ORIGINAL ARTICLE

China's Complex Leadership in G20 and Global Governance: From Hangzhou 2016 to Kunming 2021

John Kirton[1] · Alissa Xinhe Wang[1]

Abstract

How and why have China's G20 and thus global leadership changed since China hosted its first G20 summit at Hangzhou in September 2016? Since then the G20 has shaped global governance on an expanding array of subjects beyond its finance-economic core. China has consistently surpassed the other major powers in its economic growth, but also in its vulnerabilities at home. Its institutional leadership in long-established multilateral organizations has grown. The most systematic detailed account of China's leadership in G20 governance from 1999 to 2015 argued that China was always a leader in G20 governance but never led alone, always doing so with another, different G20 member, as the subject changed. New findings arise by using an expanded model of China's leadership, matching Xi Jinping's priorities at G20 summits with the summit's collective conclusions, commitments, compliance, and institutional development of global governance and examining the critical cases of climate change, biodiversity, infrastructure, and digitalization. This shows that China's G20 leadership has become more complex and cautious since 2016, even as G20 performance has generally grown. In 2022 as China institutionally leads global governance on biodiversity and thus climate change, by hosting the United Nations biodiversity summit in Kunming in April and May, it can create cooperative leadership in the G20 from all the world's great biodiversity powers of Russia and Brazil from the BRICS, Canada and the US from the G7, and Indonesia as G20 host.

Keywords G20 · China · United States · Leadership · Compliance

✉ John Kirton
  john.kirton@utoronto.ca

  Alissa Xinhe Wang
  alissa.wang@mail.utoronto.ca

1 Department of Political Science, University of Toronto, 1 Devonshire Place, Room 208N, Toronto, ON M5S 3K7, Canada

1 Introduction

1.1 Significance

The changing relationship between China and the United States, the world's two most powerful countries, is the central geopolitical issue of our time. It will determine how the global community shapes the new regimes needed to control the existential threats of climate change and biodiversity loss and seize the opportunities of the digital revolution and the infrastructure on which these efforts depend. Most scholars and policymakers focus on the bilateral relationship between these two powers, asking whether the current level and trends highlight conflict, containment, competition, coexistence, or cooperation (Mearsheimer 2021; Brandt and Gaddis 2021). Few chose cooperation as the prevailing form, emphasizing instead the conflict arising from recent US reactions to China's Belt and Road infrastructure projects (Shah 2021; Yilmaz and Li 2020; Chan and Song 2020) and clashes over the digital economy and cyberspace governance (Shen 2016). Questions about China's global leadership in this context were highlighted by signs of US retreat during the Trump administration (Wæver and Chen 2017; Breslin 2017).

Yet the more important, often overlooked, arena where these two major powers interact is in global governance institutions, where each seeks to lead in constructing the global regimes on which all depend. At the pinnacle stands the G20 summit of systemically significant states where, since its 2008 start, the leaders of China and the US, along with their respective BRICS and G7 colleagues, meet to address the most difficult issues in the world. It is thus important to see whether China is becoming a leader in the G20 and, through it, in global governance as a whole, and whether its efforts and effectiveness in doing so unfold through competition, coexistence or cooperation with the US and the major members in their respective BRICS and G7 clubs.

1.2 Schools of Thought

These questions have inspired a vigorous debate among several competing schools of thought.

The first school, led by Chen et al. (2018), sees the G20 as a site for China's facilitative leadership, emphasizing the collective and cooperative leadership of key actors in promoting common goals. This requires attraction and influence to lead. At the G20's Hangzhou Summit, which China hosted in September 2016, China was able and willing to assume increased institutional leadership in this facilitative way. The G20 allows China to engage in plurilateral collective leadership, rather than unilateral leadership.

The second school, led by Cooper (2021), sees China demonstrating constantly cautious, incrementally increasing leadership in the G20, gradually moving into a more central position. Caution arises from China's worries that its engagement with the G20 could burden it with responsibilities at odds with its identity as a developing country or with its own interests. A variant of this school argues that with the

hosting of the 2016 Hangzhou Summit, China indicated its willingness to identify itself as a core leader of global politics by embracing a wide range of informal institutions, with the G20 at the centre but including the BRICS, the Shanghai Cooperation Organisation (SCO), the Asian Infrastructure Investment Bank (AIIB), the Silk Road Fund, and the Belt and Road Initiative (Cooper and Zhang 2018).

The third school, led by Ren (2017), also emphasizes the collective aspect of China's leadership and its evolution since the G20's start at the level of finance ministers and central bank governors in 1999. But it sees no constant caution, as China evolved from a member to a leader. At Hangzhou, China sought to broaden the G20 agenda and participation by inviting leaders from developing countries. Its G20 leadership arose from economic growth, structural reform, development, global finance, trade and investment, and climate change. Overall, China increased its leadership in the G20 because it saw the G20's growth as part of a more desirable and more multipolar world. Its willingness to lead was based on its material and ideational power. China thus mobilized like-minded countries to lead together to promote common goals (Ren 2017).

The fourth school, led by Bo (2021), argues that China practices "international leadership with Chinese characteristics." This capability-based leadership evolved in several stages from counter-crisis management, through consolidating cooperation, to global steering. At Hangzhou, China offered more proactive leadership, as it had stronger power as a host. China leads the G20 due to the mutually supportive and mutually reliant relationship between China and the G20: China enhances the representativeness and legitimacy of the G20, while the G20 allows China to play a more proactive role in world development and global governance. Economically, the G20 provides China with a more representative, stable, and flexible international financial and economic system. The G20 allows China to advance its identity as a developing country (Bo 2021). By implication, China's G20 leadership should be strongest on economic, finance, and development subjects.

The fifth school, led by He (2019), sees China as a coalition-constructing leader in the G20, with varying success. China does not lead alone but seeks to build coalitions with other major powers. At Hangzhou, China sought to supply "Chinese solutions" for global economic governance, by securing different partners for different initiatives. On climate change's green finance agenda, China joined the United Kingdom, successfully building on their common interest in the role of the financial sector in green development. This China–UK coalition then attracted support from other G20 members, to embed the options of the Green Finance Study Group in the Hangzhou Summit communiqué. However, on Hangzhou's Enhanced Structural Reform Agenda, China sought but failed to forge a supportive coalition with the United States and the European Union. This suggests that China's leadership became stronger on climate change—a more recent issue for the G20—than on the traditional economic issues, and when its chosen partner was the UK rather than the more powerful US and EU.

The sixth school, led by McKinney (2017), sees China as a failed G20 leader. China aimed to lead the G20 by pushing for G20 institutionalization, as a part of broader efforts for global governance reform to give developing countries a greater voice. This was driven by domestic demands. As China sought to escape the

middle-income trap, it needed to focus on innovation and pursue greater regional and international economic links. The G20 allowed China to seek allies and resist international protectionism and instability. China thus led efforts to improve G20 effectiveness through its institutionalization. However, this effort failed and reform stalled. China thus shifted to regional integration as an alternative. This suggests that China's leadership, led by economics, development, trade, and innovation in the G20's early years, declined over time, and that its preferred G20 partners were its fellow Asian ones of Japan, Korea, Russia, and less proximate India, Indonesia, and Australia.

The seventh school, led by O'Neill (2021), sees the G20 itself as a failure, due to China's rising capabilities and its failure as a member of the BRICS to contribute constructively within the G20 in the context of growing US–China rivalry. O'Neill cites the 2021 Rome Summit's failure on reform of the international financial institutions (IFIs), review of special drawing rights, COVID-19 vaccine distribution, a new Global Finance and Health Board, and climate change.

The eight school, led by Soong (2021), sees China as an active participator, communicator and supporter in the G20. This role is part of China's three-pronged strategy of increasing its leadership in regional and trans-regional economic organizations. Thus, China was a booster and promoter of the BRICS and the Regional Comprehensive Economic Partnership, an active participator and support of the G20, and an initiator and creator of the Belt and Road Initiative and the SCO.

1.3 Puzzles

Together these schools offer or imply several competing hypotheses about the form and foundation of China's G20 leadership, whether it has risen, remained constant, or declined, on what subjects it is most prominent, and with what partners, if any, China aligns and succeeds. However, none covers the newer subjects of biodiversity, infrastructure, and digital finance, systematically assesses a broad range of China's actual and potential G20 partners, or considers the full trends through to the G20's Rome Summit on 30–31 October 2021 and the impact of the recent mega shocks of climate change, biodiversity loss, and the COVID-19 pandemic. This study takes up these tasks.

1.4 Thesis

This study argues that since 2016, China's G20 leadership increased in a more complex and cautious way, even as the G20's performance generally grew. In its collective commitments, G20 performance was strong at the 2016 Hangzhou and 2017 Hamburg summits, dropped in 2018–2020, but climbed back at the Rome Summit in 2021. Members' compliance with these commitments since 2016 has been generally strong, with a surge to an all-time high for those made at the Riyadh Summit in 2020. Amid this rising tide, China's performance, which surged to an all-time high in 2020–2021, has been generally strong and growing but neither consistently nor comprehensively so.

China's leadership after 2016 arose in different ways across the critical subjects the G20 increasingly addressed. On climate change, China's G20 leadership was dominated by cooperative leadership with G7 partners, while the US lagged as one of the lowest-performing members here. On biodiversity, China led cooperatively with several G7 members, while the US lagged again as a below-average performer. On infrastructure, China was an average performer alongside a wide range of G7 and BRICS members, while the US led as a top-performing member. On the digital economy, China performed at an average level alongside predominantly BRICS partners, while the US lagged as a below-average performer. Overall, the China–US G20 relationship thus featured co-existing leadership, where each power led on specific subjects, to produce more effective global governance as a whole. In 2022, as China leads global governance on biodiversity, by hosting the summit of the 15th Conference of the Parties (COP) to the United Nations Convention on Biological Diversity (CBD) in Kunming in April and May, it can lead through cooperative leadership with all the world's great biodiversity powers: Russia and Brazil from the BRICS, Canada and the US from the G7, and Indonesia as G20 host.

2 The Concept of Leadership

The concept of leadership used here begins with Kirton's (2016) model of G20 leadership presented in *China's G20 Leadership*. It uses the more recent focus on three different models of leadership (Kirton and Wang 2021). It now identifies four forms, arising from two dimensions.

On the first dimension, leadership can be cooperative or competitive. Cooperative co-leadership sees China leading alongside other partners. Here China's performance, especially on compliance, both overall and on a particular subject, is higher than the G20 average but close to at least several other G20 members. Thus, China is leading but not leading alone. In contrast, unilateral leadership would see China leading alone, having top performance, with no other members coming close.

The second dimension recognizes that cooperative or unilateral leadership can arise on a few or on many subjects. Comprehensive leadership arises when China is a leader on all or most major G20 subjects, either by itself or with others close behind. In contrast, a more complex pattern of selective, subject-specific but cumulatively coexisting leadership occurs when China leads only on certain subjects, while other members, notably the US, lead on other subjects where China falls behind. In this configuration, with its de facto division of labour, the combined effect of China and other members' leadership produces more effective global governance as a whole.

Leadership is measured here through a quantitative assessment of China and other members' performance, above all on the critical dimension of a member's compliance with the summit commitments the leaders make, as this contributes critically to the G20's effectiveness and legitimacy. A member's leadership in compliance is measured by the extent to which the member has complied with the politically binding, future-oriented commitments made at G20 summits. Data on member-specific compliance are based on the database of 363 compliance assessments developed by the G20 Research Group, enriched by its partners at the Russian Academy of

National Economy and Public Administration (Kirton and Larionova 2018; Rapson and Kirton 2020). The analysis then turns to China and other members' performance on the now critical global issues of climate change, biodiversity, infrastructure, and digitalization.

This analysis finds that on climate change and biodiversity, China leads cooperatively alongside G7 members. Yet China's compliance lags in infrastructure, where the US leads, and on digitalization, where China's performance is average and the US lags. This complex, subject-specific pattern helps produce comprehensive, but not complete, G20 governance and global governance beyond.

3 China's G20 Performance, 2016–2021

China's increasing, cautious, and complex G20 leadership is seen first in the generally improving performance of the G20, and China within it, since China hosted the G20 summit at Hangzhou in September 2016. Hangzhou stands out from the other G20 summits, as China used its prerogative as host to forward its leadership ambitions and priorities. It is further seen in China's strengthening performance, relative to other members, from 2016 to 2021, on the key dimensions of domestic political management, deliberation, direction setting, decision making, delivery, and the institutional development of global governance.

