

AI for Global Governance

Using Predictive Machine Learning to Improve the Efficiency of G7 and G20 Summits

Research paper

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The G20 Research Group is a global network of scholars, students, and professionals in the academic, research, business, non-governmental, and other communities who follow the work of the G20 leaders, finance ministers central bank governors, and other G20 institutions. It is directed by Trinity College at the University of Toronto, also the home of the G7 Research Group. Our mission is to serve as the world's leading independent source of information and analysis on the G20.

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ABSTRACT

G7 and G20 summits play crucial roles in tackling global challenges. However, historical data show that only 62% and 54% of commitments made by their leaders have been fully met, respectively. In the face of new global challenges, it is imperative for G7 and G20 institutions to increase their effectiveness through stronger multilateralism, achieved by improving the success rate of implementing their summit commitments. This article explores the potential for predictive artificial intelligence to improve G7 and G20 effectiveness. A predictive model was trained using historical compliance rates for each member, G7 and G20 ministerial meeting patterns, economic conditions, and commitment attributes. With a predictive accuracy rate of over 80%, the tool can enhance the impact of the G7 and G20 by identifying commitments with a high risk of failure, enabling G7 and G20 members to strategically allocate resources to better meet commitments.

INTRODUCTION

The call for effective global governance is intensifying, yet the available resources and mechanisms are not keeping pace, resulting in a substantial performance gap. None of the 17 Sustainable Development Goals (SDGs) is currently on track for achievement by their impending 2030 deadline. Climate change looms as an existential threat, and the rapid advances in artificial intelligence (AI) pose both unknown dangers and promises of benefits for SDG-related issues and beyond. Consequently, the world looks to premier global summit institutions, namely the G7 major democratic powers and the G20 sys-

temically significant states, to bridge this gap before it becomes irreversible.

A significant critique of G7 and G20 summit governance revolves around the observed failure of their members to fulfill the collective commitments made during summits, potentially undermining the institutions' overall effectiveness (Kokotsis, 2017). Understanding the extent of members' compliance with these commitments and, more importantly, identifying strategies to enhance compliance is crucial for effectively addressing the issues that these institutions aim to tackle (Kirton & Larionova, 2018).

G7 AND G20 SUMMIT COMMITMENTS

Summit commitments are measurable promises made by summit members to undertake future action to meet, move toward, or adjust to reach a welfare target. For each G7 and G20 summit, the G7 Research Group (based at the University of Toronto) and G20 Research Groups (led by teams from the University of Toronto and the Russian Academy of National Economy and Public Administration [RANEP]), have identified commitments from official documents issued by leaders at the summit. From these, a subset of priority commitments is selected, representing central priorities and over-

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»... leveraging available data to predict future compliance offers a practical approach for directing resources«

all achievements of the summit, including the built-in and innovative agendas. Analysts then assess the members' compliance with these priority commitments based on a standardized method outlined in the compliance coding manual (Global Governance Program, 2019).

Since 1996, the G7 Research Group has produced compliance reports on the progress made by each G7 member in meeting the G7 summit's priority commitments, publishing an interim compliance report to assess progress at the halfway point between summits. Similarly, the G20 Research Group and RANEPa have produced interim and final compliance reports on the progress made by each G20 member in meeting priority commitments at each G20 summit since the first in 2008. Altogether, this work has produced several decades worth of data on compliance with G7 and G20 commitments for all members.

Using this data, past findings suggest that seven key instruments exhibit noteworthy impacts on compliance rates (Rapson & Kirton, 2020). These instruments include the total number of commitments generated at the summit, the quantity of official documents released, the specification of a particular deadline in the commitment, the hosting of a ministerial

meeting on the same subject, the binding level of the commitment, the mention of developing countries and the number of commitments on the same subject.

Among these instruments, hosting a ministerial meeting on the same subject during the year the summit takes place and the binding level of the commitment exhibit the most plausible causal relationship with compliance. Same-subject ministerial meetings, focusing on specific subjects relevant to the commitment, such as macroeconomic policy, may enhance information exchange and policy coordination. Meanwhile, using more highly binding language in commitments could foster a shared sense of urgency for collective and coordinated actions (Slaughter, 2004; Larionova, Rakhmangulov & Shelepov, 2018).

Increasing G7 and G20 summit effectiveness by capitalizing on patterns associated with higher compliance probabilities poses challenges, as performance is largely influenced by external factors. Instead, it may be more useful to leverage available data to predict future compliance – offering a practical approach for directing resources to members at higher risk of failing to meet their politically obligatory commitments.

