The US-China Digital Innovation Competition and Power Transition: China's Digital Innovation and Similarity in UN Voting

Yongjae Lee

Given the expansion of China's power, it's willingness for a power transition has become the most significant concern in international relations. Although technology is a key driving force in the power transition, previous literature has ignored its importance. This study analyzes United Nations (UN) voting data to examine whether China's rapid improvement in digital technologies influence its enthusiasm to challenge against the U.S. Essentially, China's desire to challenge the US would be reflected through a pattern of voting in the UN that is similar to countries despised by the U.S., such as authoritarian, rogue, US sanctioned countries, and those with whom the US has an antagonistic relationship. In this regard, empirical analyses demonstrate that the relatively enhancement of China's digital technological capability decreases the similarity of its UN voting record with authoritarian, rogue, US sanctioned countries, and states with whom the US has antagonistic relations. Furthermore, the enhancement of these technological capabilities increases the similarity of its voting record with that of the US.

Keywords Digital Technology, Power Transition, US, China, UN vote

INTRODUCTION

The US and China have competed through their relationship as the Group of Two (G2) in multiple fields, including economy, military, technology, diplomacy, and soft power. However, as Chinese national power has rapidly improved since the Reform and Open Policy of the early 1980s, scholar in international relations have paid much attention to whether China, as a revisionist country, would attempt to challenge the

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US' hegemon status in the near future. This research project explores whether China's capability in digital technologies influences its intention to maintain the status quo or adopt a revisionist posture. The main goal of this study is to evaluate China's willingness to pursue a power transition given its investments in research and development (R&D) in digital technologies, which has been catching up to the US. Furthermore, the study pursues this evaluation by analyzing China's United Nations (UN) voting. Specifically, as the gap in digital technological ability between the US and China decreases, this work analyzes the countries to which China's UN voting pattern on global issues considered within the UN aligns, thereby assessing China's willingness to pursue a power transition.

According to Organski's (1968) power transition theory, there is no doubt that technological innovation, a basis for measuring economic and military capabilities, is the main driver of power transitions. Such power transition begins by denying the legitimacy of an existing global order or system in which a hegemon lead (Schweller and Pu 2011). A country's voting pattern at the UN reflects its stance or policy similarity on global issues and is an important indicator of its willingness or tendency to challenge the current global order. Thus, a country having similar UN voting patterns with countries with which the US has an uncomfortable relationship or countries to oppose the US leadership in the global order, such as authoritarian, rogue, and US sanctioned, indicates its intention to challenge the leadership of the US in the global order.

Empirical results reveal that as China's relative capability in digital technologies increase, there is glowing dissimilarity in its UN voting patterns with states hostile to states the US decreases, while the similarity of its voting patterns with the US increases. Furthermore, the results verify that China does not demonstrate a strong revisionist tendency at this point. Instead, it demonstrates its preference to choose policy harmony rather than confronting the US. This research comprises six parts, the first introducing previous literatures that analyzes relations between power transition and US-China technological competition, the second section explains why technology is important in power transition, while the third part addresses the theoretical background, such as soft balance and escaping the Kindleberger trap. The fourth section explains applied research methods, and the fifth section reports the results of empirical analyses. Finally, the sixth section concludes the research.

LITERATURE REVIEW

Current research analyzing relations between the power transition and US-China technological competition has concentrated on the illegal transfer of Chinese technologies to failed countries and the huge technological gap between the two superpowers. No work has analyzed the impact of the digital technology gap between the US and China on China's intention to preserve the status quo or adopt a revisionist stance. However, several works of literature criticize China's transferring sensitive technologies to failed states as evidence of its being a revisionist state. In this regard, China has exported military, Information and Communications Technology (ICT) and equipment to rogue, developing, non-democratic, and oil- producing countries, as a tool for magnifying its influence in those states (Cheng and Shi 2009, 94, Dumbaugh

2008, 19; Lai 2007, 525; Saunders 2006, 14). For example, in 2005, China exported satellite technologies to Venezuela under President Hugo Chavez to spread the Beijing Consensus (Li 2007, 843, 848). Another example is China's export of products and technologies applied for missile developments as China recognized the decline of the US-backed Missile Technology Control Regime (Kahler 2013, 717). Moreover, China's technology transfers concentrate on regions participating in the Belt and Road Initiative to expand its influence and dominate hegemony in Eurasia (DeLisle 2021, 60-61; Hemmings 2020, 7, 14, 16).

