



INFER 2022 Initial Report

Which countries will become more competitive in AI research, technology, and human capital in the coming decade?

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Which countries will become more competitive in AI research, technology, and human capital in the coming decade?

INFER data from 12 forecasting questions on AI competitiveness suggest the EU will increase the greatest from their current status quo over the next decade.

BASED ON

554
FORECASTS

339
FORECASTERS, 78% were INFER Pros

Recency

Good

79% forecasts made or updated in the last 35 days

Forecast as of 6/30/22

Future U.S. Competitiveness



Status quo assumption: Across datasets used for for forecasting, the U.S. ranked relatively high in research and human capital metrics. The U.S. ranked especially highly in technology metrics.

See Appendix C for detailed methodology

Future Chinese Competitiveness

by



Status quo assumption: Across datasets used for for forecasting, China ranked relatively high in research metrics and average in technology metrics. Human capital data was not available for China.

See Appendix C for detailed methodology

Future E.U. Competitiveness



Status quo assumption: Across datasets used for for forecasting, the E.U. ranked low to average in research, technology, and human capital metrics.

See Appendix C for detailed methodology

Overview

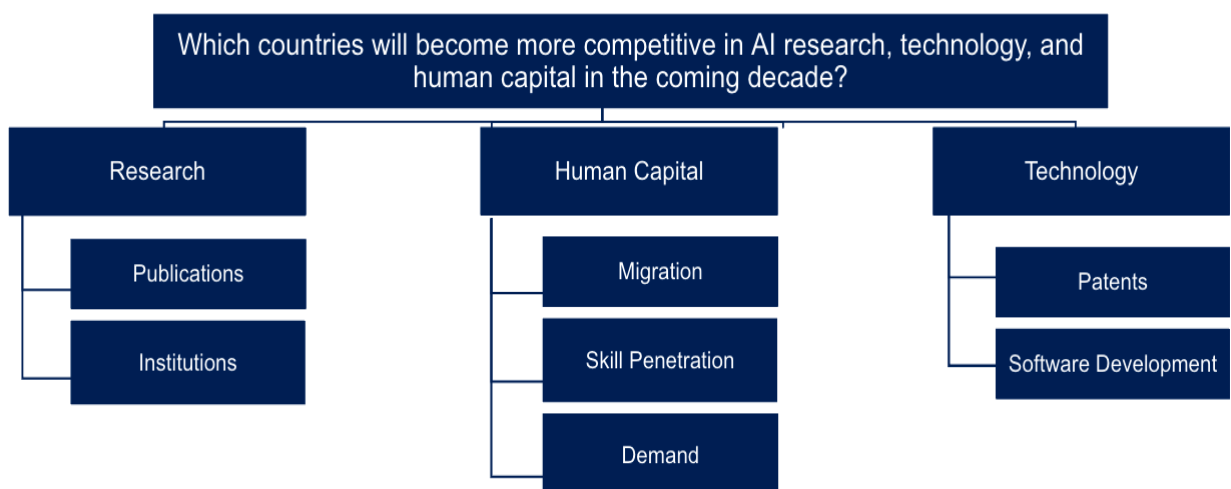
Over the coming decade, leadership in artificial intelligence (AI) will be critical for any country to compete effectively in the global economy. Emerging leaders will shape the norms governing how AI is used domestically and internationally. In what has been dubbed the “[global AI arms race](#),” governments are rapidly stepping up efforts to gain dominance and unlock AI’s disruptive potential.

Historically, the United States has led the world in AI-related research output, but others are working to increase competitiveness and claim a leadership role in this emerging sector. In 2017, China explicitly [stated](#) its goal to become the leader in AI by 2030, and is now a world leader in AI [publications](#) and patents. European countries [have been](#) investing in the creation of many AI-related jobs in the private sector. South Korea, Japan, and India are also increasing funding for the development and research of AI to ensure competitiveness in the AI era. The U.S. responded to the shifting landscape in 2020 by founding the [National AI Initiative](#), embracing a whole-of-government approach to ensure continued U.S. leadership in the field.

Tracking Progress With INFER

To better understand how the competitiveness of key countries is changing, INFER launched a strategic question focused on various key areas within AI development. Below, you can see how INFER [decomposed](#) this strategic question to develop forecast questions relevant to each area.

Using the [OECD’s \(Organization for Economic Cooperation and Development\) and metrics and methods](#), we identified three contributing factors in AI competitiveness: research, human capital, and technology. Research covers academic advancements and achievements; human capital will include issues concerning the people working in AI; and technology deals with innovation and development of AI technology. Asking forecast questions covering these three factors and their subfactors for the U.S., China, and the European Union enabled us to assess the strategic question: Which countries will become more competitive in AI research, technology, and human capital in the coming decade?



Questions will focus on comparing the strengths of the US, China, European Union, India, and the United Kingdom across these contributing factors and subfactors. Other countries that are competitive within a single contributing factor or subfactor may also be included.

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How many European Union countries will have an AI skill migration greater than 2 per 100,000 in 2022?

AI skills migration refers to the AI talent gained or lost due to migration trends. As demand for AI talent grows, competing effectively in AI requires countries to compete for limited supply. A skill migration rate of 2 per 100,000 represents a high net migration flow, and in 2021, [6 European Union countries had AI skill migration greater than 2](#): Austria, Estonia, Finland, Germany, Ireland, and Luxembourg.

Based on 65 forecasts by 31 forecasters:

Possible Answer	INFER % Chance on 5/30	INFER % Chance on 6/30
Less than 3	1%	1% (0%)
Between 3 and 5, inclusive	9%	7% (-2%)
Between 6 and 7, inclusive	47%	43% (-4%)
Between 8 and 10, inclusive	39%	45% (+6%)
More than 10	4%	4% (0%)

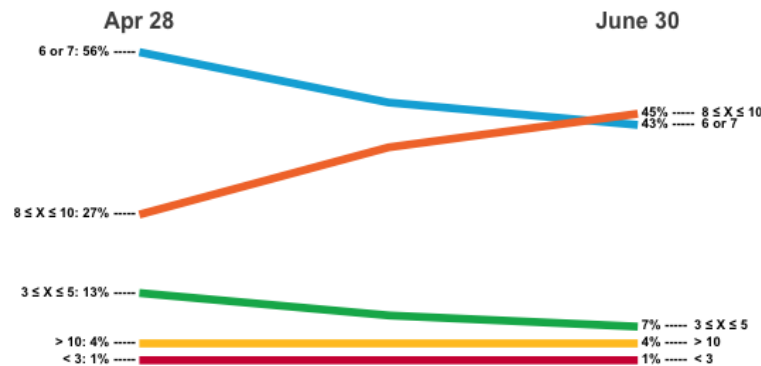
Summary of Forecaster Rationales [\(See Live Forecasts and Rationales\)](#)

Bold = Summary of forecast rationales made in the last 30 days

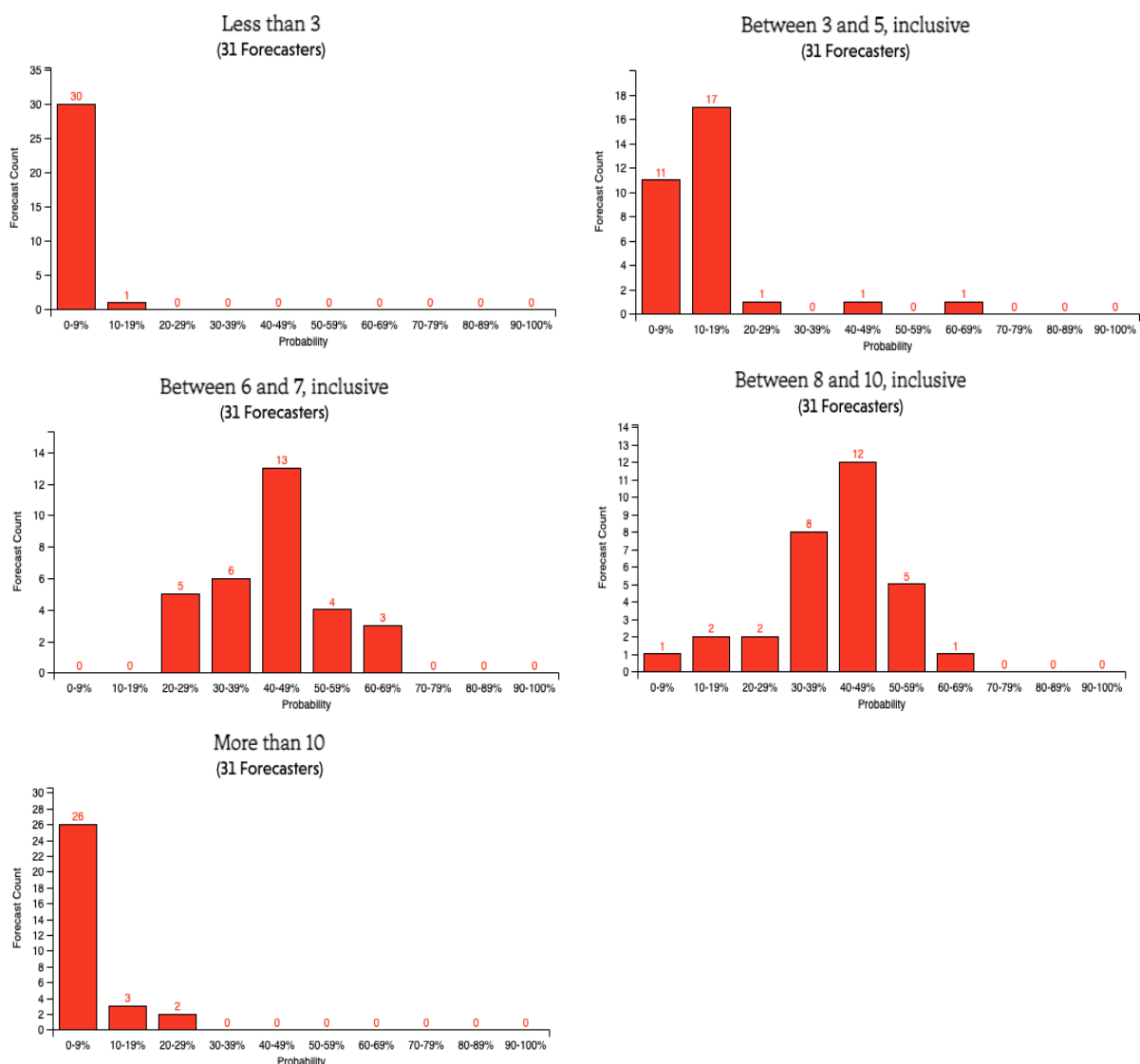
Will be 7 or less:	Will be 8 or more:
<ul style="list-style-type: none">▪ There were 6 countries >2 in 2021. Maybe a couple do better in 2022; maybe some do worse. So I focused on 6 as most likely, with some likelihood in the adjoining quantities. (@Sepeskoe, 5/31/22)▪ The COVID pandemic and its variants will decrease migration in general. (@MightyChimpy, 5/7/22)▪ Austria, Finland, and Ireland all are technically sitting right above 2.0 and could fall back below. (@MullenAustin, 4/28/22).	<ul style="list-style-type: none">▪ As COVID restrictions decrease it makes sense that this would stay the same or increase compared to last year. (@fionack, 6/28/22)▪ With 6 E.U. countries at a level of 2 or greater for AI migration, it seems only plausible that the number will grow in 2022. (@tjc142, 6/5/22)▪ AI skill migration in general throughout Europe has been increasing of the last three years. (@MiguelGM, 5/17/22)▪ By June 2021, 20 Member States and Norway had adopted national AI strategies, signaling a broader focus on attracting AI talent. (@Himanshu, 4/30/22)

How many European Union countries will have an AI skill migration greater than 2 per 100,000 in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



Which country will have published the second most top tiered journal articles on artificial intelligence in 2022?