PREDICTING COMPLIANCE

The robust data available on the historical compliance with G7 and G20 commitments provides a unique opportunity to predict members' compliance with future commitments, thus enabling summit attention to focus on highly important commitments that are at risk of not being fully or adequately met. The G7 and G20 Compliance Simulators have been developed with this precise objective. Accessible online at no

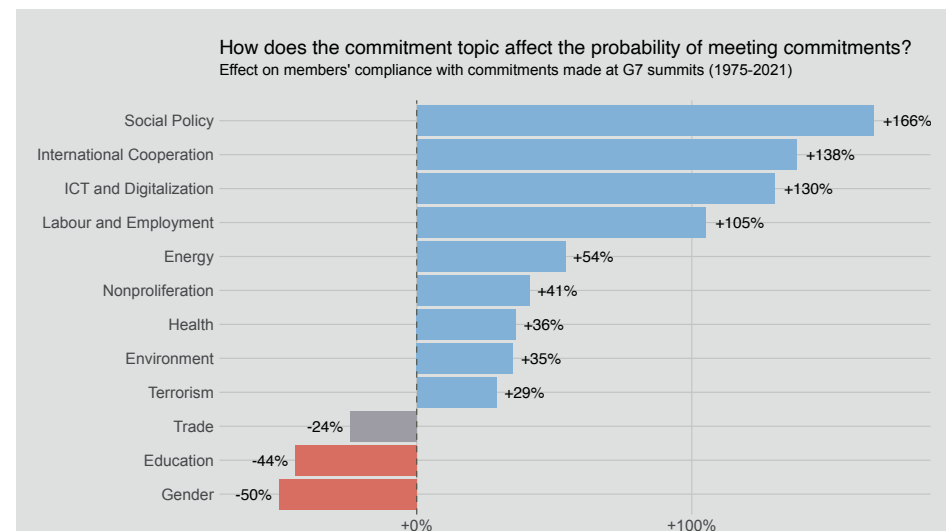
cost, interested parties can input relevant information about each commitment to pinpoint members who may require support in meeting their G7 or G20 obligations (G7 Compliance Simulator 2023; G20 Compliance Simulator 2023).

Constructing this model involved amalgamating a diverse array of data sources, encompassing historical compliance rates, details about G7 and G20 ministerial meetings (including their timing and subjects), G7 and G20 members' affiliations with international organizations, economic conditions, the focus of summit commitments, the host country of the summit and specific attributes of the commitments themselves – such as the strength of the language, mention of monetary commitments and specified timelines for compliance. The core dataset used for training the model comprised 5,994 assessments of past G7 compliance patterns and 7,940

assessments of past G20 compliance patterns conducted by the G7 and G20 Research Groups.

By compiling each G7 member's historical performance across these individual commitments, a binomial regression model was constructed to analyze the impact of various summit and commitment characteristics. The findings revealed several key features associated with increased compliance probabilities. These included references to democracy or human rights, pre-G7 ministerial meetings, the establishment of official G7 bodies in relevant issue areas, and summit hosting. Notably, the host country's influence on compliance levels varied, with higher compliance observed when the United Kingdom hosts the summit and lower compliance when France and Canada took the helm. Additionally, significant variations in compliance probabilities were identified