Some studies argue that China's technology transfer can threaten the US by challenging the world economic order, blocking a US-preferred resolution to the Taiwan issue, and preventing democratization. Specifically, Chinese new military and digital technologies can cause security dilemmas, offset the US domination of military power, and expand the anti-democratic and anti-free market "China model" (Johnson 2021, 357; Medeiros 2019, 96, 99-101). For example, China's investments in Russian high-tech fields reduce its dependence on Western high-technology, which is considered a challenge to the liberal international economic order (Malkin 2020, 89). In addition, China transfers weapons and military technologies to enemy states of the US to punish the intervention by the US. on the Taiwan issue (Christensen 2002, 17). In terms of democracy, censorship, and surveillance technologies, China's exports curb the US-led democratization wave (Medeiros 2019, 104).

Several scholars argue that China's transfer of technologies does not a violate the world order or threaten of US hegemony (Ali 2015, 18-19; Hameiri and Zeng 2020; Saunders 2006; Shambaugh 2001) because China has provided technical assistance to foreign states by following international standards through international organizations (Saunders 2006, 14). Shambaugh (2001, 28-29) mentions that China's signing of the Nuclear Non-Proliferation Treaty (NPT) demonstrates that it is not revisionist. Hameiri and Zeng (2020) also argued that Chinese nuclear governance could be either pro-status quo or revisionist. Joining the NPT and organizing negotiations on the North Korean nuclear issue indicate pro-status quo position. However, exporting nuclear technologies and components to failed states reflect a revisionist tendency. For example, China, which did not join the Missile Technology Control Regime, transferred missile technology and components to Pakistan in the 1980s and early 1990s (Jalil 2019, 53). However, Johnston (2003, 18) argues that because Chinese nuclear technologies exported to Pakistan were for civilian use and most transferred technologies were for conventional weapons, it did not exhibit revisionist behavior or violated international treaties.

The literature analyzing the substantial technological gap between the two superpowers, the US and China address whether China's technological development can threaten the US' hegemonic status. Challenger's innovation can threaten a hegemon's leadership based on economic power with technological innovation (Layne 2009, 161). "US military overextension, reduced readiness, eroded technological dominance, and inability to confront multiple crises in an era of power transition will invite aggression and revisionism from challenger states, destabilize the international system, and increase the likelihood of war" (Marsh 2014, 608). Many scholars anticipated that the current huge technology gap between the US and China would not prevent China from challenging the US and its allies in the near future (Chang-Liao 2019, 253;

Johnston 2019, 100). Other experts argue that China's innovation in digital and military technologies will pose a challenge the US by destroying the status quo in troubled regions, such as the South China Sea and Taiwan (Johnston 2003, 52; Mearsheimer and Walt 2016, 70; Panda 2021, 6). For example, the rapid development of Chinese naval military capability and port infrastructure and technology can improve its deterrence against the US by breaking status quo in the South China Sea (Caverley and Dombrowski 2020, 587, 592; Friedberg 2005, 370; Mearsheimer and Walt 2016, 70). Moreover, "much of China's recent acquisitions of military technology from Russia appear aimed at developing capabilities to deter or hinder U.S. military operations in defense of Taiwan" (Johnston 2003, 52). However, Han (2009) and Reinola (2021) believe that China peacefully tries to challenge the US-designed global technology standard by developing ICTs (34-36).

Many scholars have considered China's technologies-based military power is as being far inferior to US military power, and expect the huge technological gap to persist over in the next few decades (Al-Rodhan 2007, 56; Brooks and Wohlforth 2015, 14; Christensen 2001, 8; Tammen and Kugler 2006, 52; Zakaria 2008, 6; Zhang 2004, 97; Zhao 2018, 652). "Today, U.S. extended deterrence relies on high-technology conventional weaponry that can be as effective as nuclear weapons in achieving military objectives" (Ross 2002, 64). Posen (2003, 26) emphasized that the US' superior power comes from "an integrated air defense system (IADS), which combines a communications system, early warning radars and signals intelligence collection devices, and medium to-high-altitude SAM (*Surface to Air Missile*) systems, as well as AAA (Authentication, Authorization, and Accounting)". In terms of space technology, competition between the US and China can affect the relative power between both states from a long-term perspective (Hickman 2019, 180). However, although the Chinese government successfully tested a new anti-satellite weapon, it does not pose a serious threat to any country (Tellis 2007, 42). Although Chinese cyber technology operations and emerging technologies still depend on technologies created by Western states, the US is concerned about the leading role played by the Chinese government and military in supporting science and technology fields (Bey 2018, 33). Montgomery (2014, 126) argues that China's significant inferiority in military technologies may lead it to pursue asymmetric strategies against the US