While the U.S. has consistently held a substantial lead in published articles, the race for second has gotten closer in recent years, with China surpassing the second-place EU for the first time in 2018. This comes as part of a broader trend of a rapidly rising number of articles from China amidst falling publication rates for the EU from a peak in 2013.

Based on 96 forecasts by 47 forecasters:

Possible Answer	INFER % Chance on 5/30	INFER % Chance on 6/30
United States	2%	2% (0%)
EU	60%	54% (-6%)
China	31%	38% (+7%)
United Kingdom	7%	6% (-1%)
None of the above	0%	0% (0%)

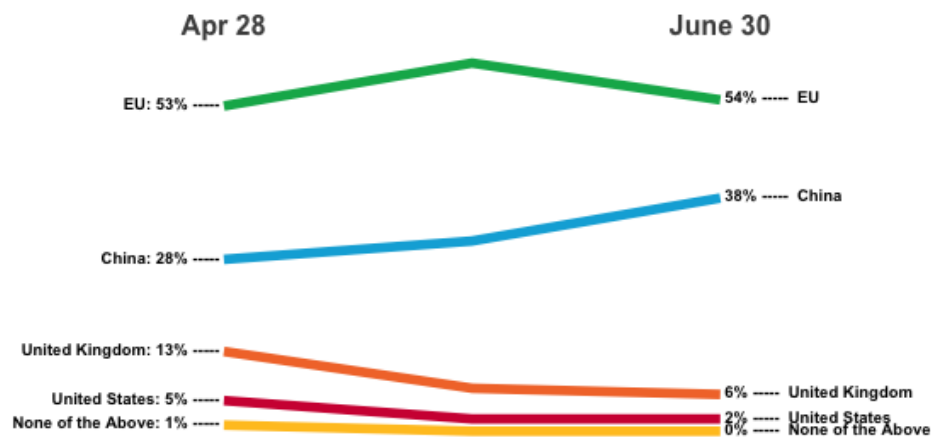
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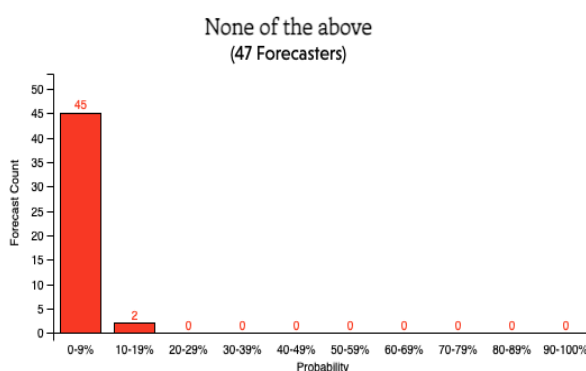
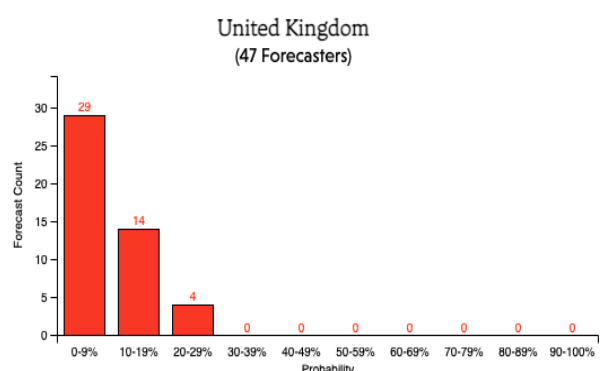
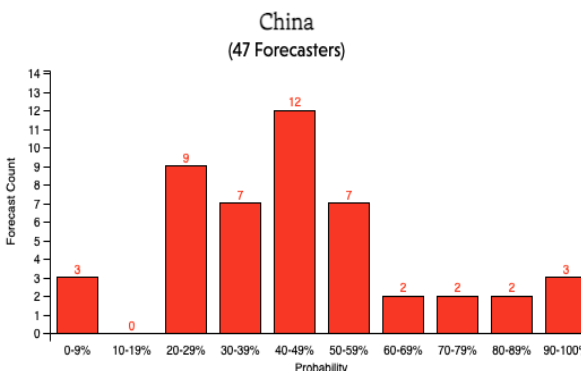
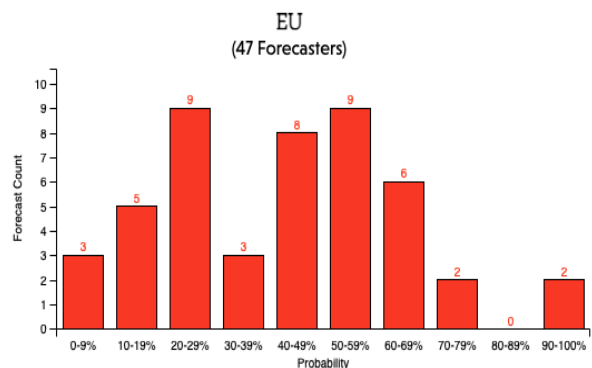
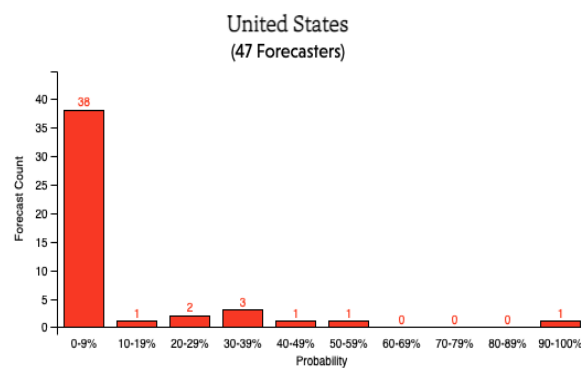
EU	China	U.K. / U.S / None of the Above
<ul style="list-style-type: none">▪ While China leads EU on overall AI publications, and growing rapidly, their share of top 10% publications has actually been going down for a few years now while the quality of EU research is increasing. (@TrishBytes, 5/10/22)▪ China would have to surpass its best yearly growth by about 400 publications to beat the EU. Or, the EU would have to simultaneously decrease its output by about 400, which seems unlikely given its recent history of growth / stagnation. (@emmakate, 4/30/22)▪ Since COVID, China decreased publications and has not regained momentum with the current lockdowns while in Europe life is returning to its pre-pandemic ways. (@rhellborn, 4/29/22)	<ul style="list-style-type: none">▪ China is second currently with the EU not too far behind, but based on the recent trend, it seems that China has had more steep increase, while the EU had a little decline and now a slower increase. (@israakhan, 7/1/22)▪ Since 1980, according to the data, China's publications surpassed EU's for the first time in 2018 and has kept itself in second place. Moreover, China has widened the gap between itself and EU since then. (@LPinheiro, 6/30/22)	<ul style="list-style-type: none">▪ China leads the journal article publication, but things could change and different indicators on the advance nature of the research, quality, peer review, and other factors would put the U.S. at second. (@Anagha19, 6/7/22)▪ The proportion of top 10% was surprisingly high in 2021 for the United Kingdom. If this trend continues, the U.K. could be in the top three. (@AnonymousTofu, 5/5/22)▪ “None of the above” would be Canada. The per capita publication rate shows a dramatic rate of increase, which may boost its current 4th place into 2nd. (@cmeinel, 4/28/30)

Which country will have published the second most top tiered journal articles on artificial intelligence in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



What percentage of contributions to Github's "very high impact" AI projects will be from China in 2022?

GitHub is the main provider of Internet hosting for software development, and the primary place for collaboration for many technology organizations and software developers.¹ A country's share of contributions to "very high-impact" projects on GitHub reflects both the quality of their contributions and the level of influence they have on AI software development. China's share rose to 25.5% in 2021, surpassing both the EU and the previous leader, the U.S.

Based on 60 forecasts by 32 forecasters:

Possible Answer	INFER % Chance on 5/30	INFER % Chance on 6/30
Less than 22%	51%	50% (-1%)
More than or equal to 22% but less than 27%	39%	39% (0%)
More than or equal to 27%	10%	11% (+1%)

Summary of Forecaster Rationales [\(See Live Forecasts and Rationales\)](#)

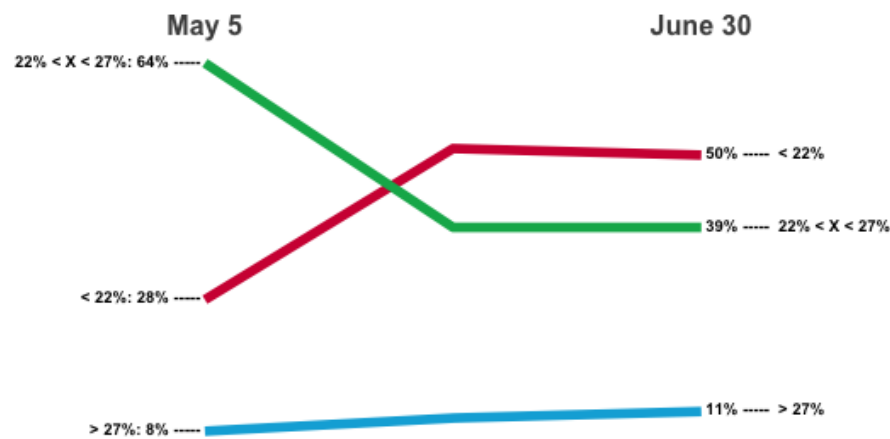
Bold = Forecast Rationales made in the last 30 days

Less than 22%:	More than or equal to 22% but less than 27%	More than or equal to 27%:
<ul style="list-style-type: none">▪ With harsh lockdowns and migration away from GitHub, China is not contributing as much as other countries with less-stringent policies. (@qassiov, 6/30/22)▪ China is making statements about sequestering source code for national security reasons. While some China developers might experiment with submitting code, a national security law might freeze out any initiative. (@TDHesslink, 6/28/22)	<ul style="list-style-type: none">▪ Supply chain disruptions due to zero COVID policies are likely to cause this to be lower than perhaps expected, but this does not automatically mean a large decrease will occur. (@fionack, 6/28/22)▪ China's 2021 contribution rate was 25.6%. (@shaun-ee, 6/29/22)	<ul style="list-style-type: none">▪ China's increases in the higher impact tiers implies they're doing something right about getting people on board their projects; and/or that those getting on board are (proportionally or not) more and more identifying as Chinese. (@bvtv, 6/11/22)▪ There has been a rise in contributions throughout the past several years. (@emmakate, 5/26/22)