3.1 The Distinctive Performance of China's 2016 Hangzhou Summit

The Chinese-hosted, -designed, -and produced G20 Hangzhou Summit on 4–5 September 2016 stands out from all the other G20 summits in several ways (see "Appendix A"). Across almost all dimensions of performance and their measures, China's G20 leadership leapt to a new level, and its leadership on global governance outside the G20 also rose.

Leaders attendance at Hangzhou, at 95%, was higher than at the preceding three summits, at 90%. The Hangzhou Summit issued seven communiqué compliments to individual members, more than the G20's 4.4 average per summit, and far more than the average from 2015 to 2021. It produced outcome documents totalling 16,203 words, well above the per summit average of 12,708 words. This started a spike from far fewer words since the G20's 2008 start (save for St. Petersburg in 2013). Hangzhou's total more than doubled again at Hamburg in 2017, before a subsequent plunge to a far lower level. A high 73% of Hangzhou's affirmations of the G20's two distinctive foundational missions were to globalization for all, the one that China preferred (rather than financial stability). This was well above the G20 average of 49%. Hangzhou also saw a surprising spike in the affirmations of the G7's two distinctive foundational missions of open democracy and human rights, a trend subsequently sustained on human rights. Hangzhou's 213 commitments were above the G20's per summit average of 189. Members' compliance with them, at 72%, equalled the G20's per summit average and was higher than that of eight of the 10 summit's before. Hangzhou's 179 references to international institutions inside the

G20 and 223 to those outside were each well above the G20's per summit average. They were the second highest (after St. Petersburg's 190) in developing G20 bodies themselves and the fifth highest (among the 16 summits) in developing global governance bodies outside.

3.2 Domestic Political Management

The first dimension of performance, domestic political management, is initially measured by the attendance of a member's leader at the summit. China's president from 2008 to 2021 had perfect attendance, including by participating virtually in the COVID-19—constrained years of 2020 and 2021. Although Rome in 2021 was heralded as the return to in-person summitry, a historically high number of leaders chose to participate in virtual form.

On a second measure, the compliments awarded to individual members in the summit's outcome documents, China stood first, along with Mexico and Saudi Arabia, from 2008 to 2020 (see "Appendix B-1"). China received three of the seven compliments at Hangzhou in 2016. China's compliments rose, even as the number of communiqué compliments decreased since 2016. At the 2021 Rome Summit, China received one of seven compliments, for hosting the Beijing Winter Olympics in February 2022.

3.3 Deliberation

The second dimension of performance, deliberation, is measured in its public forum by the number of words in the summit's outcome documents issued in the leaders' name.

G20 deliberation generally increased from 2008 to 2017, then declined (see "Appendix B-2a"). However, Hangzhou's 16,203 words were well above the summit average of 12,708 words. They were the second highest from 2008 to 2021. They rose sharply from the two summits before.

At Hangzhou, China secured its core agenda priority of development. The 4091 words on this subject were above the per summit average of 3261. They were the fourth highest ever and double the level of the two years before.

The G20 summit's agenda steadily broadened, from its initial concern with financial regulation, macroeconomic policy, and international financial institution reform to an increasing range of subjects beyond the economic sphere. They included the world's—and China's—existential threats of climate change and biodiversity loss, and the opportunities of infrastructure and digitalization.

On climate change, there was a surge in performance in the post-Hangzhou period, which peaked at the 2017 Hamburg Summit (see "Appendix B-2b"). Deliberation on climate change began with only 47 words at the 2008 Washington Summit, increased to a peak of 888 words at the 2013 St. Petersburg Summit but dropped back to 597 in 2015. At Hangzhou it leapt to 787 words, followed by an all-time high of 3600 words at Hamburg. Then came a dip, before a climb back to 3092 words at the Rome Summit in 2021.

On biodiversity, there was a dramatic rise in public deliberation after Hangzhou. There had been none at the first four G20 summits. The fifth summit at Seoul in November 2010 produced 459 words. This then decreased to none in 2014 and 2015. Hangzhou returned biodiversity to the agenda, with 87 words, followed by an all-time high of 2333 words in Hamburg. Then came a dip, before a climb to 1089 words at Rome.

On infrastructure, the post-Hangzhou period generally maintained the trend of growing performance, although not in a steady way. Infrastructure reached an all-time high at the 2014 summit with 2245 words, followed by a drop to 1200 in 2015. Deliberation dropped further to 740 words at Hangzhou but increased to 1349 at Hamburg in 2017. Then came a further drop from 2018 to 2020, before a climb to 1232 at Rome.

On the digital economy, deliberation was low from 2008 to 2015, starting with 88 words in 2008 and ending with 299 words in 2015. At Hangzhou, it increased dramatically to 3042 words, followed by an all-time high of 5029 words at Hamburg in 2017. This was followed by a drop from 2018 to 2020, and another substantial increase to 2776 words at Rome.

3.4 Direction Setting

The third dimension of performance, principled and normative direction setting, is measured by affirmations of the G20's distinct foundational missions of promoting financial stability and making globalization work for all (GFA) expressed in the summit's public documents. China increasingly secured its desired emphasis on the development-oriented mission of GFA, even as the G20's affirmation of both missions grew in number and breadth.

This came in four distinct phases (see "Appendix B-3"). In the first phase, the G20 began in 2008 with a total of 18 affirmations of its two distinctive founding missions. This increased gradually, reaching a peak of 102 total affirmations at the 2010 Seoul Summit. In the second phase, the 2011 Cannes Summit, made 50 affirmations. This increased to reach an all-time high of 181 affirmations at the 2013 St. Petersburg Summit. In the third phase, which began in 2014, direction-setting began with only 22 affirmations at the Brisbane Summit. This increased gradually to a peak of 76 affirmations at the 2018 Buenos Aires Summit. In the fourth phase, which began in 2019, there were 29 affirmations at the Osaka Summit, followed by a gradual increase to 33 in 2020, and 62 at Rome.

Of the G20's two distinctive foundational missions, China as a self-identified developing country and as the leader of the G77, and constantly concerned about social stability at home, emphasized globalization for all. It was less concerned with financial stability, as it was one of the few G20 members that had never had a financial crisis of its own.

Here China's performance rose. In the relative number of affirmations of the two missions, G20 performance had two phases, marked by a distinct shift in emphasis. From 2008 to 2012, most summits had many more affirmations of financial stability than globalization for all. In 2008, financial stability was affirmed 16 times

while globalization for all was affirmed only twice; similarly, at the London Summit, financial stability was affirmed 29 times, compared to six for globalization for all; a similar pattern arose at the Toronto, Seoul, Cannes, and Los Cabos summits (with the Pittsburgh Summit being the only exception).

In the second phase, starting in 2013, the G20 began to affirm globalization for all more frequently than financial stability. At St. Petersburg, it was affirmed 108 times, compared to 73 for financial stability; at Brisbane, it was affirmed 12 times compared to 10 for financial stability; the same pattern continued to Rome, where it was affirmed 44 times, compared to 18 times for financial stability. Overall, Hangzhou led all 16 summits, with 73% of its affirmations devoted to globalization for all. Rome came a close second with 71%.

3.5 Decision Making

The fourth dimension, decision making, is measured through the summit leaders' production of precise, politically binding, future-oriented, public, collective commitments. Here the G20 made a total of 3017 commitments across all 16 summits and subjects. It did so through three main phases (see "Appendix B-4"). Decision-making performance increased gradually within each phase but remained strong and stable overall. In the first phase from 2008 to 2010, decision making began with 95 commitments in Washington, increased to 129 and 127 at London and Pittsburgh, declined to 61 in Toronto, and climbed back to 153 at Seoul and 282 at Cannes. The second phase began with 180 commitments in 2012, climbed to 281 in 2013, 205 in 2014, 155 in 2015, 213 in 2016 at Hangzhou, and peaked at an all-time high of 531 commitments at the 2017 Hamburg Summit. The third phase began in 2018 with a drop to 129 commitments, followed by 144 at Osaka, 107 at Riyadh, and 225 at Rome.

By subject, macroeconomics led with 491 commitments. Yet it was followed in second place by China's priority of development with 320 commitments. Then came financial regulation, the US priority since 2008, with 307. Trade had 197, energy 169, labour and employment 162, IFI reform 148, crime and corruption, China's priority since 2013 142, food and agriculture 134, health 124, information and communications technologies (ICT) and the digital economy 122, climate change 115, and tax 105. These were followed by the environment with 96 commitments, gender with 80, accountability with 79, infrastructure with 51, international cooperation with 49, terrorism with 48, migration with 27, social policy with 19, human rights with 13, microeconomics with 10, and education with nine.

On China's priority of development, an average of 12 commitments were made at the first seven G20 summits from 2008 to 2012. In the nine summits after Xi Jinping became China's president on 14 March 2013, starting at St. Petersburg in September 2013, the per summit average more than doubled to 26. Average commitments on climate change, the key to sustainable development, also more than doubled, from 4.3 to 9.4. The environment, including biodiversity, increased almost 20-fold, from 0.6 to 10.2. Infrastructure had none before 2013 but a per summit average of 5.1 afterward. ICT/digitalization also had none before 2013, but an average of 13.5 at

each summit since Xi arrived, led by 48 at Hangzhou alone. No other subject had a higher total at a single subject, save for macroeconomic policy (with 91 at Cannes in 2011, 71 at Los Cabos in 2012, and 65 at St. Petersburg in 2013), financial regulation (with 57 at Washington in 2008), and the environment (with 57 at Hamburg in 2017).

3.6　Delivery

G20 performance on the delivery of these decisions was solid. The overall average of members' compliance with their commitments across all summits and across all years up to the 2020 Riyadh Summit was 71% on the popular score (or +0.42 on the scientific scale). Compliance substantially rose, although not steadily, from 2008 to 2020 and was particularly pronounced after 2016. Compliance began with a substantial 76% (or +0.52) with a commitment made at the 2008 summit. This was followed by a dip to 60% (or +0.20) for the 2009 London Summit, and a gradual rise to 77% (or +0.54) for the 2012 Los Cabos Summit. It dipped for 2013 to 67% (+0.34), and then rose gradually to an above-average 72% (+0.43) for Hangzhou. It then dipped to 66% (+0.32) for 2017, followed by a dramatic rise to 78% (+0.56) for 2018, 75% (+0.50) for 2019, and an all-time high of 85% (+0.69) for the 2020 Riyadh Summit.

The highest complying G20 members were the EU, UK, and Germany with an overall average of 85%. They were followed by Canada with 84%, Australia with 83%, and France with 81%. Next were Japan and Korea with 74%, and the US with 73%. China's compliance of 70.5% was closest to the overall G20 average of 71%. China thus ranked 10th, sitting directly in the middle among all G20 members.

The subject with the highest compliance was infrastructure with 91% (+0.82), followed by microeconomics with 89% (+0.78), ICT with 84% (+0.67), macroeconomics with 82% (+0.63), and terrorism and tax both with 77% (+0.54). Then came labour and employment with) 76% (+0.52), financial regulation with 75.5% (+0.51), migration with 74% (+0.47), food and agriculture with 73% (+0.45), and health with 72% (+0.43). Below average were energy with 70% (+0.40), IFI reform with 68% (+0.36), climate change and digital economy with 67.5% (+0.35), trade with 67% (+0.34), development with 66.5% (+0.33), and gender with 65% (+0.30). The worst compliance came in crime and corruption with 61% (+0.21), the environment with 60% (+0.19), and international cooperation with 58% (+0.15).

China's highest complying subjects were macroeconomics at 85% (+0.70), infrastructure and ICT at 84% (+0.67), financial regulation at 79% (+0.58), health and tax at 77% (+0.53), energy at 76% (+0.52), IFI reform, terrorism, environment, and microeconomics at 75% (+0.50), and climate change at 74% (+0.47). Below the G20 average was China's compliance with commitments on the digital economy at 67% (+0.33), labour and employment at 66% (+0.32), trade at 65% (+0.30), and development and crime and corruption at 64.5% (+0.29). Its worst performing subjects were food and agriculture at 55% (+0.10), international cooperation and migration both at 50% (0), and gender at 44% (−0.13).

3.7 Delivery on Climate Change, Biodiversity, Infrastructure, and Digital Economy

On climate change, China was a compliance leader from 2016 to 2020. Its average compliance during this period of 81% (+0.62) was substantially higher than the overall G20 compliance on this subject of 69% (+0.38). China's closest compliance companion was Italy at an identical 81% (+0.62), followed by its Asian neighbour Australia at 79% (+0.57). China followed the leadership of the strongest complying G7 members of Canada, France, Germany, Italy, the UK, and the EU. But the US lagged well behind.