Finally, several studies analyze UN voting patterns. Kim and Russett (1996) address a variation of UN General Assembly voting patterns after the Cold War by analyzing UN General Assembly votes from 1991 to 1993. They found that the North-South cleavage prevails over the East-West division (629). Carter and Stone (2015) examine the conventional wisdom regarding UN voting patterns which upholds the view that the votes of democratic states align with the US as opposed to non-democratic states. However, empirical analyses of UN voting record demonstrate that democratic states oppose the US more than authoritarian states because they cannot ignore median voters' preferences, which do not favor US foreign policies (2-3). Chan, Hu, and He (2019) explore the possibility of China being a revisionist state by analyzing UN General Assembly voting patterns. Since 1971, China has recorded a much higher "yes" voting ratio (78.8%) than the US (21.9%), with China having been counted among the majority in most UN General Assembly votes, while the US has been isolated in in the General

Assembly (631). Therefore, China's UN voting pattern does not support the argument that it is a revisionist state seeking to change the global order. Forero Lopez (2019) analyzes how second-tier states restrict US' policy with UN votes, the soft-balancing tool. The author found that second-tier states voted against the US in the Israel-Palestine-related issues in the UN as a soft-balance against the US (33). Ferdinand (2014) found convergence among Pacific Asian nations' UN votes, especially, the Association of Southeast Asian Nations (ASEAN) states, even more than the European Union (EU) (667, 669). This finding proves "the widespread reluctance of most Pacific Asian states publicly to criticize human rights abuses" (662).

IMPORTANCE OF TECHNOLOGY AND UN VOTE IN POWER TRANSITION

Innovation in Power Transition

Many international relations scholars have recognized innovation as a key driving force in power transitions. For example, Robert Gilpin (1975, 67) argued that a major technological advancement results in political domination. Scholars of long cycle theory emphasized that a rising power state achieving major innovations in a new or a leading industry can become dominant (Modelski and Thompson 1996; Thompson 1990). Organski (1968), an exponent of the power transition theory, already recognized the importance of unusually rapid industrial development based on technological innovation in power transitions. Uneven economic improvement based on rapid industrialization changes power distribution in the international system, and the change in the power gap between hegemonic and challenging states has caused hegemonic wars in the past 200 years (Barma, et al. 2009, 528; Organski and Kugler 1980, 61; Paul 2005, 49). "Hegemons sprint to the front of the great power pack because of economic leadership based on productivity and technological innovation. Technological innovations enhance national ability in economy, military, and soft power" (Paul 2005, 51). Improvement of science and technology including new production methods and skills and new forms of management and production organization, is a significant element for increasing productivity (Bulturbayevich and Jurayevich 2020, 5; Khong 2019, 122). However, know-how, technology, and managerial skills diffuse throughout the international economic system over time, allowing other states to catch up (Layne 2009, 161). The industrial development that is heavily reliant on science and technology innovation changes the power distribution.

Kennedy and Lim (2018) define the concept of the innovation imperative as a necessary condition for an emerging power in the power transition. "The innovation imperative means that the rising state must attempt to acquire and create new technologies to meet specific short- and long-run growth objectives" (Kennedy and Lim 2018, 556). Because innovation is a core element for sustainable economic development ("a relative strong correlation exists between the percentage of GDP spent in research and development (R&D) and GDP per capita" (Fan and Watanabe 2006, 304)), the emerging power aiming not merely to be great power, but a hegemon, has
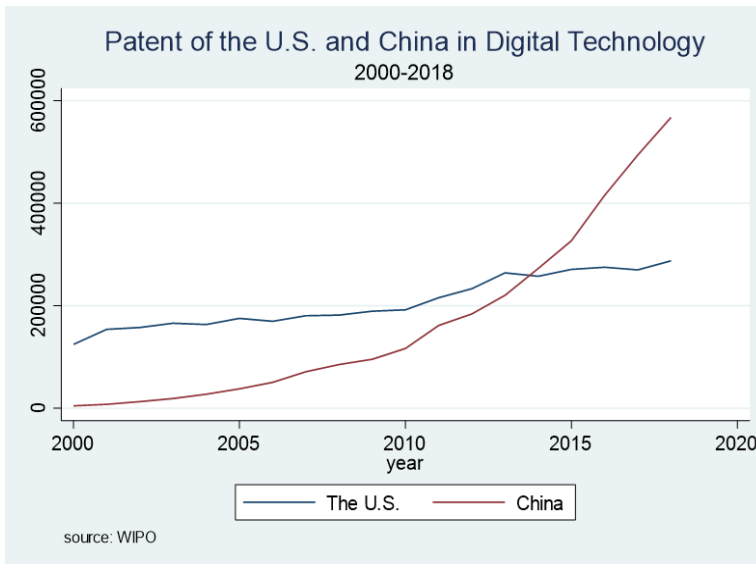
Figure1. Patent of the US and China in Digital Technology