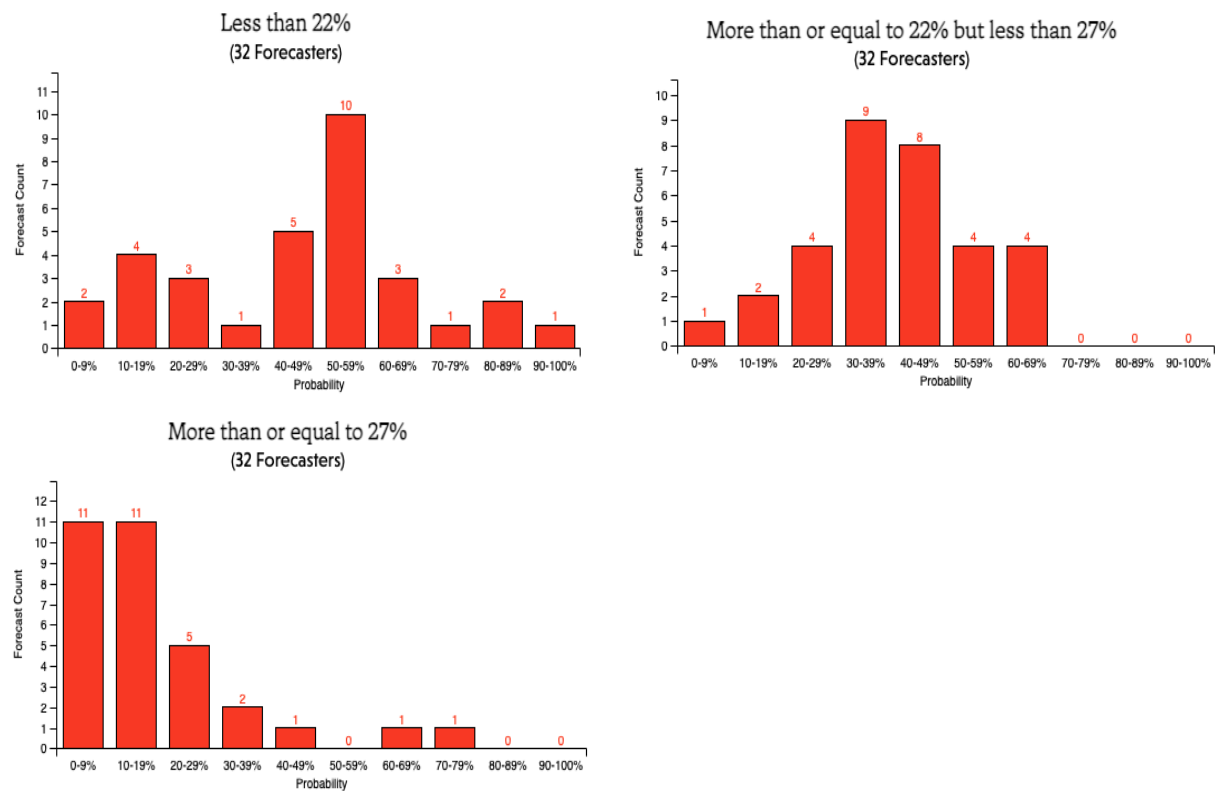
¹<https://oecd.ai/en/github>

What percentage of contributions to Github's "very high impact" AI projects will be from China in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



Which country or union will publish the second most AI related patents in 2022?

Patents are a precursor to the commercialization of new technologies and play a key role in national strategies promoting technological competitiveness.² In recent years, the United States has published approximately 2.5x as many AI-related patents as its closest competitors, the EU and Japan. However, the gap between second and fifth place has narrowed, with both Korea and China showing signs of catching up.

Based on 48 forecasts by 29 forecasters:

Possible Answer	INFER % Chance on 5/30	INFER % Chance on 6/30
United States	3%	2% (-1%)
EU	59%	64% (+5%)
Japan	25%	23% (-2%)
Korea	7%	6% (-1%)
China	5%	5% (0%)
None of the Above	1%	0% (-1%)

Summary of Forecaster Rationales [\(See Live Forecasts and Rationales\)](#)

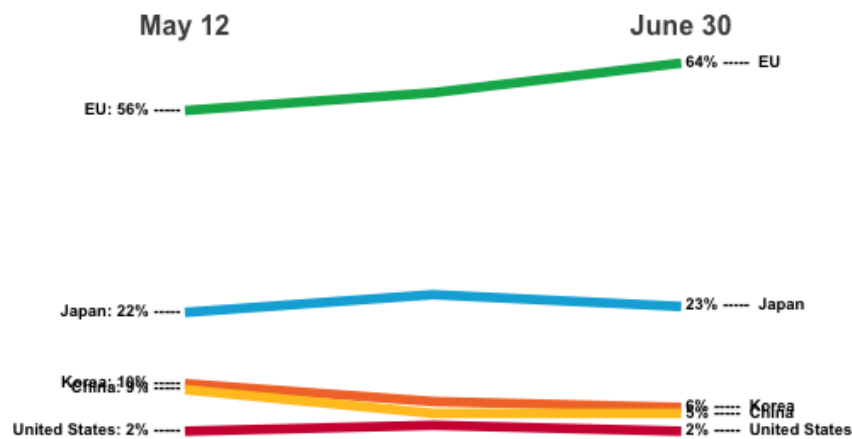
Bold = Forecast Rationales made in the last 30 days

EU:	Japan	Other:
<ul style="list-style-type: none">▪ In 4 of the past 5 years (2017 - 2021), the EU has registered a number of patents higher than Japan, the exception being 2018. More generally in the past three years from 2019-21, the EU has consistently had 10 - 15% more patents than Japan. (@shaun-ee, 6/29/22)▪ The EU has clearly demonstrated more 'patent publishing capacity' historically than the other countries that published similar numbers last year. (@qassiov, 6/30/22)▪ EU is in second in 9 out of the last 10 years, so it should be given a majority of the probability here. (@henry1924, 5/27/22)	<ul style="list-style-type: none">▪ If historical trends continue, Japan has been third and has been aiming to increase publication. (@bte, 5/22/22)▪ Japan led in 2018, so there can always be a surge in publications that would cause Japan to leapfrog the EU. (@antsantillan, 5/12/22)	<ul style="list-style-type: none">▪ Korea and China are within striking range of second place, a concentrated effort by their governments could cause them to get into second place. (@MullenAustin, 5/12/22)

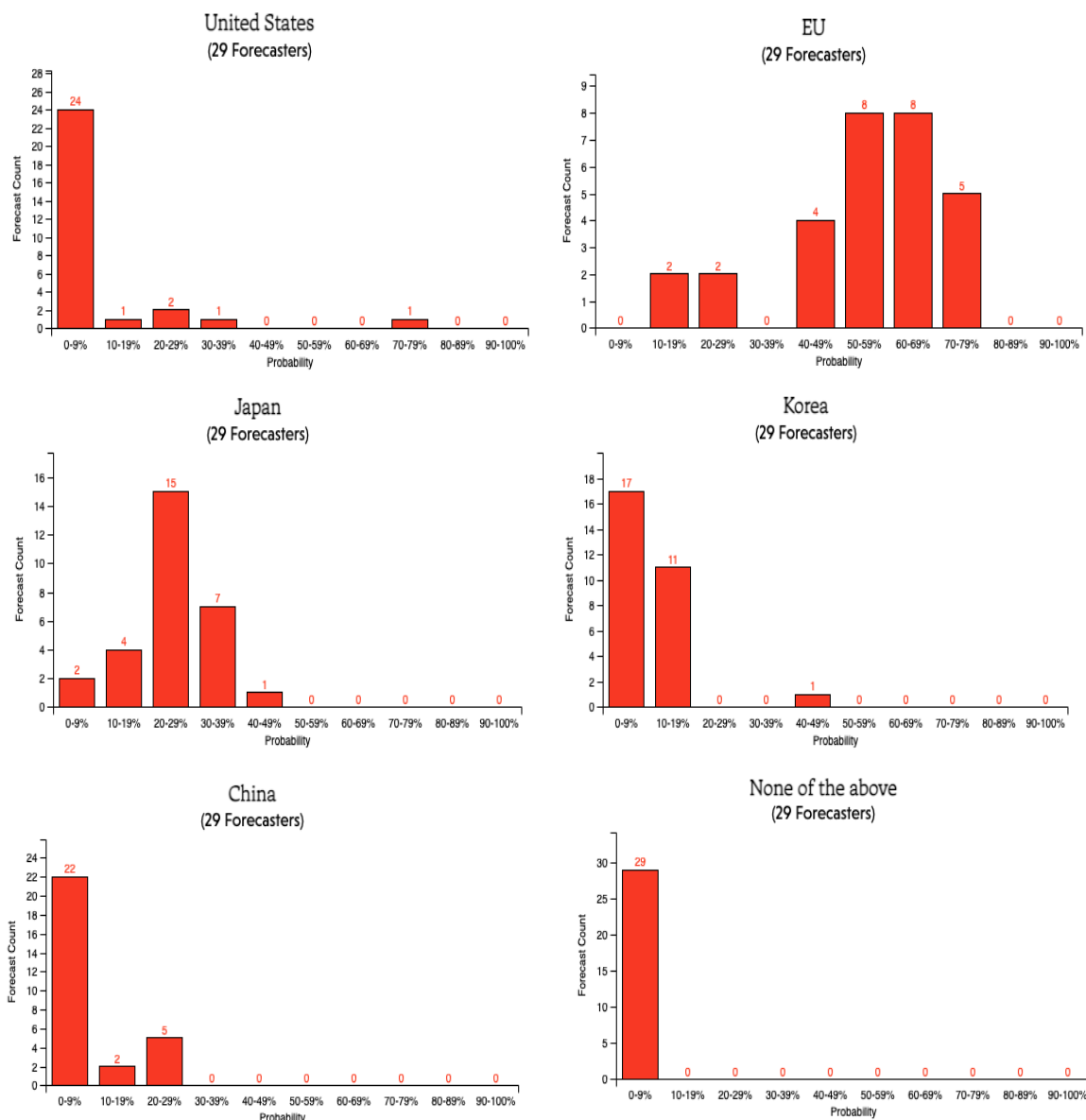
² “Chapter 12: Intellectual Property,” National Security Commission on Artificial Intelligence Final Report <https://reports.nscai.gov/final-report/chapter-12/>

Which country or union will publish the second most AI related patents in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



In 2022, will a Chinese institution have the most AI research publications ranked in the top 10%?

Enhancing national research and development capabilities is a key component of many national AI strategies,³ and the number of high quality publications is an important measure of an institution’s output. Historically, American universities have been the most prolific publishers of high quality research. However, in 2021, a Chinese organization, the Chinese Academy of Sciences, took the top spot for the first time.