On biodiversity, China was a moderate compliance leader after 2016. Its average compliance of 63% (+0.25) was higher than the G20 average of 54% (+0.08). Its compliance companions were Argentina and Canada, which all lagged behind Australia, France, Germany, Japan, Korea, the UK, and the EU. The US lagged far behind at a mere 38% (−0.25).

In contrast, on infrastructure, China lagged at 75% (+0.50), much lower than the G20's average of 88% (+0.75). However, China's compliance in the two years where data are available increased from 0 to +1. It increased alongside a wide range of G7 and BRICS companions, including Germany, the UK, Turkey, South Africa, and India. On infrastructure, the US led with an average of 100% (+1). However, on an expanded set of five assessed infrastructure commitments from 2014 to 2020, China's compliance was 80%, equal to the UK, Italy, Australia, and Argentina, behind the US, Canada, and the EU at 100%, and above the G20 average of 78%. After 2016, China's compliance rose, while that of the G20 declined.

On the digital economy, China was an average complier after 2016. Its score of 67% (+0.33) was very close to the overall G20 average of 68% (+0.35). Its closest compliance companion was Russia. Yet China's leadership was pronounced from 2017 to 2018, when it led with Australia, Russia, and the EU. However, its leadership declined in 2019 and 2020. The US again lagged, with average compliance of only 50% (0).

Overall, on all these key subjects, China demonstrated cautious and cooperative leadership, as it led to different degrees, with different partners, and never led alone. Across these key subjects as a whole, the relationship between China and the US was co-existing leadership, as China led to a greater extent on climate change and biodiversity where the US lagged, while China lagged a little on infrastructure where the US led, and performed at the G20 average on digitalization, where the US badly lagged.

3.8 Development of Global Governance

The sixth dimension of performance, the development of global governance, is measured by the number of communiqué references to international institutions inside and outside the G20. There were four distinct phases, marked by several peaks (see "Appendix B-6a"). From 2008 to 2010, the G20's total mentions of internal and external institutions increased from 45 in Washington to a peak of 336 at Seoul.

From 2011 to 2013, mentions increased from 310 at the 2011 Cannes Summit to a peak of 427 in the 2013 St. Petersburg Summit. From 2014 to 2017, mentions increased from 83 at the Brisbane Summit to an all-time high of 709 at the Hamburg Summit. From 2018 to 2021, mentions began with only 44 at the 2018 Buenos Aires Summit but increased to 110 in Osaka, 105 in Riyadh, and 101 in Rome.

One notable feature was the G20's focus on external institutions overall and at most summits. The average number of mentions of external institutions across all years was 130, compared to 89 for internal institutions.

However, this began to change at Hangzhou, where there were 179 mentions of internal institutions compared to 223 mentions of external institutions. The next year at the Hamburg Summit, the G20 declaration had 468 mentions of internal institutions and 241 mentions of internal institutions. At the 2019 and 2020 summits (but not in 2021), internal institutions received slightly more mentions than external institutions. This suggests China's interest in institutionalizing the G20 itself and its enduring effectiveness here.

Within the external institutions, references to the World Bank Group hit an all-time high since 2008 (tied with the Seoul Summit in 2010), consistent with the development priority of China (see "Appendix B-6b"). Hangzhou also had many references to external institutions controlled or valued by China: multilateral development banks (with eight, the highest since 2011), the World Trade Organization (19, the highest since 2011), and the United Nations (22, the highest since 2011). Yet the Organisation for Economic Co-operation and Development (OECD), to which China does not belong, had 59, the highest from 2008 to 2021.

The ratio of references to the World Bank relative to the International Monetary Fund (IMF) reflects China's emphasis on the G20's development-oriented distinctive foundational mission (see "Appendix B-6c"). Although the IMF led every year from 2008 to 2021 (save for 2019), Hangzhou had a high ratio for the World Bank of 0.7, the fifth highest of the 16 summits.

In 2016 as G20 host, China created two new official level institutions—the G20 Green Finance Study Group and the Digital Economy Task Force.

4 Critical Case Studies

A more specific examination of China's priorities at each summit and their match with the summit outcomes again demonstrates China's growing, cautious, complex G20 leadership under Xi Jinping, especially since Hangzhou.

4.1 Climate Change

A comparison of the portion of Xi's summit speeches on climate change with the portion of the summit communiqués on that subject shows China's cooperative leadership, with different partners (see "Appendix C").

The portion of Xi's G20 speeches on climate change was consistently high at 9.5% or more, save for an absence at 2018 Buenos Aires, a summit that produced

a small overall performance on climate change. There Xi focused heavily on international trade, which reflected the current US–China trade dispute and his bilateral meeting with US president Donald Trump (Xinhua News 2018).

Xi's prioritization of climate change started in 2016, where he dedicated 17% of his pre-summit speech and 12.6% of his summit speech to the subject. US president Barack Obama dedicated 6.6% of his pre-summit speech to it. The Hangzhou Summit as a whole produced a small overall performance, with only 4.9% of its conclusions on climate change. Indian prime minister Narendra Modi dedicated 9% of his pre-summit speech to climate change. China, the US, and India thus led cooperatively on climate change.

Xi's attention to climate change peaked at 26.7% at the 2019 Osaka Summit, where climate change accounted for 9.9% of overall summit conclusions. In sharp contrast from 2017 to 2019, Trump dedicated none of his speech to it. Modi also dedicated none of his pre-summit speech to climate change. Thus, China led alone this year.

Following Osaka, Xi dedicated 7% of his pre-summit speech and 9.5% of his summit speech at the 2020 Riyadh Summit to climate change. Here, the US president and Indian prime minister dedicated none of their pre-summit speeches to climate change. China's leadership was weak here, as the G20 summit produced a post-Hangzhou high of 12.0% of its deliberations on climate change.

At Rome in 2021, Xi's climate priority reached another peak, as he dedicated an average of 28% of his pre-summit speeches to climate change, and 25.1% of his summit speech to the subject. US president Joe Biden dedicated 2.6% of his pre-summit speech to climate change, and Modi dedicated 0.8%. Here US and Indian leadership were weak, and China again was alone in leading the G20 to dedicate a new high of 31.0% of its summit conclusions to climate change.

The portion of climate change deliberation in Xi's summit speeches was closely matched by the G20's at each of the six regular summits from 2016 to 2021, save for Buenos Aires in 2018 where Xi had none and the G20 had 4.7%. Xi led in two summits, at Hangzhou with 12.6% compared to the G20's 4.9%, and at Osaka next door with 26.7% compared to the G20's 9.9%.

After 2016, China lagged a little (but was still very close to the G20 average). Xi's 10.2% was surpassed by the G20's 10.4% at Hamburg, his 9.5% by the G20's 12.0% at Riyadh, and his 25.1% by the G20's 31.0% at Rome. The Hamburg Summit was hosted by the highly climate-committed and G20-experienced Angela Merkel with her scientific expertise and previous service as Germany's environment minister, and a strong Green Party at home. At both the Riyadh and Rome summits, the Saudi and Italian hosts made climate change an important summit theme from the start.

China's leadership also appeared with a one-year lag. Xi's climate priority led the G20's one year later when his 12.6% at Hangzhou was followed by the G20's 10.4% at Hamburg. His 26.7% at Osaka was followed by the G20's 12.0% at Riyadh, amid the continuing COVID-19 crowd-out that year.

Together these results show Xi's leadership as host at Hangzhou, where he led the G20 (as the G20's 4.9% portion was the second highest of any G20 summit before). He also helped lead in the following year at Hamburg (where the G20's 10.4% was

its highest to that time). He similarly led at Japan's Osaka Summit (where the G20's 9.9% became the second highest to that time), the following year at Riyadh (where the summit's 12% became once again the highest to that time), and most recently at Rome (where the summit's 31.0% became the new high).

In interpreting these results, it is possible that Xi's focus on climate change was caused by, rather than the cause of, the priority the host had placed on climate change. This had some salience in Buenos Aires, Riyadh and especially Hamburg. But it strengthens the case for China's climate leadership at Hangzhou, where Xi himself was the host, and at Osaka, where Japanese prime minister Shinzo Abe largely wished to avoid climate change until he was forced at the summit to address it by France, Germany, and Canada.

4.2 Biodiversity

A comparison of the portion of Xi's summit and pre-summit speeches on biodiversity with the portion of the summit communiqués on that subject shows China's inconsistent and sporadic leadership (see "Appendix C"). Overall, Xi dedicated an average of 3% of his summit speeches and 0.6% of his pre-summit speeches to biodiversity, below the overall average of 5.8% in the G20's summit conclusions.

Xi's leadership on biodiversity began at his 2016 Hangzhou Summit. Here he led with 2.9% of his summit speech dedicated to biodiversity, compared with only 0.5% of the G20 communiqué. India's leadership was also exceptionally strong, as Modi dedicated 8.4% of his pre-summit speeches to biodiversity. Thus, China led cooperatively with India on biodiversity in 2016. However, this leadership did not continue in the three following years.

From 2017 to 2019, Xi did not dedicate any of his summit speeches to biodiversity, and only a very small percentage of his pre-summit speeches to biodiversity. In 2017 at Hamburg, the G20 attention to biodiversity spiked, with 7.0% of its communiqué on the subject. In 2018, it declined to 2.0%, and climbed back to 6.0% in 2019 at Osaka. During this time, India's leadership was also absent.

Then, at Riyadh in 2020, Xi led the G20 on biodiversity, dedicating 9.5% of his summit speech to the subject, while the G20 gave 7.5% of its communiqué to it. At Rome in 2021, Xi dedicated 5.3% of his speech to biodiversity, while the G20 rose to a high of 11.5%. In these years, India's leadership increased slightly from previous years as Modi dedicated 4.4% and 5.5% of his pre-summit speeches to biodiversity in 2020 and 2021 respectively. Thus, China again led cooperatively with India.

Overall, Xi gave inconsistent attention to biodiversity from 2016 to 2021. However, in two of the three years where he did dedicate his attention to biodiversity, Xi led the G20, and he did so cooperatively with India's Modi.

4.3 Infrastructure

On infrastructure, China showed strong leadership, although it was inconsistent overall. On average, Xi dedicated 7.7% of his summit speeches and 3.8% of his pre-summit speeches to infrastructure, compared to the G20 average of 7.0% (see

"Appendix C"). The G20 began modestly but then increased its attention to infrastructure, as Xi's attention declined in 2019 and 2020, but spiked again in 2021.

At Hangzhou, three years after Xi had launched his Belt and Road Initiative, his 2016 leadership on infrastructure was strong. The subject took 9.8% of his summit speech, compared to 4.6% of the G20 communiqué. In contrast, Obama did not dedicate any of his speech to infrastructure. However, Modi dedicated 8.4% of his pre-summit speeches to infrastructure. Thus, Xi led cooperatively with India this year.

Xi's leadership continued at Hamburg, where he dedicated 9.6% of his speech to infrastructure and the G20 dedicated 3.9%. Here, Xi led alongside the US as Trump dedicated 6.3% of his speech to the subject. Modi did not dedicate any of its pre-summit speeches to infrastructure.

Xi's leadership continued at the 2018 Buenos Aires Summit, where Xi's attention increased to 11.2%, and the G20's also increased to 8.4%. However, Trump's leadership was weak, dedicating only 2.1% of his pre-summit speeches to the subject. Modi's leadership was also weak with only 2.2% of his pre-summit speeches dedicated to Infrastructure. Thus, China led alone this year.

At the 2019 Osaka Summit, Xi's leadership declined. Xi did not dedicate any of his speech to infrastructure, whereas the subject took 2.3% of Trump's speeches, and 7.0% of the G20 communiqué. At the 2020 Riyadh Summit, Xi did not refer to infrastructure in his summit speech but dedicated 6.5% of his pre-summit speech to the subject. The US only dedicated 0.8% of his pre-summit speeches to the subject, and Modi dedicated 3.4%. Thus, China's leadership was modest and cooperative alongside India.

At Rome in 2021, Xi's attention to infrastructure peaked. He dedicated 15.5% of his summit speech to infrastructure, while Biden dedicated only 3.1% and Modi only 5%. The G20 dedicated a high of 12.2% to the subject, almost as much as Xi had. Here again, China led with minor support from India and the US.

4.4 Digital Economy

On the digital economy, China often showed strong leadership, with several exceptions. Here China generally did not lead with the US or India. Overall, at the summits from 2016 to 2021, Xi dedicated an average of 18.9% of his summit speeches to the digital economy (see "Appendix C"). This was 2.3% higher than the average portion of 16.6% on the digital economy in the G20 communiqués.