no choice but to pursue innovation. The emerging power must become more efficient by acquiring and creating new technologies, including both products and industrial processes, in its attempt to achieve economic growth and catch up with the hegemon by resolving the biggest challenge how to acquire and invent these new technologies (Helpman 2004; Kennedy and Lim 2018, 555-556; Raymond 1966). Furthermore, Newly Industrialized Economies (NIEs), such as China, which have become a major global player, have pursued policies of improving science and technology as an alternative route for development (Fan and Watanabe 2006, 303-304). In particular, digital technologies play an important role in integration of economies in the globalized world because digital networking and communication infrastructures and facilities enabling collaboration, economical communication, and information exchange between entities improve economic productivity and efficiency (Bulturbayevich and Jurayevich 2020, 5). For these reasons, states obtaining advanced digital technologies, such as big data, supercomputers, the internet, robotics, and artificial intelligence can occupy the highest positions in the world economy in the coming decades (Khong 2019, 122). As reflected in Figure1 above, in 2014, Chinese patents in digital technologies rapidly increased and overtook the number of US patents for digital technologies.

Figure2 above shows the US and China's R&D expenditure ($PPP) from 1996 to 2018. Both countries have competed by increasing their annual R&D investment. Compared to the 1990s, the gap in R&D Expenditure between both states has diminished since 2010. According to Figure1 and 2, innovation is a key driving force behind China's quest for the power transition.

Power Transition and the UN Vote

Although the UN vote can indicate a rising power's enthusiasm to support or challenge
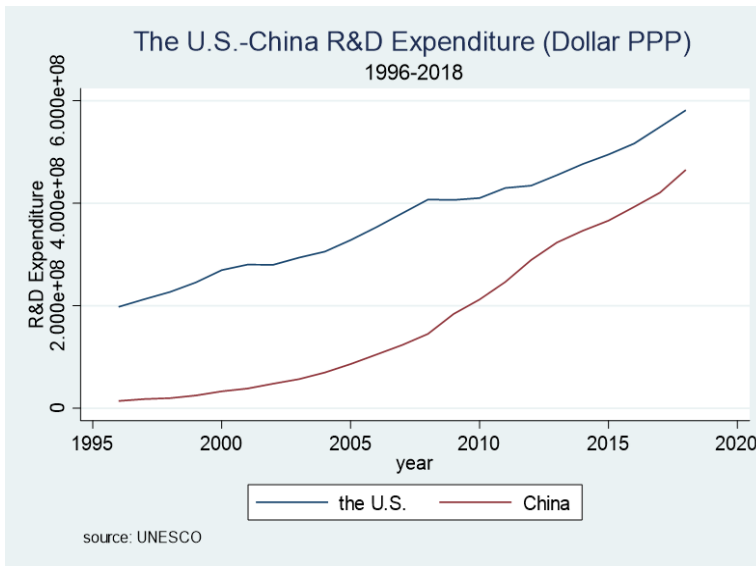
Figure 2. the US and China's R&D Expenditure ($PPP)

the current international order, some question the sufficiency of UN vote similarity in reflecting common foreign policy interests or preferences as an indication of China's willingness to support or challenge the US since, it may only reflect China's preference in foreign policies to a certain degree (Voeten 2013a, 62). The contender country attempts to conduct a power transition by denying the legitimacy of the existing global order or system in which a hegemon leads because the contender country desires to build a new world order and system that corresponds to its new interests and influences and that aligns to the expansion of its national power (Schweller and Pu 2011). The challenging state tries to get an agreement to legitimize opposition against the hegemonic global order and system by forming negative global public opinions on the order. Furthermore, the emerging power criticizes the existing international order and system that contributes to the dominant power's interests by advertising their negative effects on other countries' national interests (Organski 1968, 370). If China shares similar policies on global issues with countries that have a hostile relationship with the US or resist the US leading the global system, such as authoritarian, rogue, and the US sanctioned countries, China does not have a strong will to support of the US leading the global order. Accordingly, this study presents the following hypotheses.