Based on 47 forecasts by 30 forecasters:

Possible Answer	INFER % Chance on 5/30	INFER % Chance on 6/30
Yes	83%	91% (+8%)
No	17%	9% (-8%)

Summary of Forecaster Rationales [\(See Live Forecasts and Rationales\)](#)

Bold = Forecast Rationales made in the last 30 days

Yes:	No:
<ul style="list-style-type: none">▪ Given how much farther ahead the Chinese Academy of Sciences is, it's very likely that they will top this list again in 2022. (@thsavage, 6/30/22)▪ Chinese institutions are pushing hard for publication of AI research, and are able to pour in resources (both intellectual and monetary) towards this goal. (@emily-brown, 6/14/22)▪ The Chinese Academy of Sciences is growing much faster than other top institutions, and it's already within the top 10%. (@JeroenWillems, 5/24/22)	<ul style="list-style-type: none">▪ China sealing off campuses and sending college students home might decrease AI publications. Grad students and even undergrads tend to contribute significantly to research outputs, even when not explicitly credited. (@cmeinell, 5/26/22)▪ Zero COVID policy could diminish the research output more than other institutions in countries with more relaxed policies. (@Yifan, 5/25/22)

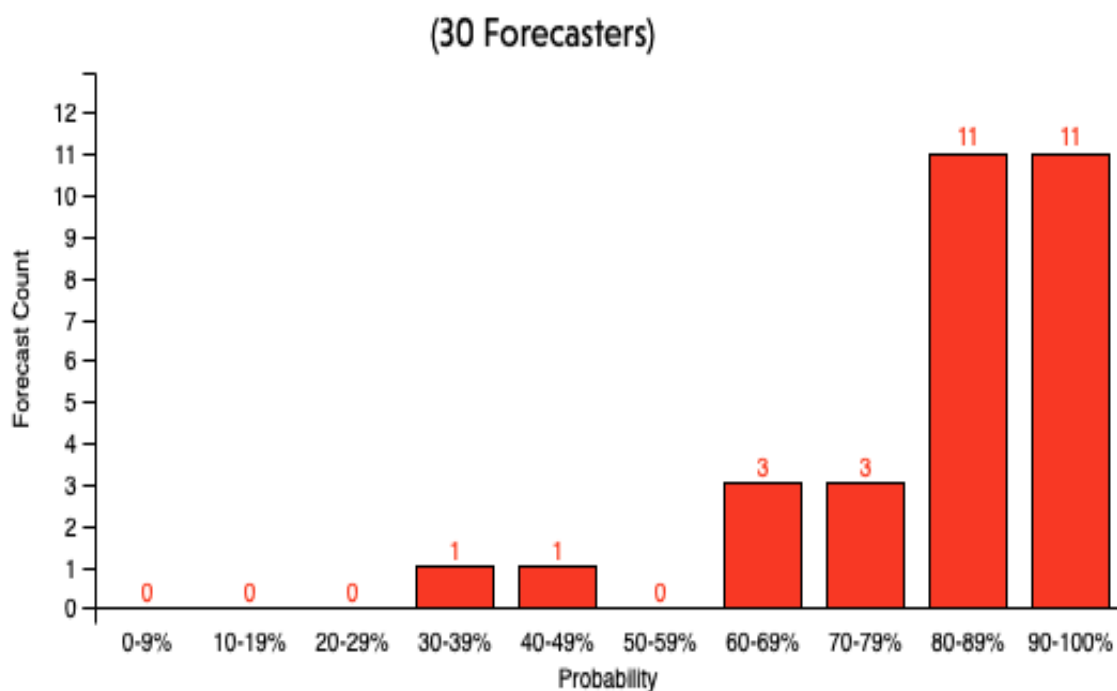
³ Galindo, L., K. Perset and F. Sheeka (2021), "An overview of national AI strategies and policies", Going Digital Toolkit Note, No. 14, [An overview of national AI strategies and policies](#).

In 2022, will a Chinese institution have the most AI research publications ranked in the top 10%?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



Will U.S. domestic labor demand for AI skills equal or exceed 3.2% for December 2022?

Domestic labor demand for artificial intelligence represents the extent to which AI skills are becoming an important part of a nation’s job market. In the U.S., demand has grown 0.3% to 0.4% per year since 2020. Demand of 3.2%, i.e., a 3.2% probability that an AI skill appears in an IT-related job posting, would represent a similar 0.35% increase year-over-year.

Based on 45 forecasts by 26 forecasters:

Possible Answer	INFER % Chance on 5/30	INFER % Chance on 6/30
Yes	59%	25% (-34%)
No	41%	75% (+34%)

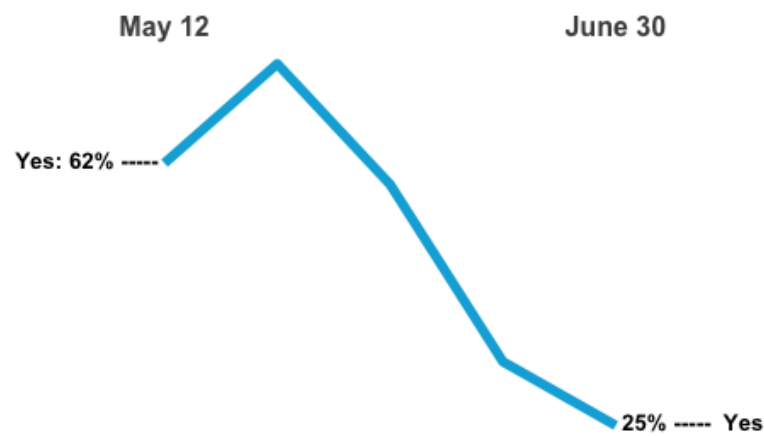
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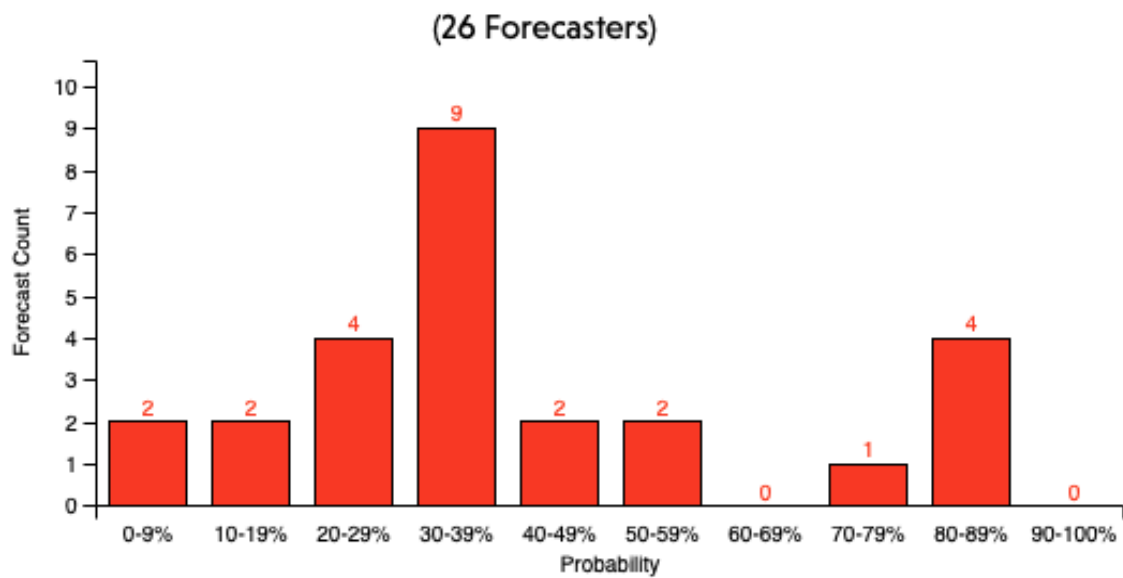
Yes:	No:
<ul style="list-style-type: none">▪ The US demand has increased by .6 % to .7 % over the past 15 months. If that trend continues, the US will pick up another .3% to .4% over the remaining 8 months of 2022. That gain appears to put the US at 3.2% to 3.3% by Dec 2022. (@sepeskoe, 5/31/22)▪ Private industries focusing on AI are rapidly expanding and AI applications in non-tech-centered domains are becoming more apparent and acceptable. (@alanfluo, 5/31/22) <p>The U.S. has already exceeded this point, and it's highly unlikely that it will go down below that. (@pmberg, 5/22/22)</p>	<ul style="list-style-type: none">▪ Taking the most recent rates as a base, it’s unlikely that it will rise to 3.2% for the US so quickly, especially since recession worries are only going to expect slower growth/contraction. (@gassiov, 6/30/22)▪ Inflation is affecting the entire labor market, even for tech companies. (@MiguelGM, 5/17/22)▪ Many tech companies are slowing or outright freezing hiring, while others are going a step further and laying employees off—and the pace seems to be accelerating. (@cmeinel, 5/12/22)

Will U.S. domestic labor demand for AI skills equal or exceed 3.2% for December 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



How will the U.S. rank in AI skills penetration in 2022?

AI skills penetration refers to the prevalence of LinkedIn members with AI skills across occupations and measures the intensity of AI skills in a given country. The U.S. ranked first overall in AI skills penetration in 2016, before being eclipsed first by India in 2017 and then Korea in 2022.

Based on 36 forecasts by 24 forecasters:

Possible Answer	INFER % Chance on 5/30	INFER % Chance on 6/30
1	3%	2% (-1%)
2	18%	21% (+3%)
3	53%	56% (+3%)
4 or lower	27%	21% (-6%)

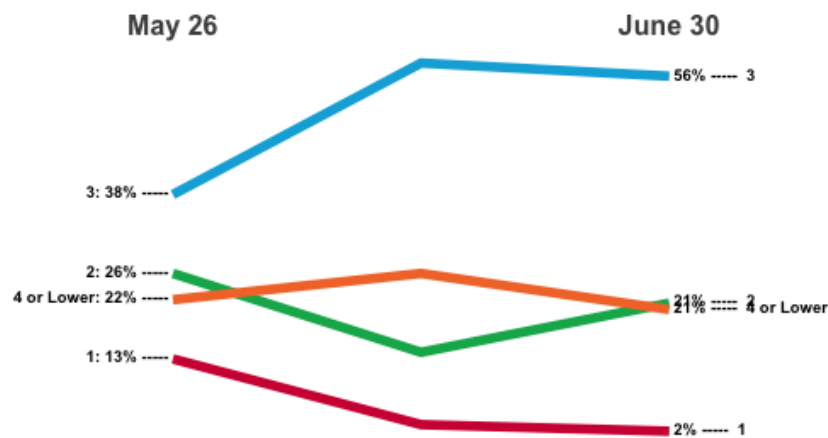
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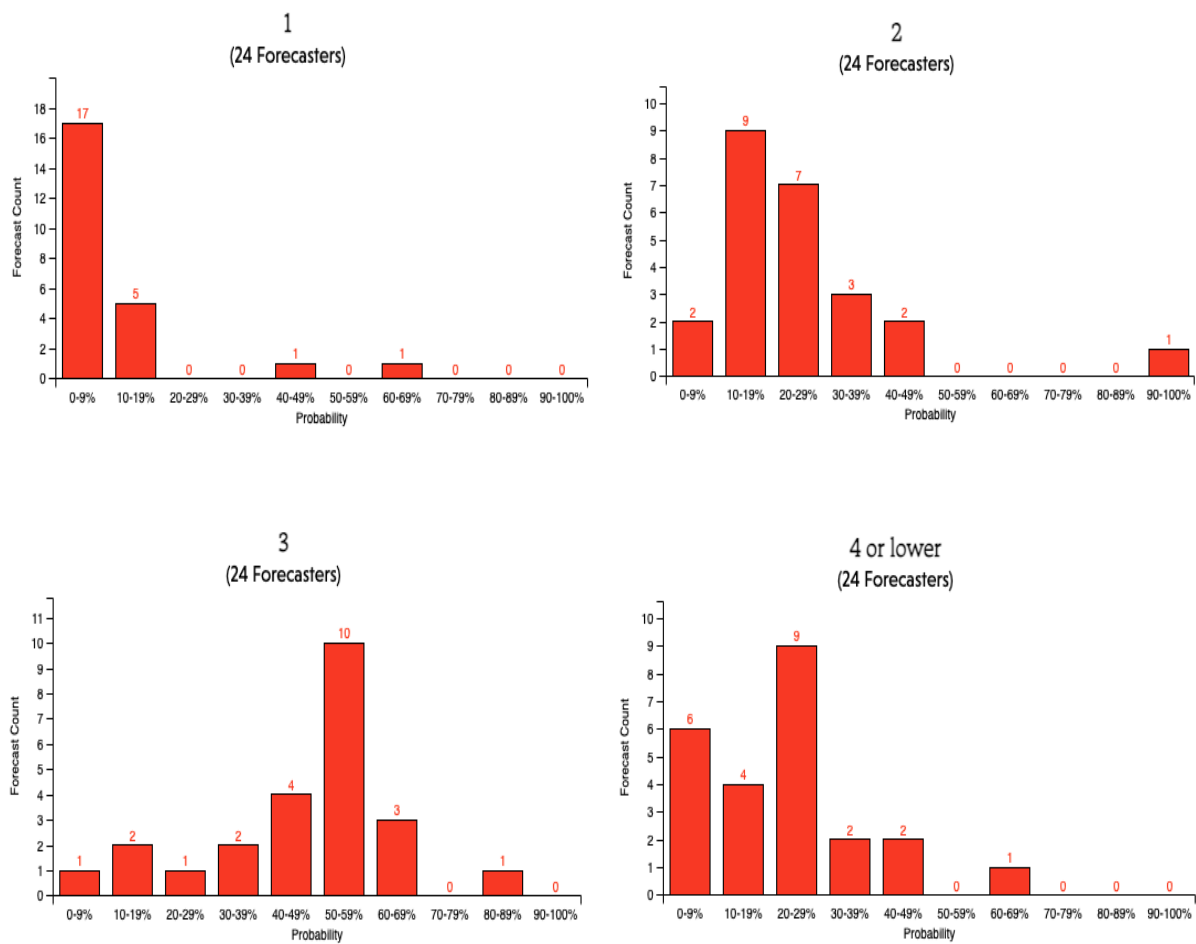
3:	4 or lower:	2:
<ul style="list-style-type: none">▪ The U.S. is currently at #3. (@emmakate, 6/30/22)▪ Historical trends dictate a decrease in skills penetration, but not a significant enough one to drop beyond third place. (@bekahcha, 5/31/22)	<ul style="list-style-type: none">▪ It's possible that Canada or Singapore will take over from the U.S., especially if there is a difference in government initiatives. (@sebawi, 6/10/22)▪ Canada has been holding pretty steady since 2018, but Singapore has been rising nearly continuously since then, so it's definitely not out of the question that it could pass the U.S. (@MullenAustin, 5/27/22)	<ul style="list-style-type: none">▪ The U.S. has been second in four of the last five years. (@Himanshu, 6/30/22)▪ Since the contribution of the USA in the AI field is immense, it's likely that new graduates will continue to put these skills in their LinkedIn to appear desirable. (@AditiS, 6/30/22)