At the 2016 Hangzhou Summit, Xi dedicated 8.6% of his speech to the digital economy. The summit communiqué also focused strongly on the digital economy, dedicating 18.7% of its text to the subject. This was the second-highest portion of communiqué text that the digital economy took from 2016 to 2021. Here, the US dedicated only 1% of its pre-summit speech to the digital economy, and India dedicated only 2.6%. Thus, China led alone.

The portion of Xi's speeches on the digital economy was consistently high, at 8.6% or more. It peaked at 30.5% at the 2017 Hamburg Summit. There, the portion of Xi's speech dedicated to the digital economy was more than twice as much as the portion in the G20 communiqué, at 14.4%. Obama dedicated none of his pre-summit

speech to the digital economy, and Modi dedicated 2.2%. Thus, China led alone again.

Xi's leadership temporarily declined at the 2018 Buenos Aires Summit. He dedicated 14.7% of his speech to the digital economy, whereas the subject took 16.7% of the G20 communiqué. Then Xi's leadership climbed back to 26.7% in 2019 at Osaka, where 13% of the communiqué was dedicated to the digital economy. At the 2020 Riyadh Summit, Xi dedicated 17.0% to the digital economy, which took 9.0% of the summit communiqué. At Rome in 2021, Xi dedicated 15.9% to the subject, while the G20's conclusions on the digital economy peaked at 27.6%. throughout these years, the Trump dedicated none of his pre-summit speeches to the digital economy, and Modi has always dedicated a small percentage to the subject.

With the exceptions of the 2016 Hangzhou Summit, which Xi hosted, and the 2018 and 2021 summits, Xi dedicated a much higher portion of his speech to the digital economy than the G20 did in its communiqués. In addition, Xi always dedicated a substantially higher proportion of his speeches to the digital economy than the US leaders and Modi. Thus, Xi's leadership on this subject was unilateral and strong, although not very consistent from 2016 to 2021.

4.5 Development

Xi's leadership was strongest in development. Overall, at the summits from 2016 to 2021, Xi dedicated an average of 59.2% of his summit speech (and 59.9% of his pre-summit speech) to the subject of development. This is 39.7% higher than the average portion of 19.5% on the development in the G20 communiqués.

At the 2016 Hangzhou Summit, Xi dedicated 68.9% of his speech to development. The summit communiqué also focused strongly on the digital economy, dedicating 25% of its text to the subject. This was the second-highest portion of communiqué text that the digital economy took from 2016 to 2021. Here, US leadership was missing, as Obama only dedicated 2.9% of his pre-summit speeches to development. India's leadership was modest, as Modi dedicated 17% of his pre-summit speeches to development. Thus, China led cooperatively with India.

Xi's leadership on development dropped in 2017, as the portion of Xi's speeches on the development reached a low of 20.3%. At the G20 summit in 2017, 17% of the summit communique was dedicated to development. US leadership was again missing, with only 3.8% of Trump's pre-summit speeches dedicated to development. India's leadership rose as Modi dedicated 18% of his speeches to the subject. Here again, China led cooperatively with India.

After 2017, the percentage of words dedicated to development was consistently high, at 48.4% or more. It peaked at 86.1% at the 2018 Buenos Aires Summit. There, the portion of Xi's speech dedicated to the digital economy was more than four times as much as the portion in the G20 communiqué, at 17%. The US dedicated only 4.6% to the subject, while India's leadership also declined to 10%. Here, China led with only modest support from India.

At the 2019 Osaka Summit, Xi dedicated 58% of his speech to development, whereas the subject took 17% of the G20 communiqué. He had modest support

from India again, as Modi dedicated 9.1% of his pre-summit speeches to development. In 2020, Xi dedicated 48.4% of his speech to development, whereas 15% of the communiqué was dedicated to the subject. He led with stronger leadership from India, which dedicated 17% of its speeches to development. Most recently, at the 2021 Rome Summit, Xi's leadership climbed again, as he dedicated 73.3% of his speech to development, which took 26% of the summit communiqué. India's leadership remained stable at 17%.

Overall, Xi consistently dedicated a much higher portion of his speeches to development than the G20 did in its communiqués. With the exception of 2017, when Xi only dedicated 3.3% more of his speech to development than the G20 in its communique, Xi consistently surpassed the G20 in development deliberation by more than one third. Thus, China's leadership on this subject was consistent and particularly strong. In addition, China often led cooperatively with India, whose leadership was always modest to strong.

5 Causes of China's Growing, Complex G20 Leadership

China's growing, cautious, complex G20 leadership and the consequent G20 performance was caused by commensurate changes in the six causes highlighted by the systemic hub model of G20 governance: shock-activated vulnerability, multilateral organizational failure, predominant equalizing capability, converging political characteristics, domestic political cohesion, and the club at the global summit network hub (Kirton 2013).

5.1 Shock-Activated Vulnerability

On climate change and biodiversity, China's cooperative leadership with predominantly G7 partners, while the US lagged, flows from the high shock-activated vulnerability it faces from these ecological threats. Its financial capital of Shanghai is one of the world's cities most vulnerable to being submerged by cumulative sea-level rise and sudden oceanic extreme weather events such as typhoons. Its political capital of Beijing and many inland areas suffer from dust storms and pollution that darken the skies and create the air pollution that caused disease and death for so many citizens.

Biodiversity loss compound China's health burden, as land-use changes from forests to food production and urbanization drove animals and their viruses into human settlements, as shown by the pandemics of severe acute respiratory syndrome in 2003 and COVID-19 since 2019. China is one of the countries most severely affected by desertification, as deserts encompass over 30% (approximately 3,327 million square kilometres) of its total land territory (Food and Agriculture Organization [FAO] 1997).

On infrastructure and digitalization, China's shock-activated vulnerability is lower, given the major strides it has made to create a modern transportation and power network, in traditional and electronic forms. Its infrastructure is more modern

than its crumbling equivalent in the US. It has also suffered far less than the US and other G7 members of the G20 from cyberattacks aimed at corporate espionage, denial of service, ransoms, or state secrets.

The shock-activated vulnerabilities recognized by G20 leaders themselves in their summit communiqués coincide well with the relevant conclusions on them, and the portion in Xi's speeches too. Shock-activated vulnerabilities explain particularly well China's leadership on the subjects of infrastructure and the digital economy. In 2016, China's leadership in the area of infrastructure coincided with three communiqué-recognized vulnerabilities related to this subject. Similarly, China's strong infrastructure leadership in 2018 also coincided with two communiqu-recognized vulnerabilities related to infrastructure. This also led to a rise in the G20's attention to infrastructure, which increased from the previous year's 3.9 to 8.4%. On the subject of the digital economy, China's peak in leadership in 2017 (where Xi dedicated a high of 30.5% of his speech to the digital economy) coincided with a high of three communiqué-recognized shocks and four communiqué-recognized vulnerabilities related to the digital economy. Overall, subject-specific shocks and vulnerabilities can help explain China's subject-specific leadership in infrastructure and the digital economy (see "Appendix F").

5.2 Multilateral Organizational Failure

The multilateral organizational failure of the established bodies of the UN galaxy is the second cause of China's G20 growing, cautious, complex leadership. China's position as one of only five veto-holding permanent members of the UN Security Council reinforced its reluctance to have the G20 govern security issues, despite China's vulnerability to North Korea's nuclear program and a Taliban-led Afghanistan after August 2021. In sharp contrast to G7 members, China hosts no secretariats of UN institutions. Its recent quest to have its nationals become the executive heads of those institutions have made only limited gains, as on digitalization in the International Telecommunication Union (ITU). This increased China's incentive to have most non-security subjects governed by the G20 where it could lead. Yet it has less incentive to do so on digitalization, preferring to lead at the ITU.

On climate change and biodiversity, China does not have the home or the head of any the environmental organizations of the UN system, notably the UN Environment Programme ([UNEP] in Nairobi), or those for climate change (in Bonn), biodiversity (in Montreal), desertification, animal health, or the World Meteorological Organization for the weather. However, China, unlike the US, has long been a signatory and ratified member of the UN Framework Convention on Climate Change and the UN's CBD, created at the UN Conference on Environment and Development in Rio in 1992. It is thus a participant in their secretariats and governing bodies. China signed the CBD on 11 June 1992 and ratified it on 29 December 1993. The United States signed it only on 4 June 1993 and never ratified it. Joe Biden no plans to ask the US Senate to do so, before China hosts the COP15 summit on biodiversity in Kunming from 25 April to 8 May 2022 (Patrick 2021). This gave China an incentive to build

on this multilateral foundation and lead on climate change and biodiversity in the G20.

This China did at the G20's Rome Summit on 30–31 October 2021. On climate change, leaders promised to "put an end to the provision of international public finance for new unabated coal power generation abroad by the end of 2021" (G20 2021). Leaders also stated "we recall and reaffirm the commitment made by developed countries, to the goal of mobilizing jointly USD 100 billion per year by 2020 and annually through 2025 to address the needs of developing countries." They added "that the goal is expected to be met no later than 2023." They also pledged to "increase our efforts to implement the commitment made in 2009 in Pittsburgh to phase out and rationalize, over the medium term, inefficient fossil fuel subsidies that encourage wasteful consumption and commit to achieve this objective."

On biodiversity, G20 leaders at Rome did more. They made several commitments with specific numerical targets and timetables, notably to "strengthen actions to halt and reverse biodiversity loss by 2030," "reaffirm the shared ambition to achieve a 50% reduction of degraded land by 2040 on a voluntary basis," "strive to achieve Land Degradation Neutrality by 2030," and "ensure that at least 30% of global land and at least 30% of the global ocean and seas are conserved or protected by 2030" (G20 2021). This provided a major boost for China's UN biodiversity summit at Kunming.

This dynamic also arose on the specific issue of forests, which is critical as a carbon sink to control climate change and as a home for species biodiversity. At Rome for the first time, all G20 leaders said: "acknowledging the urgency of combating land degradation and creating new carbon sinks, we share the aspirational goal to collectively plant 1 trillion trees, focusing on the most degraded ecosystems in the planet."

Two days later, on 2 November on the sidelines of the UN's Glasgow Summit on climate change—but not as part of it—110 country leaders, whose countries contain 85% of the world's forests, pledged to halt and reverse forest loss by 2030 (Hodgson 2021; Rannard and Gillett 2021). The signatories included China, Russia (which contains 20% of the world's forests), Brazil, Indonesia, Canada (which contains 10%), the US, the UK, and other western countries.

The November announcement also had 12 countries promise $12 billion in international development financing for forest protection. Private sector participation raised the total to almost $19.2 billion. Some of this funding was devoted to restoring damaged land, fighting wildfires, and supporting Indigenous peoples. A new £1.1 fund, pioneered by the UK, would protect the world's second-largest tropical rainforest in the Congo Basin. The US promised to spend $9 billion to conserve and restore forests.

These pledges were a major advance from the 2014 New York Declaration on Forests. There 40 governments promised voluntarily to halve the rate of forest loss globally by 2020 and halt it by 2030. They included G7 members Canada, the US, Japan, Germany, France, the UK, and the EU, and G20 members Indonesia, Mexico, Turkey, and Korea. They did not include China or any of the other BRICS members of Russia, Brazil, India, and South Africa.

5.3 Predominant Equalizing Capabilities

China's increasing predominant equalizing capabilities are the third cause of its growing, cautious, complex leadership.

Overall, China's overall relative capability, as measured by gross domestic product (GDP) at current exchange rates, continue to increase since 2016, due to its strong GDP growth and steady renminbi exchange rate. In late November 2021, the OECD (2021) estimated that China's growth would again outstrip that of the US in 2021, 2022, and 2023. This has enabled and incentivized China to increase its G20 leadership across the board.

However, China's differential level and growth in key specialized capabilities have shaped the form of leadership it has mounted on specific subjects. On climate change, China is a global leader in many of the capabilities required to reduce greenhouse gas emissions. Those capabilities include solar power, with 50% of the world's new solar power built in China in 2020. They include electric vehicles and the production and control of the materials needed for their batteries, and most rare earth minerals. Yet China is also a global leader in its reliance on coal to produce electricity, steel, and aluminum, leading it to resist G20 initiatives to phase out coal use at home.

On biodiversity, China contains the world's fourth-largest landmass (after Russia in first, Canada in second, and the US in third). China also has 220 million hectares of forest area, for 5.4% of the world's total. It thus ranks fifth in total forest area after Russia, Brazil, Canada, and the United States (FAO and UNEP 2020). In addition, in 2008 China's peat area totalled at more than 33,000 kilometres, ranking it 10th in the world, after Russia, Canada, Indonesia, US, Finland, Sweden, Papua New Guinea, Brazil, and Peru (Joosten 2009). China also contains around 10% of the world's wetlands, amounting to over 65.9 million hectares, and ranking fourth globally in total wetland area (WWF China undated). China has the world's fifth-largest volume of renewable freshwater, amounting to approximately 2,840 cubic kilometres (Misachi 2018).