> **H1a:** *The relative increase of Chinese innovation in digital technologies is likely to increase the similarity in its UN vote with authoritarian states.*
> **H1b:** *The relative increase of Chinese innovation in digital technologies is likely to increase the similarity in its UN vote with rogue and pariah states.*
> **H1c:** *The relative increase of Chinese innovation in digital technologies is likely to increase the similarity in its UN vote with the US sanctioned states.*
> **H1d:** *The relative increase of Chinese innovation in digital technologies is likely to increase the similarity in its UN vote with states that have an antagonistic relationship with the U.S.*

H1e: *The relative increase of Chinese innovativeness in digital technologies is likely to decrease the similarity in its UN vote with the US.*

Rogue states, such as Iraq, Libya, Iran, and North Korea, have been described as states that pursue their national interests through methods or policies not accepted by international standards and that are contrary to international law, such as terrorism or the acquisition of weapons of mass destruction (WMDs) (Litwak 2011; Pillar 2018). Pariah states are countries suffering "diplomatic isolation, the absence of assured, credible security support or political moorings within big-power alliance structures" (Harkavy 1981, 135). Furthermore, those countries "have become the targets of obsessive and unrelenting opprobrium and censure within international forums, such as the United Nation" (Harkavy 1981, 135). According to the definitions of rogue and pariah countries, having good relationships, cooperating, and supporting those states can be considered irresponsible behavior that is misaligned with the current international order. According to Figure 1, given that China's patent for digital technologies have been catching up with the US since 2000, China has opposed the provocations of rogue or pariah states and approved sanctions on them through UN voting, thereby acting as a responsible great power by bending the principle of non-infringement of sovereignty (Breslin 2013, 632). The lower abstention rate (4.5%)[1] in UN Security Council votes between November 1990 and May 2007 has also demonstrated China's responsible behavior in support of the global order (Wuthnow, Li, and Qi 2012, 278). For example, China voted for UN Resolution 1441 on WMD inspections in Iraq in November 2002, UN Security Council resolutions on the former Yugoslavian conflict that authorized the use of force in Bosnia, and UN Resolution 1970 sanctioning Muammar Qaddafi regime (Breslin 2013, 632; Ding 2007, 270; Richmond 2014, 574). Accordingly, the following hypotheses are presented:

H2a: *The relative increase of Chinese innovation in digital technologies is likely to decrease the similarity in its UN vote with authoritarian states.*
H2b: *The relative increase of Chinese innovation in digital technologies is likely to decrease the similarity in its UN vote with rogue and pariah states.*
H2c: *The relative increase of Chinese innovation in digital technologies is likely to decrease the similarity in its UN vote with states that have an antagonistic relationship with the U.S.*
H2d: *The relative increase of Chinese innovation in digital technologies is likely to decrease the similarity in its UN vote with US-sanctioned states.*
H2e: *The relative increase of Chinese innovation in digital technologies is likely to increase the similarity in its UN vote with the US.*

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[1] "Beijing abstained on only 49 out of 1,079 votes that were approved, a rate of of 4.5 %. It approved peacekeeping missions on five continents, economic sanctions against 16 states, and the use of force in Afghanistan" (Wuthnow, Li, and Qi 2012, 278).

METHODOLOGY

Unit of Analysis

This study is based on country-level analysis and uses annual data. Furthermore, the time range is 19 years, from 2000 to 2018. The total sample size is 2,897. Sample countries are categorized as dictatorships, rogue and pariah states, US antagonistic states, and the US sanctioned states. Dictatorship is defined as a state with a democracy index in the POLITY V project (Center for Systemic Peace 2020) lower than six. A rogue and pariah state is "a country pursuing policies that violate international norms" (Kastner and Saunders 2012, 169). This project defines rogue and pariah states as countries targeted by UN sanctions. The UN Security Council provides "Sanctions and Other Committees," including the list of UN sanctioned states. "US antagonistic states" mean "whether or not a country has an antagonistic relationship with Washington" (Kastner and Saunders 2012, 169). One of criterion used to define US antagonistic states is the similarity in foreign policy. The UN vote similarity index fully reflects the similarity of opinions between states on global issues. United Nations General Assembly Voting Data (Voeten 2013) provides a dyadic UN voting similarity index ranging from zero to one. In this regard, "1" means the highest similarity in UN votes between two dyadic states, while "0" means no similarity in UN votes between them. This project filtered states with less than 0.3 UN vote similarity with the US. US sanctions are the other criterion used to judge enemy states against the US. This study filtered US sanctioned states by using the relevant list provided by the US Treasury Department.