How will the U.S. rank in AI skills penetration in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



Which country or union will have the second most citations of "high impact" AI scientific publications in 2022?

Research citations measure the impactfulness of a publication by indicating the number of times other researchers have used their findings in their own research. Since 2019, China has published the most "high impact" articles, and its lead over other countries has grown each year. The U.S. and EU have both held second place since then, and India has shown signs of catching up in recent years as well.

Based on 42 forecasts by 30 forecasters:

Possible Answer	INFER % Chance on 5/30	INFER % Chance on 6/30
China	7%	4% (-3%)
EU	52%	56% (+4%)
United States	31%	33% (+2%)
India	9%	6% (-3%)
Other	1%	1% (0%)

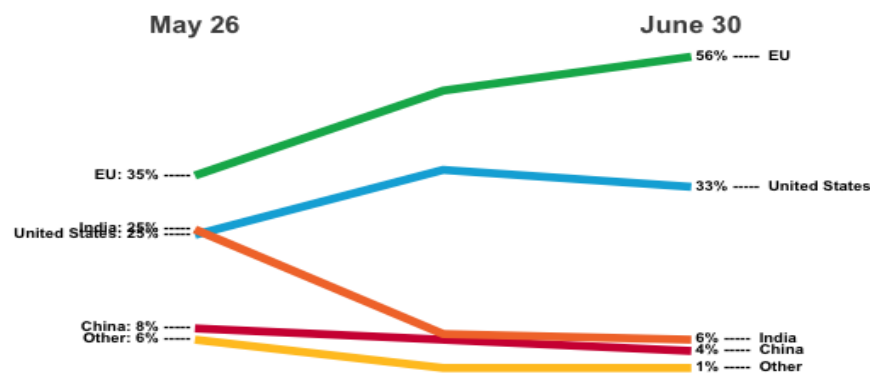
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Bold = Forecast Rationales made in the last 30 days

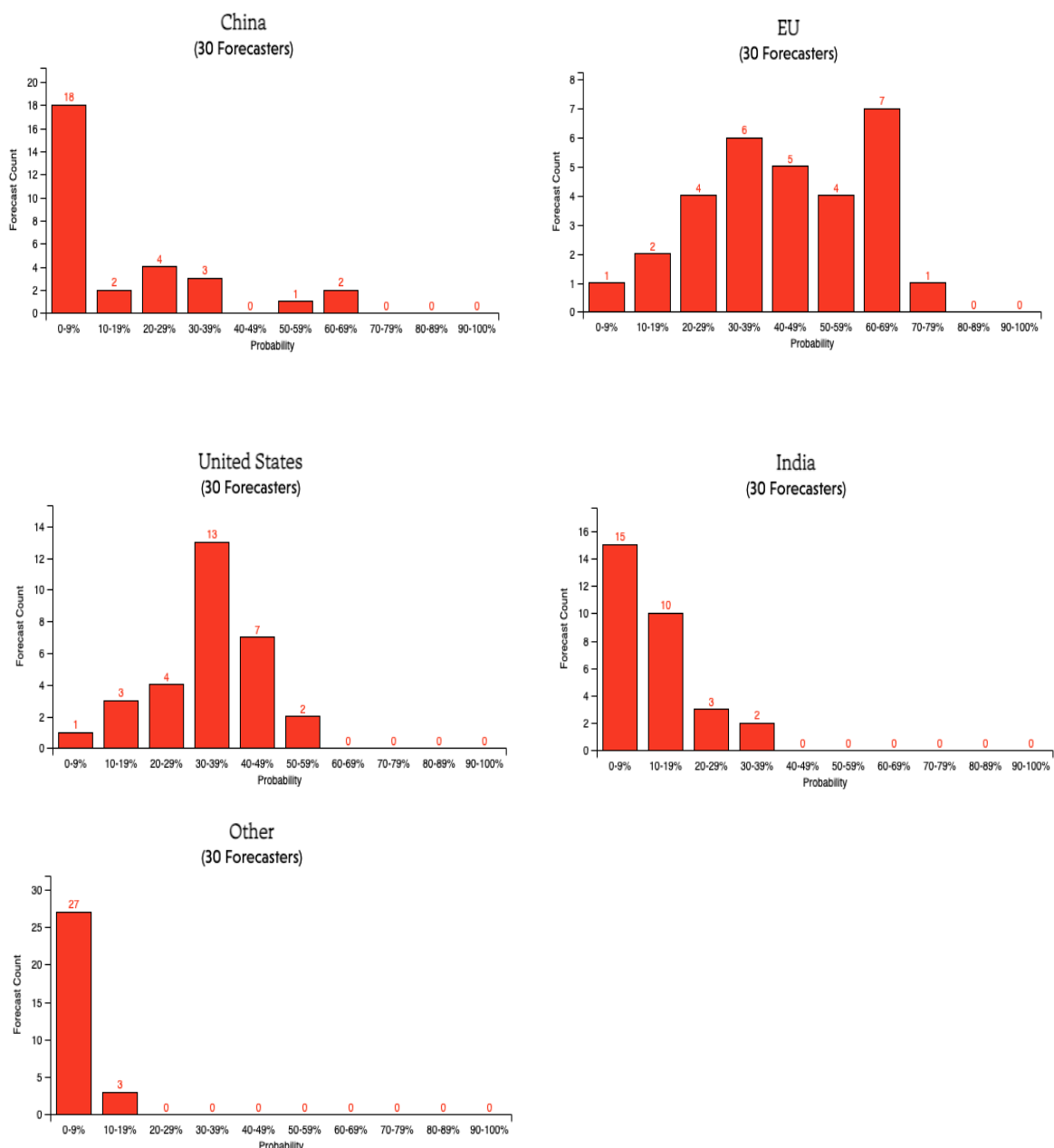
EU	U.S.	India / China / Other:
<ul style="list-style-type: none">▪ With the trends being clear and not particularly noisy, the EU is likely to remain in second place. (@qassiov, 6/27/22)▪ The U.S. is likely to continue its downward trend while the EU remains relatively stable, giving it the #2 spot. (@MullenAustin, 5/27/22)	<ul style="list-style-type: none">▪ The U.S. downward trend may be due to a reversion to the mean after several highly-cited papers in 2015/2016 as opposed to a historical trend. (@shaun-ee, 6/30/22)▪ The U.S. has never held the third spot or lower in the past four years, even during years when it dropped. (@Himanshu, 6/2/22)	<ul style="list-style-type: none">▪ India isn't too far behind and has an increasing trend (whereas the EU and US have a decreasing trend). (@israakhan, 5/31/22)▪ The number of papers coming out of china is rising steadily year by year as well as the citation impact of those papers, while Europe's has been dropping significantly. (@BenjaminSturgeon, 5/31/22)

Which country or union will have the second most citations of "high impact" AI scientific publications in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



What percentage of contributions to Github's "very high impact" AI projects will be from the EU in 2022?

GitHub is the main provider of Internet hosting for software development, and the primary place for collaboration for many technology organizations and software developers.⁴ A country's share of contributions to "very high-impact" projects on GitHub reflects both the quality of their contributions and the level of influence they have on AI software development. The EU's share of contributions has fallen in recent years, while countries like China and India have seen their percentages rise.

Based on 37 forecasts by 24 forecasters:

Possible Answer	INFER % Chance 5/30	INFER % Chance 6/30
Less than 10%	18%	11% (-7%)
More than or equal to 10% but less than 15%	44%	38% (-6%)
More than or equal to 15% but less than 20%	33%	43% (+10%)
More than or equal to 20%	5%	9% (+4%)

Summary of Forecaster Rationales [\(See Live Forecasts and Rationales\)](#)

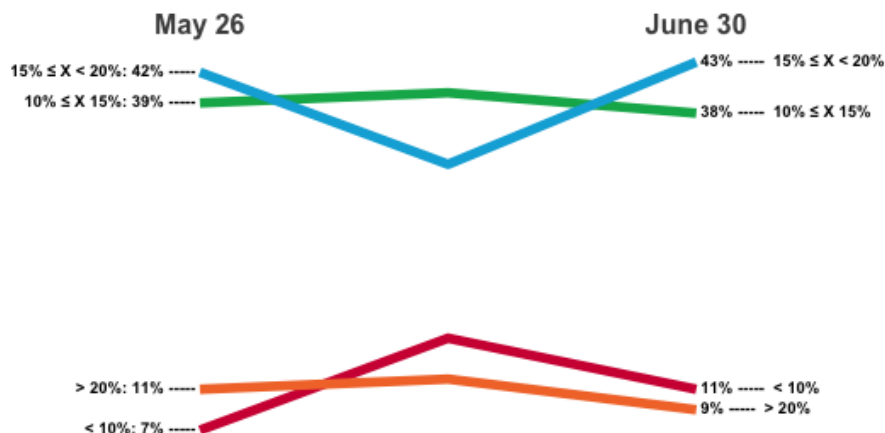
Bold = Forecast Rationales made in the last 30 days