The November 2021 announcement on forestry at Glasgow did not include detailed plans for implementation, monitoring, or enforcement, or for creating a UN global deforestation observatory to track forest loss. However, China has the ability and will to create one for itself at home, through its Blue Map for Zero Carbon and Corporate Climate Action Index, and eventually share it with the world (Economist 2021).

5.4 Converging Political Characteristics

China's converging political characteristics and policies are the fourth cause of China's growing, cautious, complex G20 leadership.

Overall, China's shift to democratic openness declined 15 places from a global rank of 144th in 2014 to 151st in 2020 (see "Appendix D"). However, the average for the G20 also declined by 21 places, from 47th in 2014 to 56th in 2020, bringing

China a little closer to the G20 norm. This may help account for the caution in China's G20 leadership since 2016.

On climate change and biodiversity, however, China's climate change performance rank has steadily risen, to exceed the G20 average in 2019 and 2022 (see "Appendix E"). China's rank rose 13 places from 46th in 2014 to 33rd in 2020. The G20's rank also rose, but only by two places, from 38th in 2014 to 36th in 2020. China became an above-average G20 ecological performer in 2019. Meanwhile, the United States ranked a below-average 43rd in 2014, dropped 18 places to 61st in 2020, at the end of Trump's years as president. In the bilateral China–US relationship, China surpassed the US as an ecological performer in 2018 and widened its lead in the following three years.

China's performance strengthened in 2021, as Biden's presidency began. In the critical case of forests, in late August 2021, China's government promised to plant 36,000 square kilometres of new forest (an area the size of Belgium) every year until 2025 to combat climate change and biodiversity loss. Its goal for this "land greening" was for the portion of land covered by forest to increase from 23.04% in 2020 to 24.1% by the end of 2025 (Patrick 2021). During this time it would also expand its national park system, create corridors for wildlife, and curb illegal wildlife trade, aiming to protect up to 25% of its territory from human encroachment.

Here the US was well aligned. Indeed, in 2020, Trump advocated meeting the global goal to plant 1 trillion trees in his State of the Union Address at home and at the Davos World Economic Forum abroad. Yet the G20's Riyadh Summit in November 2020 did not agree.

5.5 Domestic Political Cohesion

China's very high domestic political cohesion is the fifth cause of China's increasing leadership, and the cautious, complex form it took. Xi has slowly become one of the longest serving and most domestically political secure leaders in the G20. This status reached new heights at Rome in 2021, when Merkel, retiring after 16 years, came only as a caretaker leader after Germany's federal election. Biden was at his first summit. Xi was well into his second term. It is widely expected that he will soon secure a third term, and perhaps more after that.

Xi's expertise as an engineer initially inclined him to lead on digitalization, as he did as host Hangzhou in 2016. But even there in his opening speech to Business 20, he signalled his ecological interest and convictions, declaring that "green mountains and clean water are as good as gold and silver" (Xi 2016).

5.6 Club as Network Hub

China's strengthening position as the hub of a growing network of plurilateral summit institutions of global relevance and reach is the sixth cause of China's growing, cautious, complex G20 leadership. It began in 2008 as a member of only Asia–Pacific Economic Co-operation forum, the East Asian Summit and the SCO, but added the BRICS in 2009. Since its hosting of the Hangzhou Summit in 2016,

China has begun to embrace a wider array of informal institutions including the BRICS, the SCO, AIIB, Silk Road Fund, and the Belt and Road Initiative (Cooper and Zhang 2018). It pioneered the new Belt and Road Forum in 2017, which met again with more participants in 2019, but not in 2021.

6 Conclusion: From Rome to Kunming

Since 2016, China's G20 leadership has grown in a cautious, complex way, even as the G20's performance has increased. The G20 took a big, broad step forward at the Hangzhou Summit hosted by China in 2016, and China's performance did at the Rome Summit in 2021.

China's leadership has arisen in different forms across the critical subjects the G20 increasingly addressed. On climate change, China has engaged in cooperative co-leadership with predominantly G7 partners, while the US performance has lagged far behind. On biodiversity, China has led cooperatively with several G7 members, again while the US has lagged a little. On infrastructure, China has been an average performer alongside many G7 and BRICS members, while the US has led. On the digital economy, China has been an average performer alongside predominantly BRICS partners, while the US has lagged. Overall, the China–US G20 relationship has thus featured co-existing leadership, where each power has led on specific subjects, to produce more effective global governance as a whole.

In 2022, China will institutionally lead global governance on biodiversity, by hosting the CBD's COP15 summit in Kunming in April and May. Here, it can build on and broaden its cooperative leadership in the G20 by adding as partners all the world's great biodiversity powers: Russia and Brazil from the BRICS, Canada and the US from the G7, and 2022 G20 host Indonesia from the MIKTA group of Mexico, Indonesia, Korea, Turkey and Australia.

Appendix A

See Table 1.

Table 1 G20 summit performance, 2008–2021

Summit	Grade	Domestic political management			Deliberation			Direction setting				Decision making	Delivery			Development of global governance					
																Internal		External		Engagement groups	
		Attendance	# compliments	% members complimented	# days	# documents	# words	Stability	Inclusion	Democracy	Liberty	# commitments	Compliance	Compliance	# assessed	# references	Spread	# references	Spread	# references	Spread
2008	A−	100%	0	0	2	2	3567	16	2	10	2	95	+0.51	76%	8	0	4	39	11	0	0
2009[a]	A	100%	1	5%	2	3	6155	29	6	9	0	129	+0.13	57%	8	12	4	120	27	0	0
2009[b]	A−	100%	0	0	2	2	9257	11	21	28	1	128	+0.37	69%	17	47	4	115	26	0	0
2010[c]	A−	90%	8	15%	2	5	11,078	47	32	11	1	61	+0.40	70%	16	71	4	164	27	0	0
2010[d]	B	95%	5	15%	2	5	15,776	66	36	18	4	153	+0.34	67%	42	99	4	237	31	0	0
2011	B	95%	11	35%	2	3	14,107	42	8	22	0	282	+0.41	71%	26	59	4	247	27	4	2
2012	A−	95%	6	15%	2	2	12,682	43	23	31	3	180	+0.54	77%	21	65	4	138	20	7	2
2013	A	90%	15	55%	2	11	28,766	73	108	15	3	281	+0.35	68%	26	190	4	237	27	9	5
2014	B	90%	10	40%	2	5	9111	10	12	1	0	205	+0.42	71%	29	39	4	42	12	0	0
2015	B	90%	0	0	2	6	5983	13	22	0	2	198	+0.42	71%	24	42	4	54	11	8	6
2016	B+	95%	7	25%	2	4	16,203	11	29	34	5	213	+0.43	72%	31	179	4	223	19	14	6
2017	B+	95%	0	0	2	10	34,746	42	61	2	11	529	+0.38	69%	36	54	6	307	19		
2018	B−	90%	0	0	2	2	13,515	23	53	7	2	128	+0.56	78%	22	20	5	24	15		
2019		95%	0	0	2	2	6623	13	16	7	6	143	+0.56	78%	19	56	5	54	17		
2020		100%[e]	3	10%	2	1	5697	13	20	6	6	107	+0.72	86%	N.A	31	8	70	25		
2021		100%[f]	7	30%	2	1	10,060	5	27			225	N/A	N/A							
Total			73		32	64	203,326	457	476	201	46	3057			325	964	68	2071	314	42	21
Average	N/A	90%	4.6	23%	2.0	4.0	12,708	28.6	29.8	13.4	3.1	191.1	+0.44	72%	23.2	64.3	4.5	138.1	20.9	3.8	1.9

Table 1 (continued)

N/A = not applicable. Only documents issued at a summit in the leaders' name are included

Grade is based on a scoring scheme created by John Kirton, as follows: A + extremely strong, A very strong, B + significant, B substantial, B – solid, C small, D very small, F failure (including made things worse). Available at http://www.g20.utoronto.ca/analysis/scoring.html

Domestic political management: participation by G20 members and at least one representative from the European Union and excludes invited countries; compliments are references to full members in summit documents

Deliberation: duration of the summit and the documents collectively released in the leaders' name at the summit

Direction setting: number of statements of fact, causation, and rectitude relating directly to open democracy and individual liberty

Decision making: number of commitments as identified by the G20 Research Group

Delivery: scores are measured on a scale from – 1 (no compliance) to + 1 (full compliance, or fulfilment of goal set out in commitment). Figures are cumulative scores based on compliance reports

Development of global governance: internal are references to G20 institutions in summit documents; external are references to institutions outside the G20; engagement groups are references to engagement groups. Spread indicates the number of different institutions mentioned

[a]London Summit

[b]Pittsburgh Summit

[c]Toronto Summit

[d]Seoul Summit

[e]2020 Riyadh attendance = Donald Trump attended, but left early and was first replaced by Treasury Secretary Steven Mnuchin and then by Larry Kudlow

[f]2021 Rome attendance = 75% of participants attended in person; 25% participated virtually (China, Japan, Mexico, Russia, and Saudi Arabia)

[g]Measures compliance with commitments made at all summits between 2008 and 2020

Appendix B: Dimensions of G20 performance

See Tables 2, 3, 4, 5, 6 and 7.

Table 2 Communiqué Compliments, 2008–2021

Summit	Total	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	South Africa	Saudi Arabia	Turkey	United Kingdom	United States	European Union
2008	0																				
2009[a]	1													1							
2009[b]	0																				
2010[c]	8											2		1						2	3
2010[d]	5				1								1	2						1	
2011	11				1	1			1		3			1					1		
2012	6					2								2	2	2	2				
2013	15		1	2	1	1	2				1				1	2	2		1		
2014	10	1	1	1					2			1	1	1	1	1				2	
2015	0																				
2016	7			1		3						1	1						1		
2017	0																				
2018	0																				
2019	0																				
2020	3					1					2	1				2					
2021	7	1		1		1											1				1
Total	73	2	2	5	3	8	2	0	3	0	6	5	3	7	3	7	5	0	3	5	4

Blank spaces = 0
[a] London Summit
[b] Pittsburgh Summit
[c] Toronto Summit
[d] Seoul Summit

Table 3 Deliberation, 2008–2021

B-2a: All subjects

Summit	# words	# paragraphs	# documents
2008 Washington	3,567	82	2
2009 London	6,155	164	3
2009 Pittsburgh	9,257	129	2
2010 Toronto	11,078	192	5
2010 Seoul	15,776	345	5
2011 Cannes	14,107	252	3
2012 Los Cabos	12,682	205	2
2013 St. Petersburg	28,766	532	11
2014 Brisbane	9,111	220	5
2015 Antalya	5,983	353	6
2016 Hangzhou	16,203	699	4
2017 Hamburg	34,746	1,716	10
2018 Buenos Aires	13,515	191	2
2019 Osaka	6,623	97	2
2020 Riyadh	5,697	78	1
2021 Rome	10,060	115	1
Total	203,326	5,270	64
Average	12,708	335.6	4.0

B-2b: Subject specific

Summit	Climate change		Biodiversity		Infrastructure		Digital economy	
	# words	% total words	# words	% total words	# words	% total words	# words	% total words
2008 Washington	47	1.3	0	0	30	0.8	88	2
2009 London	45	1.0	0	0	113	1.8	0	0
2009 Pittsburgh	762	8.2	0	0	20	0.2	289	3
2010 Toronto	376	3.4	0	0	56	0.5	229	2
2010 Seoul	351	2.2	459	3	919	5.8	0	0
2011 Cannes	654	4.6	136	1	424	3	372	2.6
2012 Los Cabos	410	3.2	130	1	566	4.4	169	1
2013 St. Petersburg	888	3.1	115	0.4	1,150	4	760	2.6
2014 Brisbane	232	2.5	0	0	2,245	24.6	0	0
2015 Antalya	597	4.3	0	0	1,200	8.6	299	2
2016 Hangzhou	787	4.9	87	0.5	740	4.6	3,042	18.7
2017 Hamburg	3,600	10.4	2,333	7	1,349	3.9	5,029	14.4
2018 Buenos Aires	398	4.7	171	2	718	8.4	1,420	16.7
2019 Osaka	655	9.9	395	6	590	7	870	13
2020 Riyadh	681	12.0	434	7.5	343	6	513	9
2021 Rome	3,092	31.0	1,089	11.5	1,232	12.2	2,776	27.6

Table 3 (continued)