Dependent Variable

The dependent variable is China's UN vote tendency: how similar China' UN votes are with target countries (dictatorship, rogue and pariah states, the U.S. antagonistic states, and the U.S. sanctioned states) and the U.S. The UN vote similarity between China and target states (and the U.S.) was analyzed. United Nations General Assembly Voting Data (Voeten 2013) provide a dyadic UN voting similarity index that range from 0 to 1. 1 means the highest similarity in UN votes between two dyadic states, while 0 means the least similarity in UN votes between them.

Independent Variable

The gap in digital technology innovation between the US and China is analyzed as the independent variable. This study measured digital technology innovation using patent data because a more innovative country creates more patents than a less innovative country. Patents for digital technologies were used as the independent variable instead of R&D personnel or spending because the data on R&D personnel are incomplete, and a suitability problem arose regarding R&D expenditure data. The R&D personnel data on the US provided by United Nations Educational, Scientific and Cultural Organization (UNESCO) is incomplete. Because the data does not include the total number of

R&D personnel in the US, it is difficult to compare the size of R&D personnel in both countries. Regarding the suitability problem surrounding R&D expenditure, since R&D expenditure is an input for innovation (new technologies) and not an outcome, it cannot sufficiently reflect the US or China's innovativeness. However, patents better reflect both countries' innovativeness as an outcome of R&D investment (expenditure). Patent data in each country were collected from World Intellectual Property Organization (WIPO) (2021) statistics database. Patents for digital technologies were filtered according to technologies of electrical machinery, electrical apparatus, electrical energy, computer, IT methods for management, semiconductors, telecommunications, digital and basic communication, audio-visual, micro-structural, nano, and optics. The number of patent publications[2] and patent grants[3] by each sample country and given years was then totalized. Finally, the ratio of the number of Chinese patents to the sum of the US and Chinese patents was generated.

Control Variable

The control variables consist of gross domestic product (GDP) growth, GDP/capita (log), bilateral trade (log), Polity2, distance from China, conflict against China, and Chinese aid (log). Economic conditions can be a factor affecting the UN vote preference. China which has defined itself as the biggest developing state, could better represent developing states' interests on global issues more than advanced countries' interests. Thus, China's UN vote is likely to be consistent with developing states (Flores-Macía and Kreps 2013, 358). GDP growth and GDP per capita (log) are indicators of economic conditions. Data on these variables were collected from the World Bank (2021) database. Economic cooperation with China could influence target countries' policy similarity with it on global issues because a state that is more trade-dependent is likely to grant political concessions toward a partner state than one that is less trade-dependent (Hirschman 1945, 17). Therefore, bilateral trade between China and target states should be controlled. The trade variable is the sum of logged imports and exports between each target country and China in given years. Bilateral trade data are collected from the Direction of Trade Statistics (DOTS) of the International Monetary Fund (2018).

Regime type can be related to UN vote similarity. For example, China and non-democratic countries may have similar positions on global issues, such as human rights issues. The Polity2 index[4] from the Polity V project (Center for Systemic Peace

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[2] "A patent publication is a published utility patent application. A patent publication is not a patent. While a published patent application may eventually issue into a patent, the patent publication consists of only the application itself, namely, the drawings and written specification. The patent publication does not provide information about events subsequent to the publication date, e.g., whether the application was approved. To determine the subsequent file history, you have to look up the application number at USPTO Public Pair" (Lin).

[3] "A patent grant gives an inventor a property right in his invention, allowing him to ask others to stop using, making, and selling his invention for a limited period of time. That said, it is not the patent office's responsibility to stop others from using the patent holder's invention" (Adam 2019).