Figure 1: Effect of commitment topic on G7 member compliance



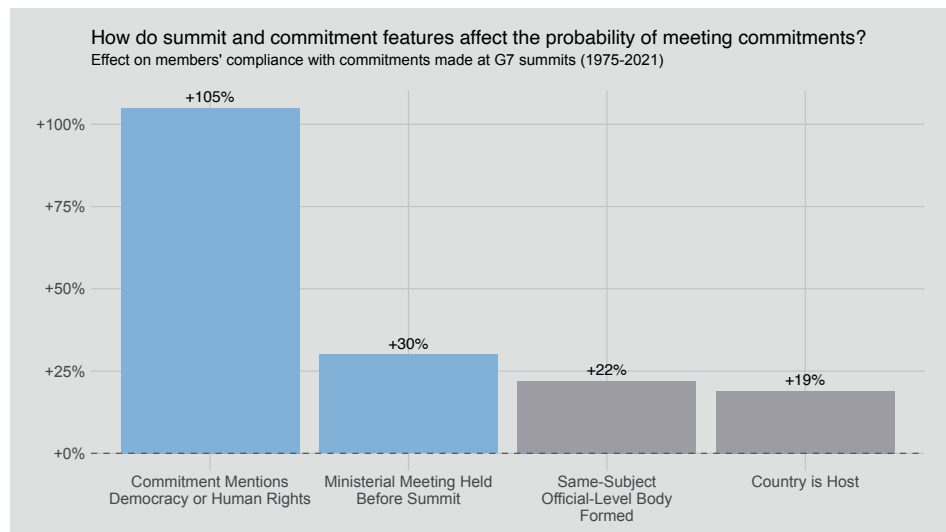


Figure 2: Effect of summit characteristics on G7 member compliance

among G7 members, with the European Union and the United Kingdom displaying higher likelihoods of fulfilling commitments compared to France, Japan, and Italy. Compliance probabilities varied according to the commitment’s subject area of focus. Commitments related to social policy, international cooperation, information and communications technology (ICT) and digitalization, labor and employment, and energy exhibited higher likelihoods of fulfillment. Conversely, commitments about education and gender were less likely to be achieved.

Similar results were found for the G20. A binomial regression model revealed that several key characteristics of summits and commitments, such as meetings of G20 ministers and references to other G20 summits, were associated with a significant increase in the probability of a given member complying with a specific G20

commitment. However, commitments that mention specific dates or monetary values are associated with a significantly lower probability of being complied with. There was also variation in the probability of compliance among G20 members. Australia, the United Kingdom, Japan, and Canada were more likely to meet commitments, and Italy, Indonesia, and Saudi Arabia were less likely to do so. Finally, compliance probability varied by the commitment’s area of focus. Commitments related to macroeconomic policy were more than twice as likely to be achieved, the highest of any commitment issue area. Compliance was also more likely for commitments regarding labor and employment, financial regulation, terrorism, and international taxation. Compliance was less likely for commitments regarding international cooperation, crime and corruption, and gender.

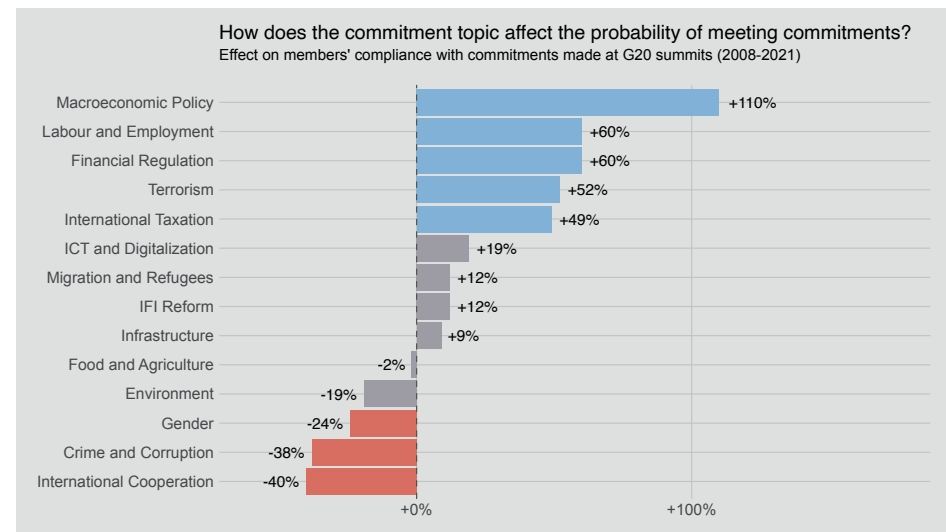


Figure 3: Effect of commitment topic on G20 member compliance

Despite identifying numerous significant variables, the overall explanatory power of the model remains modest. When considering all summit characteristics, economic conditions, and commitment features collectively, only 7.3% of the variance in G7 compliance and 8.3% of the variance in G20 compliance could be explained (McFadden’s pseudo R²). This suggests that a considerable portion of G7 and G20 compliance may be influenced by unknown factors or may be purely random.

Nevertheless, prospects for enhancing summit effectiveness exist. Although the model’s explanatory power is limited, it can be used to predict future compliance. A binomial logistic regression model accurately predicts compliance in a holdout set with 67% accuracy, and a random forest classifier model demonstrates 88% and 86% accuracy in predicting compliance with G7 and G20 summit commitments, re-

spectively. Though not flawless, the latter model performs significantly better than chance, enabling the detection of potential compliance issues using the simulation tool as commitments are made, directing scarce resources effectively.

