may occur or the significance they may have on future rankings.

BOSTON CONSULTING GROUP'S 2019 SURVEY OF GLOBAL MANUFACTURING COMPANIES



MORE THAN **HALF OF THE EXECUTIVES** SURVEYED REPORTED THAT THEY WERE PLANNING OR **CONSIDERING RESHORING** ACTIVITIES IN THE NEXT FIVE YEARS.



NOTABLY, **97%** SAID THAT THEY WOULD CONSIDER A **DOMESTIC SOURCE** FOR PARTS IF THE PRICE AND QUALITY WERE COMPETITIVE TO FOREIGN SUPPLIERS.



IN ADDITION TO THE GROWING ATTRACTIVENESS OF U.S. MARKETS, THE UNPREDICTABILITY OF TARIFFS AND TRADE REGULATIONS LEAVE COMPANIES CONDUCTING INTERNATIONAL BUSINESS **WARY OF UNEXPECTED COST INCREASES.**



THE SURVEY FOUND THAT FROM 2017 TO 2018, THE NUMBER OF COMPANIES OPERATING IN **MULTIPLE GLOBAL LOCATIONS DECREASED BY 10%.**

BASELINE



DESCRIPTION AND WEIGHTINGS

The Baseline scenario gives equal importance to a country's operating conditions and cost competitiveness.



COST

DESCRIPTION AND WEIGHTINGS

The Cost scenario places greater emphasis on cost reduction to give a higher score to countries where operating costs, including labour, are lower.