Less than 15%:	15% or more:
<ul style="list-style-type: none">▪ The overall number of "very high impact" projects has been decreasing continuously since 2017. (@shaun-ee, 6/29/22)▪ The drop will continue as commits from Chinese and Indian researchers continue growing at a rapid rate. (@qassiov, 6/27/22)▪ The EU has been sitting fairly consistently at 15% up until 2021, where it dropped down to 11.5%. (@MullenAustin, 5/27/22)	<ul style="list-style-type: none">▪ Historical data has been between 15-20% of contributions have come from European contributors. (@mudiku, 6/13/22)▪ The E.U. does a lot in scientific research, disproportionate to its population, making it likely to translate over into AI contributions. (@gmp71, 5/31/22)

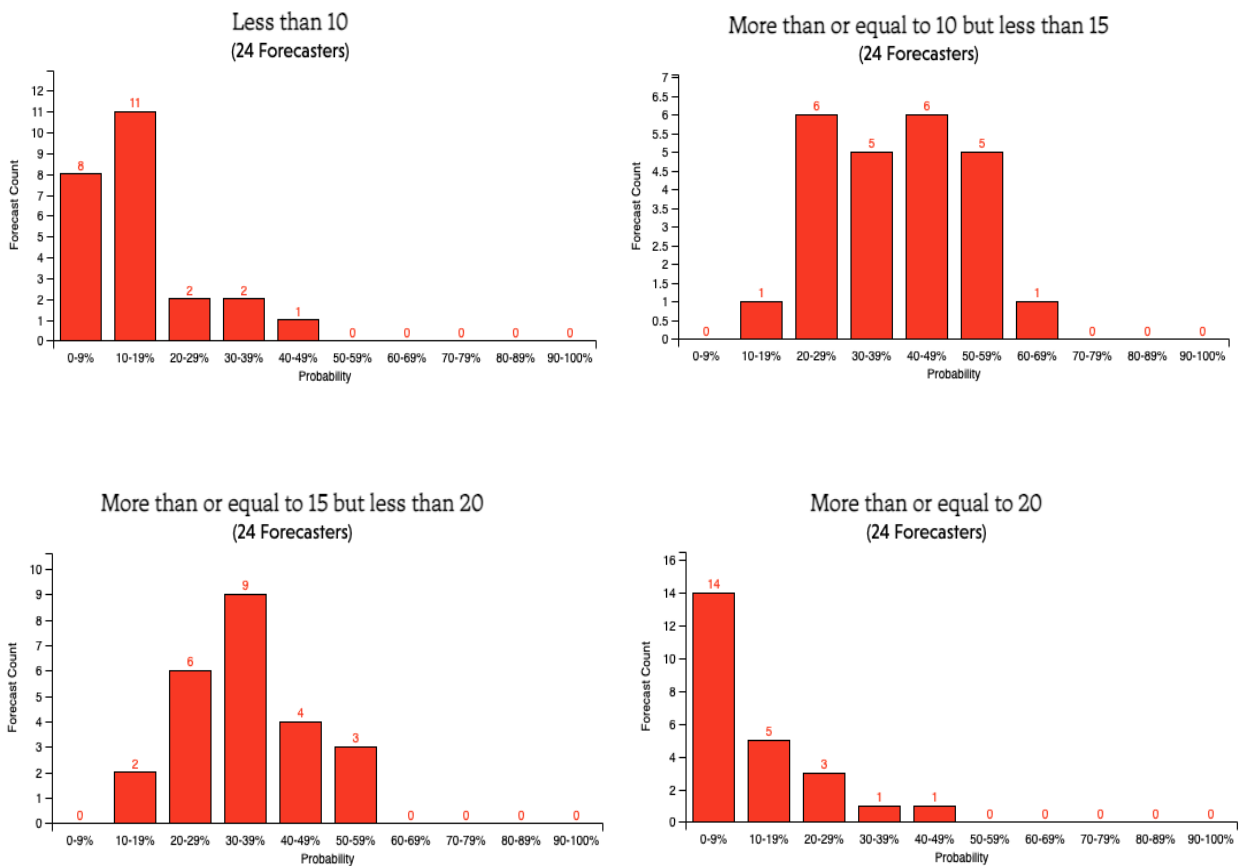
⁴<https://oecd.ai/en/github>

What percentage of contributions to Github's "very high impact" AI projects will be from the EU in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



How many AI scientific publications will be published by EU institutions in 2022?

*This question opened 9 June 2022.

Enhancing national research and development capabilities is a key component of many national AI strategies,⁵ and the number of scientific publications produced reflects a country’s overall research output. The number of AI scientific publications published by EU institutions has risen consistently from about 1,500 in 2016 to just over 3,000 in 2021.

Based on 25 forecasts by 20 forecasters:

Possible Answer	INFER % Chance 6/30
Less than 2,500	2%
More than or equal to 2,500 but less than 3,000	13%
More than or equal to 3,000	85%

Summary of Forecaster Rationales [\(See Live Forecasts and Rationales\)](#)

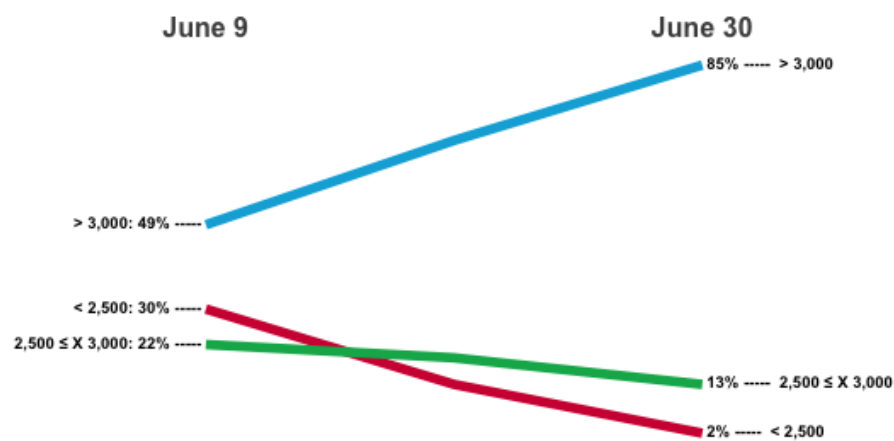
Bold = Forecast Rationales made in the last 30 days

Less than 3,000:	More than or equal to 3,000:
<ul style="list-style-type: none">▪ There has yet to be a big hit due to COVID, which could have taken a year or two to materialize. (@btv, 6/11/22)▪ An average of the past seven years, accounting for reversion to the mean, signals that a jump into the 3,000 range is unlikely. (@2e10e122, 6/10/22)	<ul style="list-style-type: none">▪ The trend since 2015 has been a consistent linear increase. (@shaun-ee, 6/30/22)▪ Decreases are rare (2 times in 12 years), so there is no prevailing reason why there would be one this year. (@qassiovi, 6/27/22)▪ There are already over 2,000 published papers this year, halfway through the year. (@mudiku, 6/13/22)

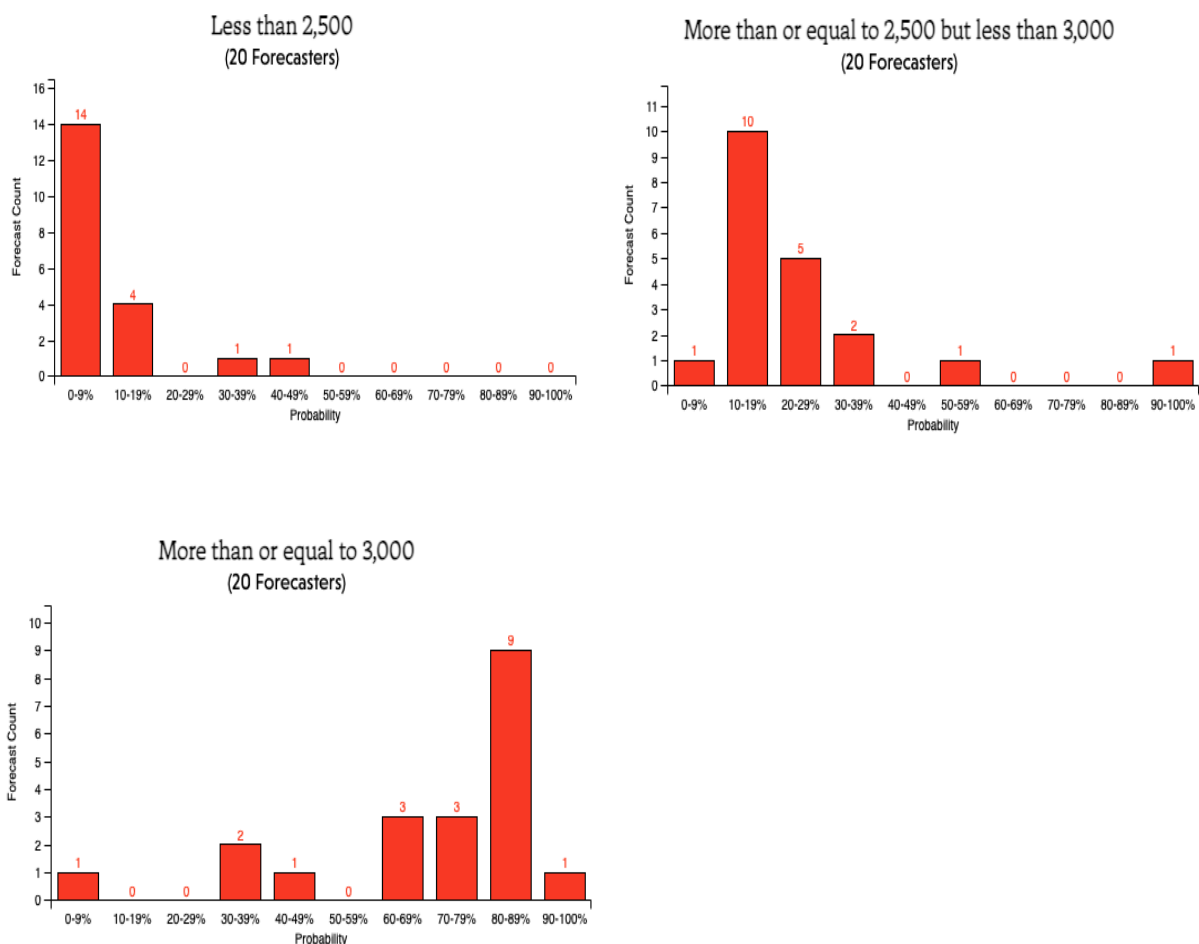
⁵ Galindo, L., K. Perset and F. Sheeka (2021), "An overview of national AI strategies and policies", Going Digital Toolkit Note, No. 14, [An overview of national AI strategies and policies](#).

How many AI scientific publications will be published by EU institutions in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



How many AI related patents will be published in the U.S. in 2022?

*This question opened 9 June 2022.

Patents are a precursor to the commercialization of new technologies and play a key role in national strategies promoting technological competitiveness.⁶ The number of AI patent publications in the U.S. has varied significantly in recent years. The number peaked at approximately 18,400 in 2013 before dropping below 11,000 in 2017, and then rising again to 17,500 in 2021.