B-2b: Subject specific

Summit	Climate change		Biodiversity		Infrastructure		Digital economy	
	# words	% total words	# words	% total words	# words	% total words	# words	% total words
Total	13,575		5,349		11,695		15,856	
Average	848	7	334	2	730	6	991	7.2

Table 4 Direction setting, 2008–2021

Phase	Summit	Financial stability	Globalization for all	Total (% globalization for all)
1	2008 Washington	16	2	18 (11%)
	2009 London	29	6	35 (17%)
	2009 Pittsburgh	11	21	32 (66%)
	2010 Toronto	47	32	79 (41%)
	2010 Seoul	66	36	102 (35%)
2	2011 Cannes	42	8	50 (16%)
	2012 Los Cabos	43	23	66 (35%)
	2013 St. Petersburg	73	108	181(60%)
3	2014 Brisbane	10	12	22 (55%)
	2015 Antalya	13	22	35 (63%)
	2016 Hangzhou	11	29	40 (73%)
	2017 Hamburg	11	22	33 (67%)
	2018 Buenos Aires	23	53	76 (70%)
4	2019 Osaka	13	16	29 (55%)
	2020 Riyadh	13	20	33 (61%)
	2021 Rome	18	44	62 (71%)

Table 5 Commitments by Subject, 2008–2021

Issue	Total	Phase 1					Phase 2							Phase 3			
		2008	2009		2010		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
		Washington	London	Pittsburgh	Toronto	Seoul	Cannes	Los Cabos	St. Petersburg	Brisbane	Antalya	Hangzhou	Hamburg	Buenos Aires	Osaka	Riyadh	Rome
Macroeconomic policy	491	6	15	28	14	29	91	71	65	34	21	31	40	21	9	9	7
Development	320	4	15	9	8	22	17	10	43	18	33	18	71	4	23	7	18
Financial regulation	307	57	42	22	12	23	35	15	20	3	7	19	19	14	6	6	7
Trade	197	5	14	6	9	17	15	10	12	9	14	24	29	5	6	10	12
Energy	169	0	0	16	1	14	18	10	19	16	3	8	42	8	2	4	8
Labour/ employment	162	0	4	3	0	3	8	18	30	16	10	9	25	16	9	6	5
IFI reform	148	14	29	11	4	16	22	8	5	4	2	4	14	7	4	2	2
Food and agriculture	134	0	0	3	2	2	36	4	11	0	31	3	22	5	4	3	8
Crime/ Corruption	142	3	0	2	3	9	5	7	20	1	4	7	26	5	13	14	23
International taxation	105	2	3	2	0	2	3	3	21	9	2	8	31	10	5	3	1

Table 5 (continued)

Issue	Total	Phase 1			Phase 2									Phase 3			
		2008	2009		2010		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
		Wash-ington	London	Pitts-burgh	Toronto	Seoul	Cannes	Los Cabos	St. Peters-burg	Bris-bane	Antalya	Hang-zhou	Ham-burg	Buenos Aires	Osaka	Riyadh	Rome
ICT/ Digital economy	122	0	0	0	0	0	0	0	0	0	2	48	26	11	6	3	26
Climate change	115	0	3	3	3	8	8	5	11	7	3	2	22	3	13	3	21
Health	124	0	0	0	0	0	0	0	0	33	2	3	19	4	14	14	35
Account-ability	79	4	3	15	3	4	5	13	9	17	2	4	0	0	0	0	0
Environ-ment	96	0	0	0	0	1	3	0	1	0	0	0	57	0	7	6	21
Gender	80	0	0	0	0	0	0	2	0	4	0	0	30	7	12	8	17
Interna-tional coopera-tion	49	0	0	3	0	2	12	3	12	0	0	7	9	0	0	1	0
Terrorism	48	0	0	0	0	0	0	0	1	0	12	3	24	3	5	0	0
Infrastruc-ture	51	0	0	0	0	0	0	0	0	28	0	8	6	1	1	3	4
Migration/ refugees	27	0	0	0	0	0	0	0	0	0	4	3	16	1	0	1	2
Social policy	19	0	1	1	2	1	3	1	0	0	3	1	2	0	0	0	4

Table 5 (continued)

Issue	Total	Phase 1			2010		Phase 2							Phase 3			
		2008	2009				2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
		Washington	London	Pittsburgh	Toronto	Seoul	Cannes	Los Cabos	St. Petersburg	Brisbane	Antalya	Hangzhou	Hamburg	Buenos Aires	Osaka	Riyadh	Rome
Human rights	13	0	0	0	0	0	0	0	0	0	0	0	0	4	5	4	0
Microeconomics	10	0	0	0	0	0	0	0	1	6	0	3	0	0	0	0	0
Education	9	0	0	3	0	0	1	0	0	0	0	0	1	0	0	0	4
Total	3,017	95	129	127	61	153	282	180	281	205	155	213	531	129	144	107	225

ICT information and communications technologies, *IFI* international financial institution

Table 6 Summit compliance

B-5a: By summit, 2008–2020

Summit	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	South Africa	Saudi Arabia	Turkey	United Kingdom	United States	European Union
2008	0.52	0.10	0.80	0.78	0.60	0.40	0.70	1.00	0.30	0	0.30	0.90	0.80	0.20	0.60	0.30	0.40	0.40	0.80	0.50	0.60
2009[a]	0.20	-0.30	0.60	0	0.50	0	0.60	0.70	-0.30	-0.40	0	0.20	0.20	0	0.10	-0.10	0.30	0.10	0.80	0.30	0.70
2009[b]	0.37	0.07	0.50	0	0.65	0.44	0.71	0.67	-0.13	-0.19	0.21	0.67	0.53	0.50	0.12	-0.25	0.60	0.19	0.88	0.71	0.40
2010[c]	0.40	0.15	0.60	0.46	0.73	0.50	0.53	0.53	0.15	0	0.67	0.53	0.60	0	0.21	0	0.08	0.18	0.73	0.40	0.62
2010[d]	0.34	-0.05	0.61	0.30	0.57	0.28	0.54	0.63	0.38	0.21	0.37	0.32	0.49	0.10	0.08	-0.03	0.21	0.13	0.73	0.37	0.55
2011	0.44	-0.04	0.68	0.44	0.52	0.44	0.60	0.72	0.48	0.08	0.52	0.44	0.68	0.44	0.32	0.13	0.28	0.04	0.76	0.44	0.74
2012	0.54	0.32	0.90	0.58	0.68	0.42	0.63	0.50	0.58	0.50	0.11	0.40	0.70	0.68	0.53	0.44	0.47	0.33	0.68	0.68	0.63
2013	0.34	0.07	0.52	0.30	0.52	0.11	0.58	0.73	0.48	0.22	0.42	0.33	0.22	0.30	0.22	-0.11	0.19	0.11	0.62	0.56	0.52
2014	0.42	-0.07	0.66	0.28	0.76	0.52	0.64	0.68	0.34	0.07	0.32	0.69	0.59	0.38	0.42	-0.07	0.03	0	0.69	0.69	0.71
2015	0.42	0.42	0.54	0.42	0.54	0.50	0.67	0.58	0.54	0.04	0.46	0.42	0.29	0.33	0.29	0.04	0.25	0.25	0.54	0.63	0.74
2016	0.43	0.50	0.68	0.29	0.84	0.52	0.45	0.65	0.55	0.26	0.16	0.45	0.48	0.23	0.35	0.29	0.19	0.06	0.52	0.32	0.81
2017	0.32	0.29	0.49	0.24	0.83	0.37	0.54	0.76	0.29	0.20	0.29	0.39	0.29	0.07	-0.02	-0.05	0.20	-0.20	0.71	0.05	0.68
2018	0.56	0.65	0.73	0.50	0.73	0.46	0.65	0.73	0.31	0.31	0.46	0.50	0.46	0.15	0.19	0.31	0	0.04	0.69	0.46	0.92
2019	0.50	0.48	0.74	0.30	0.70	0.43	0.67	0.86	0.39	0.22	0.52	0.65	0.35	0.39	0.30	0.30	0.39	0.26	0.74	0.38	0.91
2020	0.69	0.60	0.90	0.65	0.85	0.70	0.89	1.00	0.35	0.50	0.58	0.70	0.90	0.35	0.50	0.60	0.40	0.65	0.90	0.80	0.90
Total	0.42	0.23	0.65	0.36	0.68	0.41	0.61	0.70	0.36	0.17	0.37	0.48	0.48	0.27	0.25	0.11	0.24	0.13	0.70	0.46	0.70

B-5b: By issue, 2008–2020

Issue	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
Macroeconomics	0.63	0.44	0.79	0.46	0.93	0.70	0.52	0.89	0.69	0.56	0.56	0.52	0.64	0.63	0.74	0.41	0.38	0.50	0.72	0.55	0.85
Trade	0.34	-0.04	0.78	0.26	0.52	0.30	0.42	0.67	0.19	0.11	0.17	0.59	0.52	0.15	0.22	0.11	0.15	0.26	0.65	0.22	0.63

Table 6 (continued)

B-5b: By issue, 2008–2020

Issue	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
Financial regulation	0.51	0.13	0.71	0.52	0.67	0.58	0.75	0.75	0.50	0.32	0.42	0.78	0.42	0.17	0.33	0.29	0.38	0.17	0.67	0.63	0.79
Development	0.33	−0.13	0.54	0.27	0.63	0.29	0.55	0.71	0.35	0.08	0.27	0.46	0.34	0.02	0.16	0	0.10	0.17	0.73	0.53	0.67
Climate	0.35	0.19	0.64	0.22	0.71	0.47	0.78	0.87	0.29	0.13	0.43	0.40	0.50	0.36	−0.22	−0.37	0.02	−0.32	0.80	0.21	0.73
Energy	0.40	0.26	0.39	0.57	0.30	0.52	0.65	0.52	0.52	0.30	0.41	0.35	0.70	0.57	0.26	−0.05	0.22	−0.05	0.61	0.48	0.41
Crime/corruption	0.21	0.14	0.29	0.36	0.57	0.29	0.43	0.14	−0.14	0.29	0	−0.29	0.21	0.07	0.14	−0.14	0.14	0	0.64	0.36	0.64
IFI reform	0.36	−0.25	0.50	0.38	0.63	0.50	0.75	0.75	0.50	−0.25	0.13	0.88	0.50	0.25	0.13	0.13	0.38	0.13	0.50	0.25	0.38
Food/agriculture	0.45	0.80	0.50	0.70	0.90	0.10	0.60	0.50	0.60	0.40	0.60	0.20	0.20	0.30	0.40	0.20	0.10	0.20	0.50	0.50	0.60
International cooperation	0.15	0	0	0	0	0	0	0	0	0.50	0	0	0.50	0.50	1.00	0	0	0	0.50	0	0
Labour/employment	0.52	0.52	0.84	0.40	0.76	0.32	0.56	0.72	0.56	0.16	0.52	0.60	0.52	0.28	0.44	0.28	0.52	0.36	0.72	0.56	0.80
Microeconomics	0.78	1.00	1.00	0	1.00	0.50	1.00	1.00	1.00	0.50	0.50	0.50	1.00	0.50	0.50	0.50	1.00	1.00	1.00	1.00	1.00
Gender	0.30	0.07	0.69	0.13	0.80	−0.13	0.53	0.75	0	−0.20	0.47	0.31	0.44	0	−0.07	0.33	0.07	−0.20	0.53	0.67	0.71
Health	0.43	0.11	0.68	0.28	0.79	0.53	0.58	0.68	0.26	−0.05	0.11	0.63	0.58	0	0.26	0.21	0.32	0.16	0.79	0.79	0.84
Infrastructure	0.82	1.00	1.00	1.00	1.00	0.67	0.33	0.67	0.67	1.00	1.00	0.33	0.67	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00
Migration	0.47	1.00	0.33	1.00	1.00	0	0.67	1.00	−0.33	0.33	0.67	0.33	0	0.33	0.33	0.33	−0.33	1.00	0.33	0.33	1.00

Table 6 (continued)

B-5b: By issue, 2008–2020

Issue	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
Terrorism	0.54	0.67	0.50	0.33	0.83	0.50	0.83	0.83	0.50	0.17	0.67	0.17	0.83	0.33	0.50	0.50	−0.17	0.33	0.67	0.83	1.00
ICT	0.67	0.67	0.67	0.67	1.00	0.67	0.67	0.67	0.67	0.67	0.33	0.33	1.00	0.67	0.67	1.00	0.33	0.67	0.67	0.33	1.00
Tax	0.54	0.53	0.69	0.47	0.63	0.53	0.72	0.75	0.56	0.25	0.53	0.75	0.47	0.44	0.47	0.19	0.59	0.22	0.81	0.50	0.74
Digital economy	0.35	0.63	0.89	0.44	0.89	0.33	0.56	0.44	0.11	0	0.22	0.22	0.56	0.11	0.33	0.22	−0.11	−0.11	0.56	0	0.78
Environment	0.19	0.33	0.83	−0.50	0.50	0.50	0.50	0.83	−0.17	−0.50	−0.17	0.50	0.50	−0.17	−0.17	−0.33	0.17	−0.33	0.83	0	0.67
Overall	0.42	0.23	0.65	0.36	0.69	0.41	0.61	0.71	0.37	0.18	0.37	0.48	0.49	0.26	0.25	0.11	0.24	0.13	0.70	0.47	0.71