The forecasting model is based on a random forest binary classifier, integrating 500 trees with eight variables select-

»... the G7 and G20 Compliance Simulators can enhance the impact of the G7 and G20 by identifying high-risk commitments early«

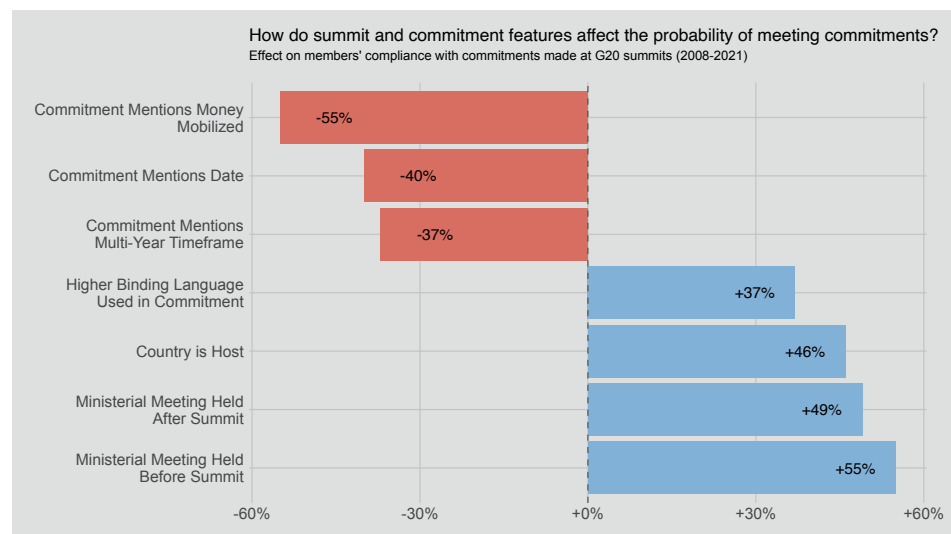


Figure 4: Effect of summit characteristics on G20 member compliance

ed at each split. The binary classification nature of the model enables it to predict whether a member is likely to comply with a given commitment. When evaluated on a holdout dataset, both the G7 and G20 models were over 80% accurate in predicting compliance. This is quite impressive, as many factors that influence compliance are likely idiosyncratic political and logistical factors that are not accounted for in the data as they are difficult to quantify.

To enhance user-friendliness and accessibility, the predictive AI tool has been developed as an online web application. This application allows users to input specific features of a commitment made during a G7 or G20 summit and receive predictions regarding the likelihood of each member fulfilling that commitment. Users can also experiment with different settings, such as holding relevant G7 or G20 ministerial meetings, to explore how

these adjustments might enhance the probability of members' compliance.

Enhancing G7 and G20 effectiveness by leveraging patterns associated with higher compliance probabilities remains challenging due to external factors influencing performance. However, leveraging available data to predict future compliance offers a practical approach for directing resources to members at higher risk of failing to meet their obligations, ultimately improving the overall ability to achieve multilateral goals.

IMPLEMENTING THE COMPLIANCE PREDICTOR

In the preparations for and during the G7 and G20 summits, leaders are often faced with making complex decisions in a limited timeframe. Predictive AI can offer real-time decision support by continuously analyzing the evolving dynamics of discus-

Commitment	Issue Area	Predicted Probability of Compliance	Most At-Risk Members
We resolve to work with the private sector to create inclusive, sustainable, and resilient global value chains, and support developing countries to move up the value chain	Trade	30-40%	Indonesia Mexico Turkey
We resolve to work with the private sector to facilitate investments including Foreign Direct Investments (FDIs) towards sustainable business models	Trade	30-40%	Indonesia Mexico Turkey
We resolve to work with the private sector to promote the ease and reduce the cost of doing business	Trade	30-40%	Indonesia Mexico Turkey
We will support policies that enable trade and investment to serve as an engine of growth and prosperity for all	Trade	30-40%	Indonesia Mexico Turkey
[We] ... renew our commitment to ensure a level-playing field and fair competition by discouraging protectionism and market distorting practices, to foster a favourable trade and investment environment for all	Trade	30-40%	Indonesia Mexico Turkey
We commit to work constructively to ensure positive outcomes at the WTO's [World Trade Organization's] Thirteenth Ministerial Conference	Trade	30-40%	Indonesia Mexico Turkey
[We] ... welcome the High-Level Principles on Digitalization of Trade Documents and ... will make efforts to encourage implementation	Trade	30-40%	Indonesia Mexico Turkey
[We] ensure that trade and environment policies should be mutually supportive, consistent with WTO and multilateral environmental agreements	Trade	30-40%	Indonesia Mexico Turkey
We reaffirm the Sendai Framework for Disaster Risk Reduction (SFDRR) and recognize the need for accelerating its full implementation	Infrastructure Climate change	30-40%	China Indonesia Mexico
Continue to support augmentation of capabilities of all countries, including emerging economies, in particular developing countries, LDCs [least-developed countries] and SIDS [small island developing states], for promoting disaster and climate resilience of infrastructure systems	Infrastructure Climate change	30-40%	China Indonesia Mexico
Promote mutual learning of recovery experiences applying all the principles of Sendai Framework	Infrastructure Climate change	30-40%	China Indonesia Mexico