Based on 25 forecasts by 22 forecasters:

Possible Answer	INFER % Chance 6/30
Less than 12,000	14%
More than or equal to 12,000 but less than 15,000	34%
More than or equal to 15,000 but less than 18,000	43%
More than or equal to 18,000	11%

Summary of Forecaster Rationales ([See Live Forecasts and Rationales](#))

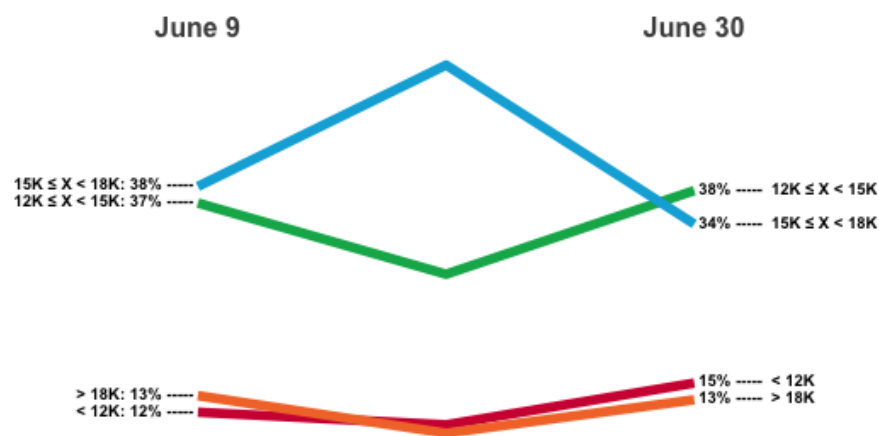
Bold = Forecast Rationales made in the last 30 days

Less than 15,000:	15,000 or more:
<ul style="list-style-type: none">▪ Patent filings may decrease due to economic downturn as R&D becomes expensive and resources are saved to other alternatives than patents. (@Paul Rowan, 6/30/22)▪ Only around 10,000 patents were filed in 2021. (@ansantillan, 6/11/22)	<ul style="list-style-type: none">▪ Post pandemic recovery will continue, thus increasing funding to develop AI-related patents. (@Mauricio B, 6/29/22)▪ The average for the past ten years is well above 15,000. While there were not as many in 2021, a reversion to the mean is expected. (@mayank k, 6/19/22)▪ AI growth is exponential -- based on previous years, tech stressors, and work-from-home models, AI tech patenting will continue to explode. (@CVincent, 6/12/22)

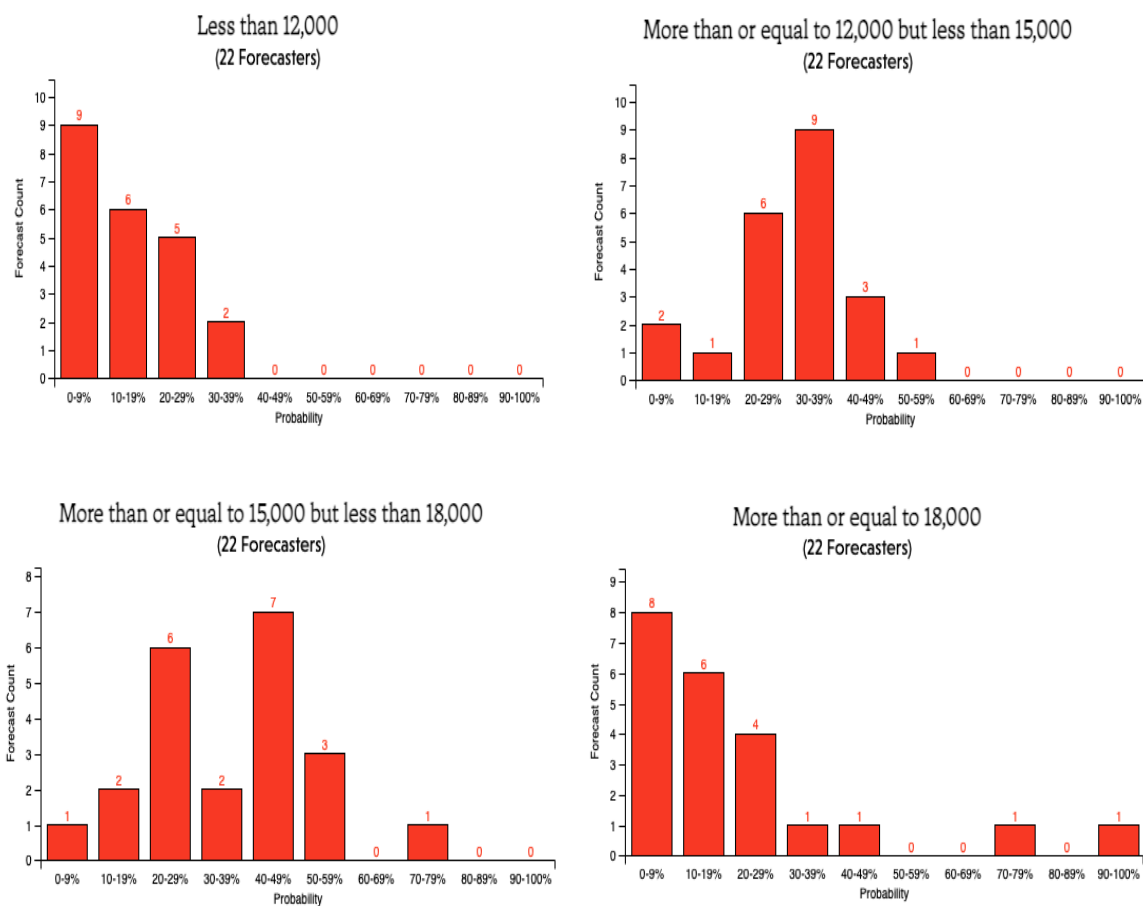
⁶ “Chapter 12: Intellectual Property,” National Security Commission on Artificial Intelligence Final Report <https://reports.nscai.gov/final-report/chapter-12/>

How many AI related patents will be published in the U.S. in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



How many AI related patents will be published in China in 2022?

*This question opened 9 June 2022

Patents are a precursor to the commercialization of new technologies and play a key role in national strategies promoting technological competitiveness.⁷ The number of AI related patents published in China had been growing rapidly, peaking at almost 2,400 in 2019 before dropping slightly in 2020 and dropping again in 2021 to approximately 1,000.

Based on 28 forecasts by 23 forecasters:

Possible Answer	INFER % Chance on 6/30
Less than 1,400	15%
More than or equal to 1,400 but less than 1,900	38%
More than or equal to 1,900 but less than 2,400	34%
More than or equal to 2,400	13%

Summary of Forecaster Rationales [\(See Live Forecasts and Rationales\)](#)

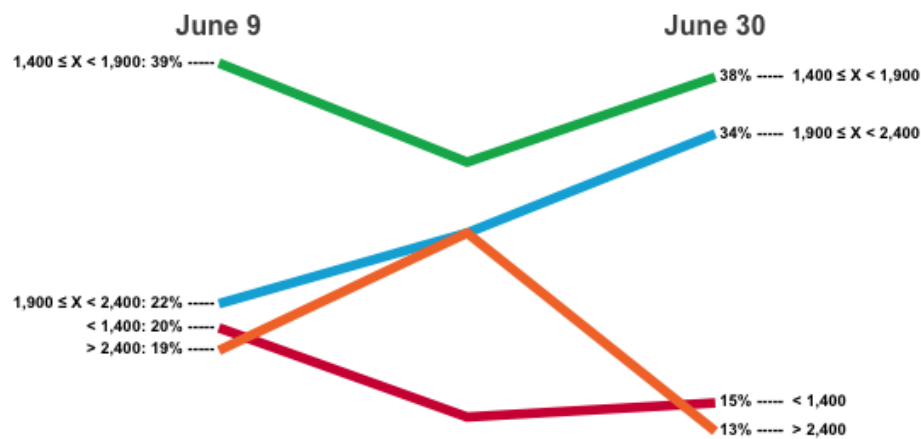
Bold = Forecast Rationales made in the last 30 days

Less than 1,900:	1,900 or more:
<ul style="list-style-type: none">▪ The cancel on IP subsidies and broader economic troubles may have lingering effects on the medium-term trend, with most of the effects fell early on (affecting last year already). (@Paul Rowan, 6/30/22)▪ There has been a slight decrease over the past two years. (@gassiov, 6/16/22)▪ China’s zero COVID policy will continue to have an impact on patent publication and innovation. (@cassandra, 6/11/22)	<ul style="list-style-type: none">▪ There seems to be a pretty straightforward linearly increasing trend for China. (@shaun-ee, 6/30/22)▪ The peak was about 2,400 before COVID – as lockdown still exists around the country it won't be able to fully recover to the pre-pandemic status but it should increase a fair amount. (@emmakate, 6/25/22)

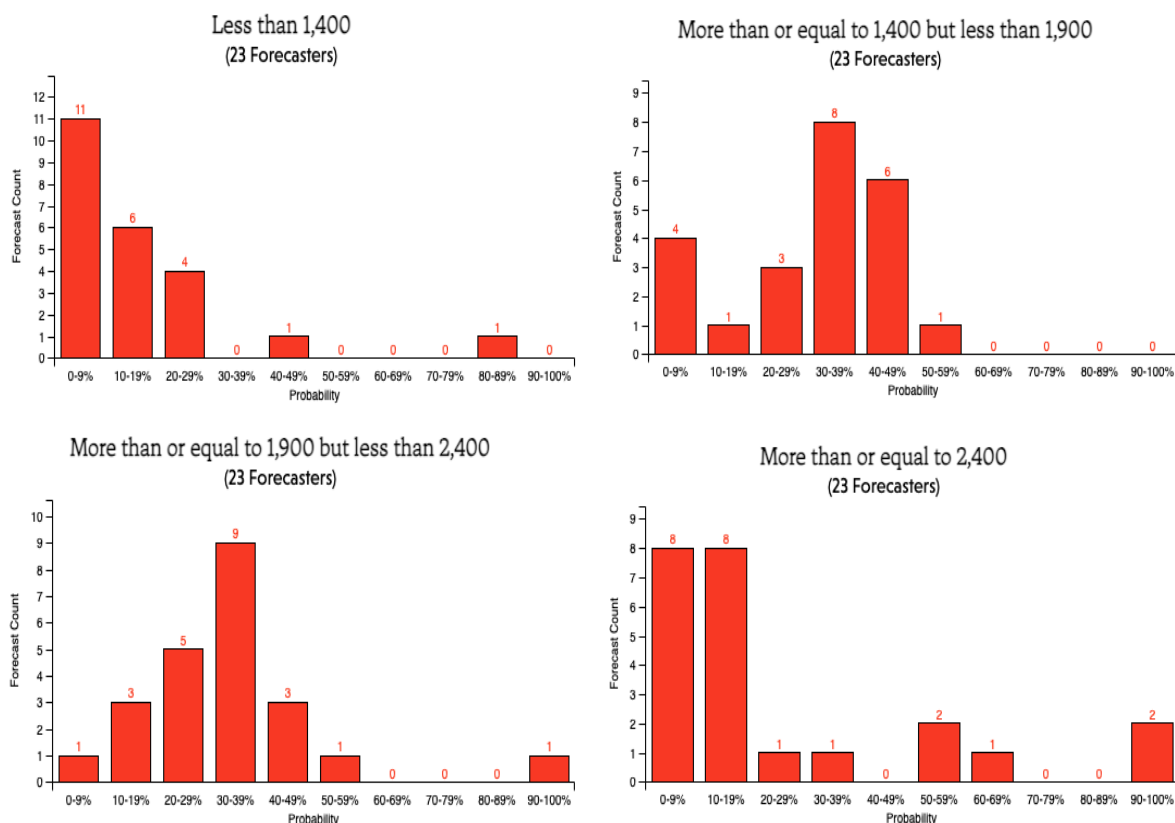
⁷ “Chapter 12: Intellectual Property,” National Security Commission on Artificial Intelligence Final Report <https://reports.nscai.gov/final-report/chapter-12/>

How many AI related patents will be published in China in 2022?