B-5c: Climate change, 2016–2020

Year	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
2016	0.65	1.00	1.00	0.50	1.00	1.00	1.00	1.00	0.50	0.50	0.50	1.00	0.50	1.00	−0.50	0.50	0.50	−0.50	1.00	−1.00	1.00
2017	0.31	0.11	0.11	0.33	1.00	0.56	0.89	0.89	0.67	0.22	0.56	0.11	0.11	0.22	−0.33	−0.56	0.11	−0.78	0.89	−0.83	0.78
2018	0.41	0.33	1.00	0.33	1.00	0.33	1.00	1.00	0	−0.33	1.00	0.67	0.67	0.33	−0.67	0	−0.67	−0.33	1.00	1.00	1.00
2019	0.44	0.60	0.80	0.20	0.60	0.60	0.80	1.00	0.60	−0.20	0.80	0.40	0.60	0	−0.20	0	0.40	0	0.80	0.33	0.80
2020	0.75	1.00	1.00	0.50	1.00	1.00	1.00	1.00	0	0	0	0	0.50	0	0	0	0	0.50	0.50	0.50	0.50
Average	0.43	0.43	0.57	0.33	0.90	0.62	0.90	0.95	0.48	0.05	0.62	0.33	0.38	0.24	−0.33	−0.19	0.10	−0.38	0.86	−0.29	0.81

B-5d: Biodiversity, 2016–2020

Year	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
2016	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 6 (continued)

B-5d: Biodiversity, 2016–2020

Year	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
2017	-0.10	0	1.00	-0.50	0	-0.50	0.50	0.50	0	-1.00	0	0.50	0	-1.00	-0.50	-1.00	0	-1.00	1.00	0	0
2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2019	0.05	0	1.00	-1.00	0	1.00	0	1.00	-1.00	-1.00	0	0	1.00	0	-1.00	-1.00	0	0	0	-1.00	1.00
2020	0.45	1.00	1.00	0	1.00	1.00	1.00	1.00	0	-1.00	-1.00	1.00	1.00	0	0	1.00	0	0	1.00	0	1.00
Average	0.08	0.25	1.00	-0.50	0.25	0.25	0.50	0.75	-0.25	-1.00	-0.25	0.50	0.50	-0.50	-0.50	-0.50	0	-0.50	0.75	-0.25	0.50

B-5e: Infrastructure, 2016–2020

Year	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2018	0.65	1.00	1.00	1.00	1.00	0	1.00	0	0	1.00	1.00	0	1.00	1.00	1.00	1.00	0	0	0	1.00	0.65
2019	0.85	1.00	1.00	1.00	1.00	1.00	0	1.00	1.00	1.00	1.00	0	0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85
2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	0.75	1.00	1.00	1.00	1.00	0.50	0.50	0.50	0.50	1.00	1.00	0	0.50	1.00	1.00	1.00	0.50	0.50	0.50	1.00	0.75

B-5f: Digital economy, 2016–2020

Year	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
2016	-0.04	0.75	0.75	0	1.00	0	0.25	0	-0.25	-1.00	-0.50	-0.25	0.25	-0.50	-0.25	-0.25	-0.50	-0.75	0.25	-0.25	0.50

Table 6 (continued)

B-5f: Digital economy, 2016–2020

Year	Average	Argentina	Australia	Brazil	Canada	China	France	Germany	India	Indonesia	Italy	Japan	Korea	Mexico	Russia	Saudi Arabia	South Africa	Turkey	United Kingdom	United States	European Union
2017	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0	1.00	1.00	1.00	1.00	1.00	0	1.00	1.00	1.00
2018	0.48	0.50	1.00	0.50	0.50	1.00	0.50	0.50	0	0.50	0.50	0.50	0.50	0	1.00	0.50	0	0.50	0.50	−0.50	1.00
2019	0.70	0	1.00	1.00	1.00	0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0	0	0	0	1.00	1.00	1.00
2020	0.80	1.00	1.00	1.00	1.00	0	1.00	1.00	0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0	1.00	1.00	0	1.00
Average	0.35	0.63	0.89	0.44	0.89	0.33	0.56	0.44	0.11	0	0.22	0.22	0.56	0.11	0.33	0.22	−0.11	−0.11	0.56	0	0.78

ICT information and communications technologies, *IFI* international financial institution

[a]London Summit

[b]Pittsburgh Summit

[c]Toronto Summit

[d]Seoul Summit

Table 7 Development of global governance

B-6a: Internal and external

Phase	Summit	Internal	External	Total	% internal	% external
1	2008 Washington	6	39	45	13.3	86.7
	2009 London	6	120	126	4.8	95.2
	2009 Pittsburgh	30	114	144	20.8	79.2
	2010 Toronto	74	163	237	31.2	68.8
	2010 Seoul	99	237	336	29.5	70.5
2	2011 Cannes	59	251	310	19.0	81.0
	2012 Los Cabos	65	143	208	31.2	68.8
	2013 St. Petersburg	190	237	427	44.5	55.5
3	2014 Brisbane	39	44	83	47.0	53.0
	2015 Antalya	42	62	104	40.4	59.6
	2016 Hangzhou	179	223	402	44.5	55.5
	2017 Hamburg	468	241	709	66.0	34.0
4	2018 Buenos Aires	20	24	44	45.5	54.5
	2019 Osaka	56	54	110	50.9	49.1
	2020 Riyadh	54	51	105	51.4	48.6
	2021 Rome	31	70	101	30.7	69.3

B-6b: External, by institution

Institution	2008	2009[a]	2009[b]	2010[c]	2010[d]	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
International financial institutions	4	2	1	9	5	1	0	1	1	1	0	1	0	0	0	0
International monetary fund	11	36	35	35	31	45	22	32	11	9	36	35	4	6	10	10
World Bank	5	8	13	16	25	9	15	24	3	4	25	13	3	8	4	3
Multilateral development banks	2	8	6	15	17	9	3	1	2	2	8	0	0	0	0	0
Bretton woods institutions	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Financial stability forum	8	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
World Trade Organization	2	2	4	3	9	11	9	34	4	4	19	12	1	5	2	7
United Nations	2	3	9	7	33	51	16	16	3	9	22	31	1	6	1	1
United Nations Environment Programme	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Table 7 (continued)

B-6b: External, by institution

Institution	2008	2009[a]	2009[b]	2010[c]	2010[d]	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
United Nations Environment Assembly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UN-Habitat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
United Nations High Commission for Refugees	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
World Tourism Organization	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UNESCO	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1
United Nations Framework Convention on Climate Change	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
Financial Sector Assessment Program	1	3	0	3	2	0	0	0	0	0	0	0	0	0	0	0
Financial Action Task Force	1	4	2	2	3	5	4	6	0	5	7	33	1	5	5	5
Organization for Economic Co-operation and Development	1	2	5	7	20	15	16	47	9	12	59	45	4	8	10	13
Financial Stability Board	0	19	10	25	24	33	20	19	3	5	17	33	1	3	7	
Global Forum	0	3	2	2	3	9	3	16	0	0	4	2	0	0	0	0
G7/8	0	1	1	0	0	0	0	0	0	0	0	7	0	0	0	0
International Labour Organization	0	1	6	5	6	6	3	7	1	2	8	3	1	2	3	3
Basel Committee on Banking Supervision	0	6	0	11	5	2	0	1	0	0	4	0	0	0	0	0
Committee on the Global Financial System	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 7 (continued)

B-6b: External, by institution

Institution	2008	2009[a]	2009[b]	2010[c]	2010[d]	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Bank for International Settlements	0	1	0	0	1	4	2	2	0	1	2	2	0	0	0	0
International Accounting Standards Board	0	1	1	2	2	2	0	1	0	0	0	0	0	0	0	0
International Organization of Securities Commissions	0	3	2	1	5	11	4	6	0	0	2	2	0	0	0	0
Debt Sustainability Framework	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asian Development Bank	0	1	0	1	0	1	0	1	0	0	0	0	0	1	0	0
Inter American Development Bank	0	1	1	4	1	0	0	1	0	0	0	0	0	0	0	0
African Development Bank	0	1	1	2	1	0	0	1	0	0	0	3	0	0	0	0
European Bank for Reconstruction and Development	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
International Finance Corporation	0	2	1	3	2	1	0	0	0	0	0	0	0	0	0	0
International Development Association	0	1	1	2	2	0	0	1	0	0	1	0	0	0	0	0
International Bank for Reconstruction and Development	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
International financial system	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Basel Capital Framework	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
African Development Fund	0	0	1	2	0	0	0	0	0	0	1	0	0	1	0	0
International Energy Agency	0	0	3	1	6	4	2	1	0	0	0	0	0	0	0	1

Table 7 (continued)

B-6b: External, by institution

Institution	2008	2009[a]	2009[b]	2010[c]	2010[d]	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Organization of Petroleum Exporting Countries	0	0	2	1	6	5	2	1	0	0	0	0	0	0	0	0
International Energy Forum	0	0	2	0	4	5	3	0	0	0	0	0	0	0	0	1
Major Economies Forum	0	0	1	0	0	0	0	9	0	0	0	0	0	0	0	0
Food and Agriculture Organization	0	0	1	1	4	3	2	0	0	0	2	0	0	0	0	2
International Fund for Agricultural Development	0	0	1	1	2	2	0	0	0	0	0	0	0	0	0	0
Financial Accounting Standards Board	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0
Globally systemically significant financial institutions	0	0	0	0	4	6	6	0	0	0	0	0	0	0	0	0
Global Partnership for Financial Inclusion	0	0	0	0	9	2	2	4	0	0	3	16	1	0	1	0
Asia Pacific Economic Co-operation	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
International Maritime Organization	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Business 20	0	0	0	0	0	2	2	3	0	2	0	2	0	0	0	0
Labour 20	0	0	0	0	0	2	2	2	0	2	0	0	0	0	0	0
Association of Southeast Asian Nations	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0
Economic Community of West African States	0	0	0	0	0	2	2	0	1	0	0	0	0	0	0	0
Think 20	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Civil 20	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0
Youth 20	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0

Table 7 (continued)

B-6b: External, by institution

Institution	2008	2009[a]	2009[b]	2010[c]	2010[d]	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
European Investment Bank	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
International Atomic Energy Agency	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
World Health Organization	0	0	0	0	0	0	0	0	3	0	0	0	2	2	1	10
African Union	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Women 20	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Paris Club	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1
Intergovernmental Panel on Climate Change	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
International Organization for Migration	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
International Civil Aviation Organization	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
International Telecommunication Union	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Inter-Agency Group on Economic and Financial Statistics	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
OIE (World Organization for Animal Health)	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1
World Customs Organization	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

Table 7 (continued)

B-6b: External, by institution

Institution	2008	2009[a]	2009[b]	2010[c]	2010[d]	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
World Health Assembly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Total	39	120	114	163	237	251	143	236	44	62	223	241	24	54	51	70

B-6c: Ratio between World Bank (development) and international monetary fund (financial stability)

	2008	2009[a]	2009[b]	2010[c]	2010[d]	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
World Bank	5	8	13	16	25	9	15	24	3	4	25	13	3	8	4	3
International Monetary Fund	11	36	35	35	31	45	22	32	11	9	36	35	4	6	10	10
Ratio WB:IMF	0.5	0.2	0.4	0.5	0.8	0.2	0.7	0.8	0.3	0.4	0.7	0.4	0.8	1.3	0.4	0.3

There has been no mention of the Asian Infrastructure Investment Bank in G20 documents

[a]London Summit

[b]Pittsburgh Summit

[c]Toronto Summit

[d]Seoul Summit

Appendix C

See Tables 8, 9 and 10.