Commitment	Issue Area	Predicted Probability of Compliance	Most At-Risk Members
[We] remain committed to conducting discussions with a view to having a fully and well-functioning dispute settlement system accessible to all members by 2024	International cooperation	40-50%	China Indonesia Turkey
[We commit to] strengthen the voice of developing countries in global decision making	International cooperation	40-50%	Indonesia Turkey United States
We will unite in our endeavour to address the adverse impact of the war on the global economy	International cooperation	40-50%	China Indonesia Turkey
We reiterate the need to pursue WTO reform to improve all its functions through an inclusive member-driven process	International cooperation	40-50%	Indonesia Turkey United States
As Leaders of G20, the premier global forum for international economic cooperation, we resolve to act in concrete ways through partnerships	International cooperation	40-50%	Indonesia Japan United States
[We commit to] better integrate the perspectives of developing countries, including LDCs, LLDCs [least of the less developed countries], and SIDS, into future G20 agenda	International cooperation	40-50%	Indonesia Japan United States
We will continue to integrate the perspectives of the developing countries into the G20 agendas	International cooperation	40-50%	Indonesia Japan United States
We commit to halve the digital gender gap by 2030	Gender ICT and digitalization	40-50%	Indonesia Mexico Turkey
[We] will pursue and encourage efforts to triple renewable energy capacity globally through existing targets and policies ... in line with national circumstances by 2030	Energy Climate change	40-50%	Brazil Indonesia Turkey

Table 1: Top 20 At-Risk Commitments Made at the G20 2023 New Delhi Summit

sions and commitments made. By predicting the likelihood of commitment fulfillment for each member, these institutions can allocate resources where they will be most effective in achieving desired global goals. Members with a higher probability of non-compliance can receive targeted support to address potential obstacles to implementation. Conversely, members with a strong track record of compliance can be encouraged to share best practices and offer support to others who comply less well.

By using the G7 and G20 Compliance Simulators, summit organizers can immediately assess which commitments they make are most at risk of failing to be met and which members are most likely to fail to meet them. This means that they can, in real-time, while leaders are still gathered, devote additional discussion and efforts to finding strategies to meet these commitments.

Table 1 shows the 20 commitments made at the G20's 2023 New Delhi Summit that were predicted to have the lowest average compliance rates for members. The commitments primarily relate to trade, infrastructure, climate change, and international cooperation— although one gender and one energy-related commitment also appear on the list. The G20 members most at risk of failing to meet these commitments are also listed. Data such as this can be very useful for summit organizers. For example, the New Delhi Summit's commitment to implement the Sendai Framework for Disaster Risk Reduction is one of the most at-risk commitments. In particular, Indonesia is predicted to be unlikely to meet this commitment. This information may be relevant to leaders as Indonesia

»When evaluated on a holdout dataset, both the G7 and G20 models were over 80% accurate in predicting compliance«

is one of the countries most at risk from natural disasters (World Bank 2021). If Indonesia is unable to implement the Sendai Framework due to a tractable reason such as a lack of government funding or local expertise, it may provide an opportunity for other G20 leaders to provide support.

It is important to remember that these predictions are not a negative assessment of the members who are at risk of failing to meet their commitments. The assessments are based on historical patterns in following through with commitments made at G7 and G20 summits. Indeed, it may even benefit members with historically low track records of compliance to be highlighted as being at risk since it may motivate the transfer of resources to benefit them.

Predictive AI tools such as the G7 and G20 Compliance Simulators can enhance the impact of the G7 and G20 by identifying high-risk commitments early using real-time prediction of commitment outcomes during summits and enabling strategic resource allocation to areas with low predicted probabilities of success. Equipped with predictive AI, plurilateral and multilateral institutions can be better poised to strategically address global challenges.

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