Consensus Trend (See the latest consensus trend [here](#).)



Forecast Distributions (See the most up-to-date distributions [here](#).)



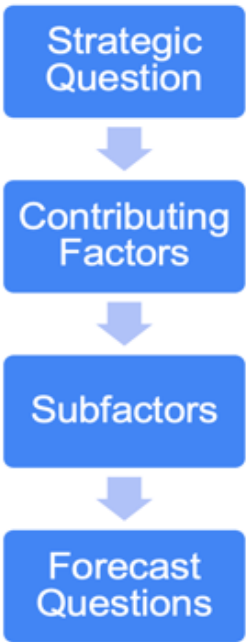
Appendix A - Methodology for Identifying Forecast Questions

INFER operates as a continuous, 4-step life-cycle between U.S. Government policymakers and a global community of forecasters who bring a diverse, informed perspective to their assessment of the future.

1. As initial input, policymakers work with INFER to identify *priority areas* (e.g. “AI competitiveness”) and *strategic questions* within those priority areas (e.g. “Will the U.S. regain its lead in microelectronics?”) where guidance, regulation, or clarification is needed to inform policy and strategy.
2. INFER draws on open source resources and subject matter experts to define what *contributing factors* will need to be understood to best inform the answer to the strategic question (e.g. “What will the future of domestic microelectronics manufacturing capabilities be?”). We call the process of identifying these pivotal factors “strategic question decomposition.”
3. Using factors identified in the decomposition, we define signals that we can use to assess the outcome of that factor. From those signals, we author *forecast questions* that appear on our public crowdsourced forecasting platform at inferpublic.com (e.g. “Will the U.S. Congress pass tax credits to incentivize semiconductor manufacturing and design in 2022?”).
4. Based on the forecasts the crowd generates, INFER creates curated reports and automated dashboards to share with policymakers. Unlike a one-time survey, individuals are encouraged to update their forecasts over time so INFER can always create near real-time assessments of what will happen in the future.

Here’s a model of that strategic question decomposition process and terms we use to describe it:

- **Strategic questions** represent the broad categories we want to learn more about. Breaking down a strategic question is the main focus of a decomposition.
- **Contributing factors** are the primary drivers of the strategic question. They directly influence the outcome in one direction or another.
- **Sub-factors** are the individual elements that make up and influence a contributing factor. Depending on the size and scope of the strategic question, it may be possible to identify signals directly from the contributing factors without the need for sub-factors.
- **Signals** are specific metrics or events that tell us how a factor or sub-factor is trending, and that ultimately used to create **forecast questions** we publish on INFER.



Once forecasts have been made, the decomposition model is used to synthesize and analyze data from individual forecasts and glean information about how a strategic question might trend. We call this **recomposition**—the process and product of combining forecasts together to provide insight into the strategic question. This final recomposition can take many forms, e.g., a dashboard, a summary report, or an index.

Decomposing our strategic question

Forecast questions are selected to provide coverage over the contributing factors and subfactors listed on page 3 , with an emphasis on questions that allow us to assess multiple factors or subfactors at once. The table below lists the forecast questions INFER has launched to assess our broader strategic question about which countries will lead in AI development.

Contributing Factor	Subfactor	Forecast Question
Research	Publications	<p>Which country will have published the second most top tiered journal articles on artificial intelligence in 2022?</p> <p>Which country or union will have the second most citations of "high impact" AI scientific publications in 2022?</p>
	Institutions	<p>How many AI scientific publications will be published by EU institutions in 2022?</p> <p>In 2022, will a Chinese institution have the most AI research publications ranked in the top 10%?</p>
Human Capital	Migration	How many European Union countries will have an AI skill migration greater than 2 per 100,000 in 2022?
	Skill Penetration	How will the U.S. rank in AI skills penetration in 2022?
	Demand	Will U.S. domestic labor demand for artificial intelligence skills equal or exceed 3.2% for December 2022?
Technology	Patents	<p>Which country or union will publish the second most AI related patents in 2022?</p> <p>How many AI related patents will be published in the U.S. in 2022?</p> <p>How many AI related patents will be published in China in 2022?</p>
	Software Development	<p>What percentage of contributions to Github's "very high impact" AI projects will be from China in 2022?</p> <p>What percentage of contributions to Github's "very high impact" AI projects will be from the EU in 2022?</p>

Appendix B - Current Forecaster Pool Profile

Attributes of the forecasters who have responded to the forecast questions included in this report.

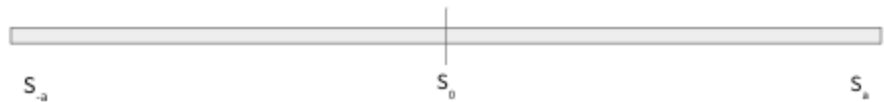
Gender	
Male	65%
Female	31%
Nonbinary, or prefer not to say	4%
Age	
18-24	24%
25-36	45%
37-60	27%
60 and older	3%
Country	
United States	54%
Canada, UK, European Union, AUS	23%
South East Asia	8%
Central and South America	14%
Other	1%
Education	
Graduate education (completed or have some)	65%
Undergraduate education (completed or have some)	35%
Degree Fields - choose all that apply	
Science, Engineering, or Technology	34%
Political Science, International Relations, International Business	34%
Foreign Service, Security, or Government	20%
Public Policy	19%
Public Administration, Business Administration	8%
Other	21%
Experience in Relevant Topics 1-Not at all familiar to 5-Very Familiar	Rated 4-5
AI or machine learning	43%
U.S. policy on AI	22%
China policy on AI	16%
Advanced computing (supercomputers, quantum)	18%
Biotechnology	19%
Climate science	27%
Energy	27%
Forecasting and critical judgment	59%
Reasoning, decision making, and rationality	74%
Cognitive psychology	42%

Appendix C - Methodology for Slider Position

For each strategic question, three scenarios are defined:

- S_a : Scenario A
- S_{-a} : Scenario -A represents the opposite of Scenario A
- S_0 : Scenario 0 represents perpetuation of the status quo.

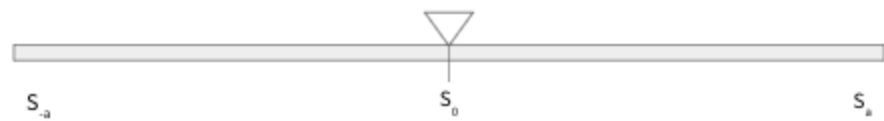
These three scenarios are represented on a horizontal axis, called the slider. This axis runs from -1 to 1, with 0 at the midpoint. The midpoint is labeled S_0 , the endpoint at -1 is labeled S_{-a} , and the endpoint at 1 is labeled S_a .



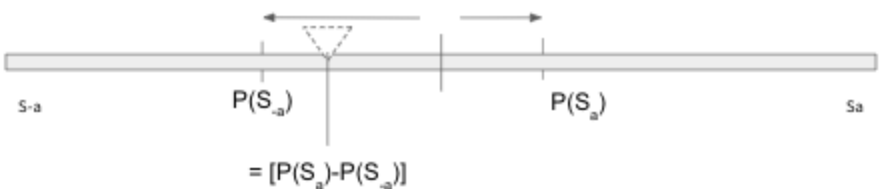
A set of forecasting questions is identified, and their answers are each associated with one of the scenarios S_a , S_{-a} , or S_0 . We define the probability of a scenario S_x as the average of the probabilities of the set of outcomes associated with S_x . More formally, for a set of outcomes, O_{xi} , $i=1, \dots, n$

$$P(S_x) = \frac{\sum_{i=1}^n P(O_{xi})}{n}$$

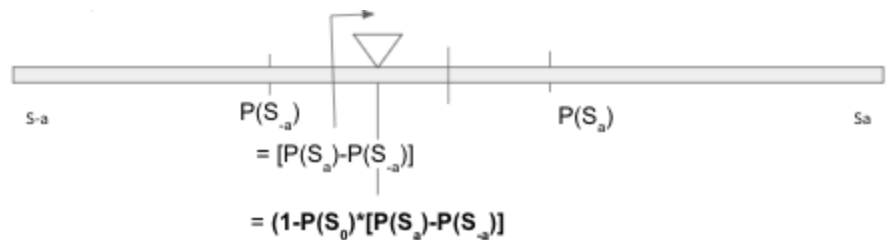
The ticker's position on the slider begins at the status quo, S_0 .



The probabilities of S_a and S_{-a} move the ticker toward their respective end points, resulting in a net movement probability of $P(S_a) - P(S_{-a})$.



The probability of the status quo scenario, S_0 , then moves the ticker back toward the status quo by multiplying the net movement probability by the probability that we depart from the status quo, $(1 - P(S_0))$.



The final position of the ticker is thus represented by the following equation:

$$= (1 - P(S_0)) \times [P(S_a) - P(S_{-a})]$$

For the purposes of this report the scenarios are defined as follows:

- S_a: The U.S. regains a two generation lead in microchip technologies.
- S_{-a}: The U.S. falls further behind in microchip technologies.
- S₀: Status quo

There are three sliders contained in this report (one each for the United States, the European Union, and China), and forecasted probabilities are only included in the calculation for the slider relevant to their associated scenario. The answers of the forecast questions included in this metric are assigned to the scenarios in the table below.

Question	Answers	Associated Scenario
What percentage of contributions to Github's "very high impact" AI projects will be from the EU in 2022?	Less than 10	EU decreases competitiveness
	10-15	EU status quo
	More than 15	EU increases competitiveness
Which country or union will have the second most citations of "high impact" AI scientific publications in 2022?	China	China decreases competitiveness
	US	US status quo
	EU	EU increases competitiveness
	Other	N/A
How will the U.S. rank in AI skills penetration in 2022?	1-2	US increases competitiveness
	3	US status quo
	4+	US decreases competitiveness
Will U.S. domestic labor demand for artificial intelligence skills equal or exceed 3.2% for December 2022?	Yes	US increases competitiveness
	No	US status quo
In 2022, will a Chinese institution have the most AI research publications ranked in the top 10%?	Yes	China status quo
	No	China decreases competitiveness
Which country or union will publish the second most AI related patents in 2022?	US	US decreases competitiveness
	EU	EU increases competitiveness
	China	China status quo
	Other	N/A
What percentage of contributions to Github's "very high impact" AI projects will be from China in 2022?	Less than 22	China decreases competitiveness
	22-27	China status quo
	>27	China increases competitiveness
Which country will	US	US decreases competitiveness

have published the second most top tiered journal articles on artificial intelligence in 2022?	EU	EU increases competitiveness
	China	China status quo
	Other	N/A
How many European Union countries will have an AI skill migration greater than 2 per 100,000 in 2022?	<6	EU decreases competitiveness
	6-7	EU status quo
	>7	EU increases competitiveness
How many AI related patents will be published in China in 2022?	<1400	China decreases competitiveness
	1400-1900	China status quo
	>19000	China increases competitiveness
How many AI related patents will be published in the U.S. in 2022?	<1200	US decreases competitiveness
	1200-1500	US status quo
	>1500	US increases competitiveness
How many AI scientific publications will be published by EU institutions in 2022?	<2500	EU decreases competitiveness
	2500-3000	EU status quo
	>3000	EU increases competitiveness