Table 8 Analysis of leaders' speeches and G20 summit conclusions

C-1a: Portion of key subjects in Xi Jinping's G20 speeches and G20 conclusions

Summit	Climate change			Biodiversity			Infrastructure			Digital economy			Development		
	Portion		Difference	Portion		Difference	Portion		Difference	Portion		Difference	Portion		Difference
	Xi (%)	G20 (%)		Xi (%)	G20 (%)		Xi (%)	G20 (%)		Xi (%)	G20 (%)		Xi (%)	G20 (%)	
2016	12.6	4.9	+7.7	2.9	0.5	+2.4	9.8	4.6	+5.2	8.6	18.7	−10.1	68.9	25.0	+43.9
2017	10.2	10.4	−0.2	0	7.0	−7.0	9.6	3.9	+5.7	30.5	14.4	+16.1	20.3	17.0	+3.3
2018	0	4.7	−4.7	0	2.0	−2.0	11.2	8.4	+2.8	14.7	16.7	−2.0	86.1	17.0	+69.1
2019	26.7	9.9	+16.8	0	6.0	−6.0	0	7	−7.0	26.7	13.0	+13.7	58.0	17.0	+51.0
2020	9.5	12.0	−2.5	9.5	7.5	+2.0	0	6	−6.0	17.0	9.0	+8.0	48.4	15.0	+33.4
2021	25.1	31.0	−5.9	5.3	11.5	−6.2	15.5	12.2	+3.3	15.9	27.6	−11.7	73.3	26.0	+47.3
Average	14.2	12.2	+2.0	3.0	5.8	−2.8	7.7	7.0	+0.7	18.9	16.6	+2.3	59.2	19.5	+39.7

C-1b: Portion of key subjects in Xi Jinping's pre-summit speeches and G20 conclusions

Summit	Climate change			Biodiversity			Infrastructure			Digital economy			Development		
	Portion		Difference (%)	Portion		Difference (%)	Portion		Difference (%)	Portion		Difference (%)	Portion		Difference (%)
	Xi (%)	G20 (%)		Xi (%)	G20 (%)		Xi (%)	G20 (%)		Xi (%)	G20 (%)		Xi (%)	G20 (%)	
2016	16.9	4.9	12.00	0.0	0.5	−0.50	0.0	4.6	−4.60	0.0	18.7	−18.70	63.4	25.0	38.40
2017	26.1	10.4	15.70	1.2	7.0	−5.80	3.4	3.9	−0.50	2.3	14.4	−12.10	70.0	17.0	53.00
2018	12.7	4.7	8.00	2.6	2.0	0.60	7.7	8.4	−0.70	4.2	16.7	−12.50	55.4	17.0	38.40
2019	2.9	9.9	−7.00	0.0	6.0	−6.00	2.8	7	−4.20	4.6	13.0	−8.40	55.6	17.0	38.60
2020	6.8	12.0	−5.20	0.0	7.5	−7.50	6.5	6	0.50	0.0	9.0	−9.00	43.4	15.0	28.40
2021	25.7	31.0	−5.30	0.0	11.5	−11.50	2.6	12.2	−9.60	4.5	27.6	−23.10	71.7	26.0	45.70
Average	15.2	12.2	3.00	0.6	5.8	−5.20	3.8	7.0	−3.20	2.6	16.6	−14.00	59.9	19.5	40.40

Portion: percentage of total words on the subject in Xi Jinping's speeches and in G20 communiqué. Positive (+) difference indicates Xi's leadership

Table 9 Portion of key subjects in US presidents' pre-summit speeches (State of the Union addresses and United Nations General Assembly) and G20 conclusions

Summit	Climate change			Biodiversity			Infrastructure			Digital economy			Development		
	Portion		Difference (%)	Portion		Difference (%)	Portion		Difference (%)	Portion		Difference (%)	Portion		Difference (%)
	US (%)	G20 (%)		US (%)	G20 (%)		US (%)	G20 (%)		US (%)	G20 (%)		US (%)	G20 (%)	
2016	5.1	4.9	0.20	0.0	0.5	− 0.50	0.0	4.6	− 4.60	0.6	18.7	− 18.10	5.1	25.0	− 19.90
2017	3.9	10.4	− 6.50	0.0	7.0	− 7.00	4.3	3.9	0.40	2.0	14.4	− 12.40	13.1	17.0	− 3.90
2018	0.0	4.7	− 4.70	0.0	2.0	− 2.00	1.2	8.4	− 7.20	1.1	16.7	− 15.60	5.0	17.0	− 12.00
2019	0.0	9.9	− 9.90	0.0	6.0	− 6.00	2.3	7.0	− 4.70	0.0	13.0	− 13.00	5.1	17.0	− 11.90
2020	1.0	12.0	− 11.00	0.7	7.5	− 6.80	0.4	6.0	− 5.60	0.4	9.0	− 8.60	4.7	15.0	− 10.30
2021	12.3	31.0	− 18.70	0.0	11.5	− 11.50	5.2	12.2	− 7.00	3.0	27.6	− 24.60	7.9	26.0	− 18.10
Average	3.7	12.2	− 8.50	0.1	5.8	− 5.70	2.2	7.0	− 4.80	1.2	16.6	− 15.40	6.8	19.5	− 12.70

Portion: percentage of total words on the subject in speeches by Barack Obama (2016), Donald Trump (2017–2020) and Joe Biden (2021) and in G20 communiqué. Positive (+) difference indicates the presidents' leadership

Table 10 Portion of key subjects in Narendra Modi's speeches (Congress and United Nations General Assembly) and G20 conclusions

Summit	Climate change			Biodiversity			Infrastructure			Digital economy			Development		
	Portion		Difference (%)	Portion		Difference (%)	Portion		Difference (%)	Portion		Difference	Portion		Difference (%)
	India (%)	G20 (%)		India (%)	G20 (%)		India (%)	G20 (%)		India (%)	G20 (%)		India (%)	G20 (%)	
2016	11.8	4.9	6.90	8.4	0.5	7.90	7.6	4.6	3.00	3.6	18.7	− 15.10	22.4	25.0	− 2.60
2017	4.0	10.4	− 6.40	2.2	7.0	− 4.80	0.0	3.9	− 3.90	4.2	14.4	− 10.20	17.3	17.0	0.30
2018	4.3	4.7	− 0.40	1.0	2.0	− 1.00	1.5	8.4	− 6.90	4.5	16.7	− 12.20	19.8	17.0	2.80
2019	1.6	9.9	− 8.30	2.3	6.0	− 3.70	0.0	7.0	− 7.00	1.2	13.0	− 11.80	13.9	17.0	− 3.10
2020	0.0	12.0	− 12.00	4.4	7.5	− 3.10	3.0	6.0	− 3.00	3.6	9.0	− 5.40	15.9	15.0	0.90
2021	2.2	31.0	− 28.80	5.5	11.5	− 6.00	4.1	12.2	− 8.10	5.3	27.6	− 22.30	18.8	26.0	− 7.20
Average	4.0	12.2	− 8.20	4.0	5.8	− 1.80	2.7	7.0	− 4.30	3.7	16.6	− 12.90	18.8	19.5	− 0.70

Appendix D

See Table 11.

Table 11 G7 and G20 democracy rank

Member	2014	2015	2016	2017	2018	2019	2020	2015–2020
Argentina	52	50	49	48	47[a]	48	48	+2
Australia	9	9	10	8	9	9	9[a]	0
Brazil	44	51	51	49	50	52	49	+3
Canada	7	7	6[a]	6[a]	6[a]	7[a]	5	+2
China	144	136[a]	136[a]	139	130	153	151	−15
France	23	27	24[a]	29	29	20	24	+3
Germany	13	13	13	13	13	13	14	−1
India	27	35	32	42	41	51	53	−18
Indonesia	49	49	48	68	65	64	64[a]	−15
Italy	29	21	21[a]	21[a]	33	35	29	−8
Japan	20	23[a]	20	23[a]	22	24	21	+2
Korea	21	22	24[a]	20	21	23	23	−1
Mexico	57[a]	66	67	66[a]	71[a]	73	72	−6
Russia	132	132[a]	134	135	144[a]	134[a]	124	+8
Saudi Arabia	161	160[a]	159[a]	159[a]	159[a]	159[a]	156	+4
South Africa	30	37	39	41	40	40	45	−8
Turkey	98[a]	97	97	100	110	110	104	−7
United Kingdom	16	16	16	14	14	14	16	0
United States	19	20	21[a]	26	25	25	25	−5
G20 average	47	35	48	52	43	47	56	−21
G7 average	18	17	16	21	23	22	19	+2
BRICS	75	41	64	81	65	74	84	−43

Source: Economist Intelligence Unit (2017). "Democracy Index 2017: Free Speech under Attack." London. https://services.eiu.com/campaigns/democracy-index-2017-free-speech-under-attack

Democracy scores and ranks are measured by the following indicators: electoral process and pluralism, functioning of government, political participation, political culture and civil liberties. Rankings for 2014–2019 cover 161 countries; rankings for 2020 cover 167 countries

[a]Country is tied with another country, either inside or outside the G7/G20

Appendix E

See Table 12.

Table 12 G7 and G20 climate change performance

Country	2014	2015	2016	2017	2018	2019	2020
Argentina	41	48	48	36	46	34	46
Australia	57	60	59	57	57	55	54
Brazil	36	49	43	40	19	22	25
Canada	58	58	56	55	51	54	58
China	46	45	47	48	41	33	33
France	10	12	8	4	15	21	23
Germany	19	22	22	29	22	27	19
India	30	31	25	20	14	11	10
Indonesia	34	23	24	22	37	38	24
Italy	18	17	11	16	16	23	27
Japan	50	53	58	60	50	49	45
Korea	53	55	57	58	58	57	53
Mexico	20	18	28	28	27	25	32
Russia	56	56	53	53	53	52	52
Saudi Arabia	61	61	61	61	60	60	60
South Africa	39	37	38	32	48	39	37
Turkey	54	51	50	51	47	50	42
United Kingdom	5	6	5	6	9	8	5
United States	43	44	34	43	56	59	61
European Union	N/A	N/A	N/A	N/A	21	16	16
Average	38	39	38	38	37	37	36

Source: Germanwatch (2015–2020). "Climate Change Performance Index." Various editions. Bonn. https://germanwatch.org/en/CCPI

The years 2015, 2016, 2019, and 2020 ranked 58 countries; 2017 ranked 57 countries; 2018 ranked 56 countries; 2019 and 2020 ranked 60 countries

N/A not available

Appendix F

See Table 13.

Table 13 Communiqué-recognized shock-activated vulnerabilities

Summit	Climate Change			Biodiversity			Infrastructure			Digital Economy			Development		
	S/V	Xi (%)	G20 (%)	S/V	Xi (%)	G20 (%)	S/V	Xi (%)	G20 (%)	S/V	Xi (%)	G20 (%)	S/V	Xi (%)	G20 (%)
2016	0	12.6	4.9	0/0	2.9	0.5	0/3	9.8	4.6	0/2	8.6	18.7	0	68.9	25.0
2017	0	10.2	10.4	0/0	0	7.0	0/1	9.6	3.9	3/4	30.5	14.4	0	20.3	17.0
2018	0	0	4.7	1/0	0	2.0	0/2	11.2	8.4	0/1	14.7	16.7	0	86.1	17.0
2019	0	26.7	9.9	2/0	0	6.0	0/2	0	7	0/1	26.7	13.0	0	58.0	17.0
2020	0	9.5	12.0	2/0	9.5	7.5	0/1	0	6	1/1	17.0	9.0	0	48.4	15.0
2021	0	25.1	31.0	1/0	5.3	11.5	0	15.5	12.2	2/5	15.9	27.6	0	73.3	26.0

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John Kirton is director and founder of the G20 Research Group and the G7 Research Group, codirector of the BRICS Research Group, and co-director of the Global Health Diplomacy Program, all under the umbrella of the Global Governance Program at Trinity College in the University of Toronto, where he is a professor of political science and Canadian foreign policy. He is the author of *China's G20 Governance* (2016) and *G20 Governance for a Globalized World* (2013); coauthor of *Reconfiguring the Global Governance of Climate Change* (2022) and *Global Governance of Climate Change: G7, G20, and UN Leadership* (2015); and coeditor of *Accountability for Effectiveness in Global Governance* (2018) and *BRICS and Global Governance* (2018). With GT Media Group and the Global Governance Project, he is co-editor most recently of *G20 Italy: The 2021 Rome Summit* and *G7 UK: The 2021 Cornwall Summit*, as well as *Health: A Political Choice – Solidarity, Science, Solutions*. Follow him on Twitter @ jjkirton.

Alissa Xinhe Wang is a student at the University of Toronto, pursuing the combined JD/PhD program at the Faculty of Law and Department of Political Science. She is the co-chair of summit studies of the BRICS Research Group and a former editor of the G20 Research Group. Her areas of interest include Chinese politics, modern Chinese history, China's role in global governance, and international summit institutions.