Conditions

Risk

Cost

20%

20%

60%



RANK 1 TO 5



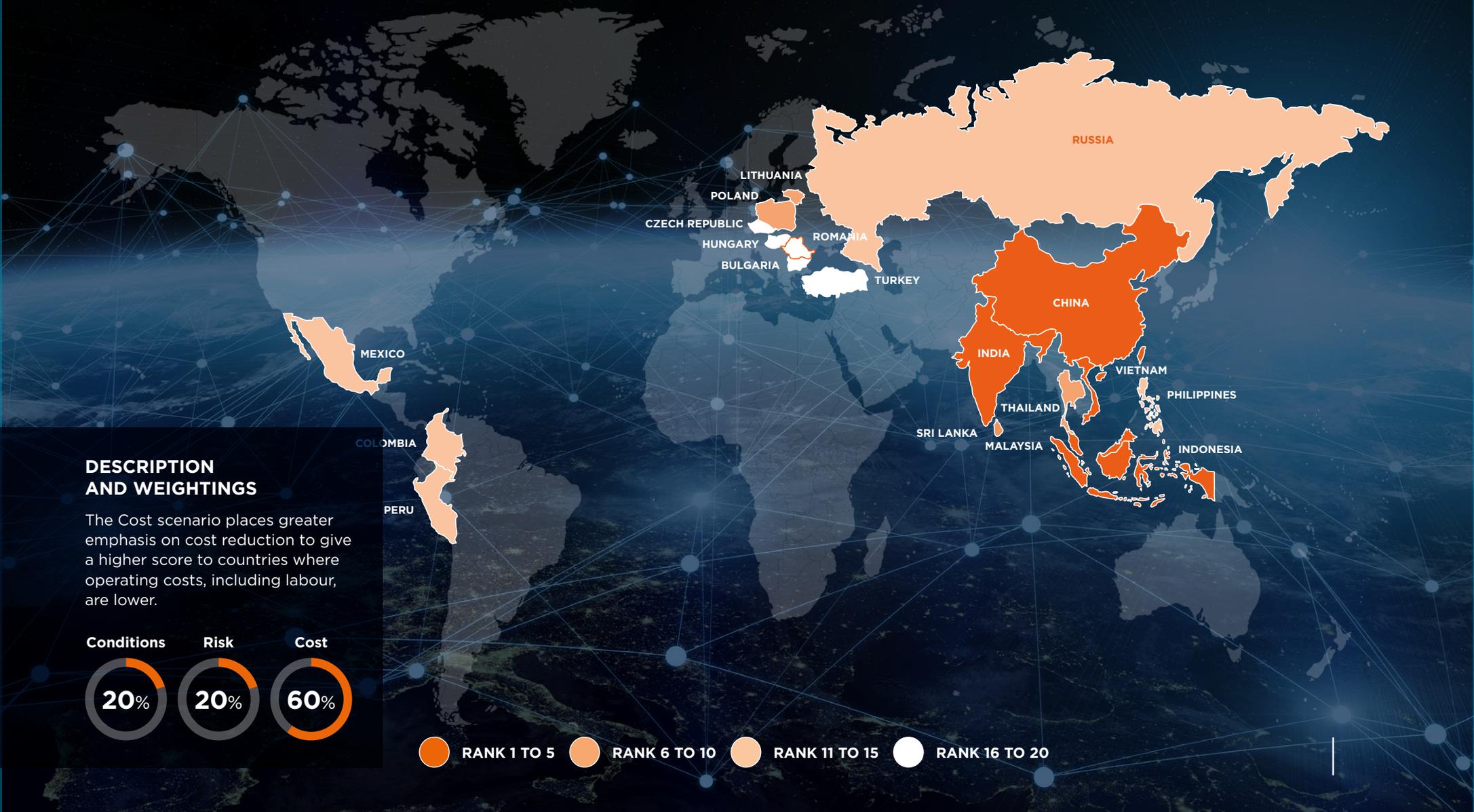
RANK 6 TO 10



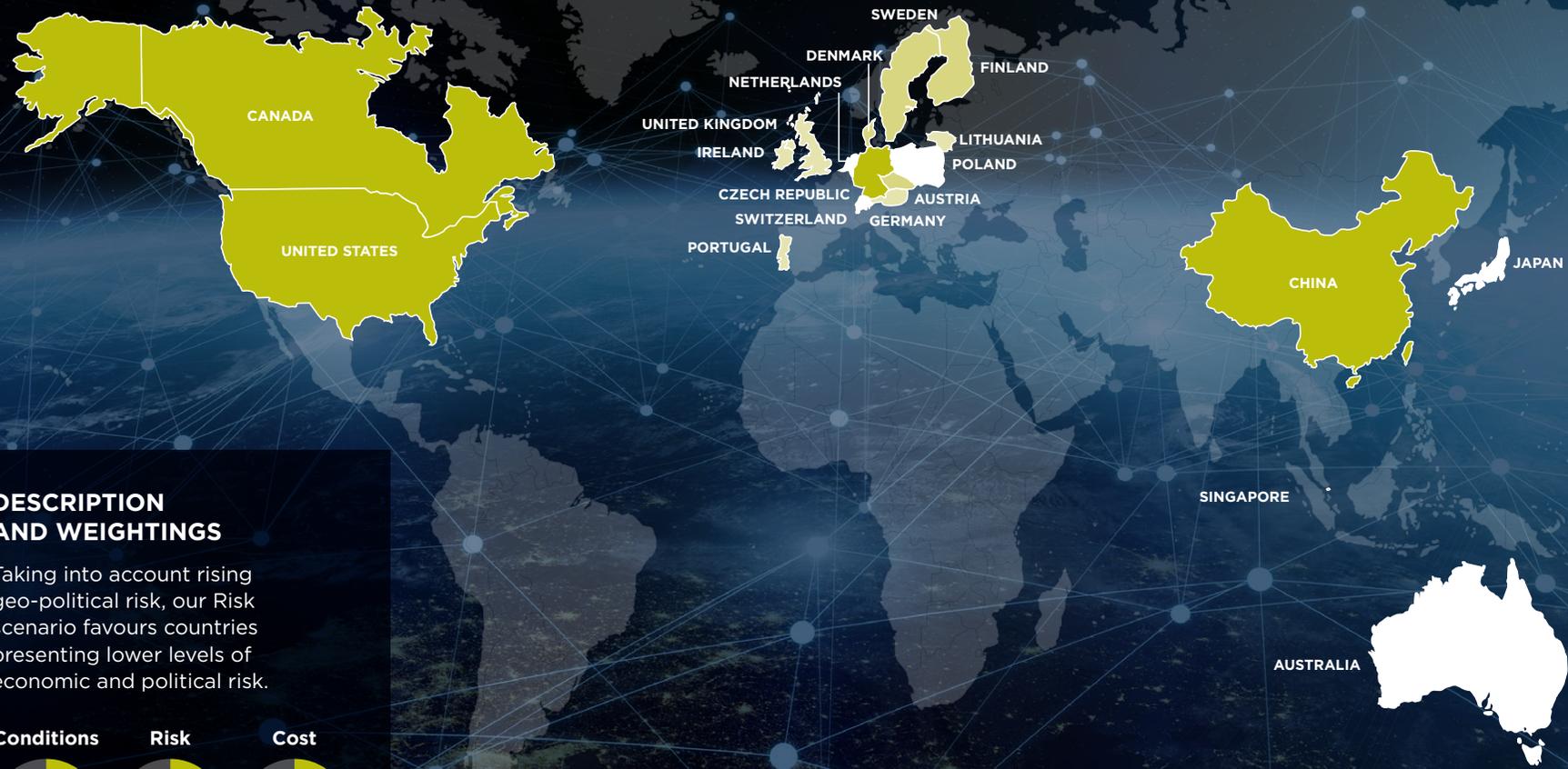
RANK 11 TO 15



RANK 16 TO 20

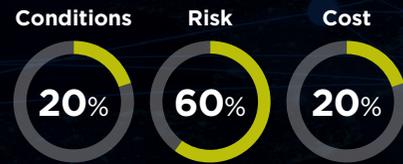


RISK



DESCRIPTION AND WEIGHTINGS

Taking into account rising geo-political risk, our Risk scenario favours countries presenting lower levels of economic and political risk.



MRI METHODOLOGY

The Manufacturing Risk Index (MRI) assesses the most suitable locations for global manufacturing among 48 countries in EMEA, the Americas and Asia-Pacific. Each country is scored against 20 tier-2/3 variables that make up the tier-1 variables (conditions, cost and risk), whose weightings vary in the three scenarios presented in this report. The data underpinning the MRI comes from a variety of reliable sources, including the World Bank, UNCTAD and Oxford Economics. A list of the tier-2 variables is available opposite.

The broad nature of the manufacturing sector means that the importance of these key parameters will inevitably vary on an individual basis. The results contained within our ranking do not provide a definitive answer for all manufacturing companies on where their facilities should be located. They are instead intended to act as a guide as to how locations can be ranked using a given set of parameters and weightings.



CONDITIONS

TALENT/LABOUR FORCE

LOGISTICS/ACCESS TO MARKETS

BUSINESS ENVIRONMENT

SUSTAINABILITY/CORPORATE RESPONSIBILITY



RISKS

NATURAL DISASTER RISK

ECONOMIC RISK

CORPORATE RISK

ENERGY RISK



COSTS

MANUFACTURING LABOUR COSTS PER HOUR

ELECTRICITY FOR INDUSTRIAL/HEAVY USE (PRICE PER HOUR)

CONSTRUCTION BUILDING COSTS

REGISTERING PROPERTY COST (% OF INCOME PER CAPITA)

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