[4] The polity 2 "is computed by subtracting the AUTOC score from the DEMOC score; the resulting unified polity scale ranges from +10 (strongly democratic) to -10 (strongly autocratic)" (Marshall

2020) was used to measure the level of political freedom. Geographical conditions influence the sharing of policy interests. Accordingly, geographically close countries with common cultures, languages, and economic and political systems are likely to share greater policy interest than distant states. The geographical distance between China and the target countries is controlled. The operational concept of the geographical distance is the distance between the capital cities of China and target countries (Bennett and Stam 2000, 196). The data concerning geographical distance were collected from Direct Contiguity 3.2 of the Correlates of War (COW) data with EUGene software (Stinnett, Tir, Schafer, Diehl, and Gochman 2002). Interstate disputes are a significant factor in disturbing foreign policy harmonization. A peaceful bilateral relationship facilitates harmony in foreign policy for global issues. This study organized conflicts between China and target states using event data from the Worldwide Integrated Crisis Early Warning System (W-ICEWS) program (Boschee, Lautenschlager, O'Brien, Shellman, and James 2018). The conflict variable includes verbal and physical disputes between China and the target states. Each event between China and target countries in the event data involves an intensity level[5] ranging from -10 to 10. Antagonistic (physical and verbal) bilateral actions were filtered by applying the Conflict and Mediation Event Observations (CAMEO) codes (Schrodt 2012) and then sum intensities of these actions

Table 1. Summary of Variables

	Observation	Mean	Standard Deviation	Minimum	Maximum
UN vote (China)	3,588	0.8151	0.1363	0	1
ratio patent (China)	3,705	0.3381	0.2000	0.0356	0.6636
GDP growth	3,581	3.8390	5.2808	-62.0759	123.1396
GDP/capita (log)	3,608	8.3547	1.5615	4.5057	12.1518
bilateral trade (log)	3,427	6.8357	2.6410	-2.3090	13.3644
polity2	3,100	3.7652	6.3296	-10	10
distance (China)	3,640	5584.86	2340.009	505	11989
conflict (China)	3,705	67.08831	365.4219	0	8091.6
Chinese aid (log)	3,705	3.9231	7.292219	0	24.9240

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and Gurr 2020, 16).

5   "Each event type having a unique name and code (typically of system-level interest only) ascribed to them, they also have a numerical value ranging from -10 to +10. This number is alternately known as the Goldstein value, the intensity value, or simply the event intensity. The numbers originally came from the CAMEO Scale3 values of the associated CAMEO codes, which were in turn motivated by the Goldstein scale for WEIS event coding4. The number is used to represent the amount of hostility or cooperation implied by the event type, where negative numbers represent hostile actions and positive numbers represent cooperative actions; -10 represents the most hostile of hostile events, while +10 represents the most cooperative of cooperative events. Values of 0 are interpreted as being neutral" (Lautenschlager 2015, 3).

by country and given year. Because intensities of disputes are negative numbers, they were converted into positive numbers for convenience.

The last variable is China's aid target countries. Foreign aid and UN vote similarity have positively correlate: aid recipient countries are likely to follow aid providers' preference in UN voting (Alesina and Weder 2002; Bernstein and Alpert 1971; Lundborg 1998; Rai 1980; Wang 1999; Wittkopf 1973). This study applied "AidData's Global Chinese Development Finance Dataset, Version 2.0" that Research Labs at William & Mary provides. Table 1 summarizes the previously mentioned variables.

RESULT

Table2 reports empirical results for the UN vote similarity, the dependent variable. All models are Ordinary Least Squares (OLS) models. Model I shows statistical analyses for non-democratic countries. The ratio of Chinese patents for digital technologies to the total number of the US and Chinese patents has significant negative relation with the UN vote similarity. As the gap in digital technology innovation between the US

Table 2. Statistical Results for UN Voting Similarity (the Dependent Variable)

	Model I (dictatorship)	Model II (rogue and pariah states)	Model III (US antagonistic states)
ratio patent (China)	-0.1265*** (0.0083)	-0.1707*** (0.0154)	-0.1330*** (0.0061)
GDP growth	0.0006** (0.0002)	0.0002 (0.0003)	0.0004** (0.0002)
GDP/capita (log)	-0.0026* (0.0015)	0.0102*** (0.0034)	0.0036*** (0.0010)
bilateral trade (log)	0.0039*** (0.0009)	0.0011 (0.0018)	0.0024*** (0.0007)
polity2	-0.0030*** (0.0003)	0.0005 (0.0007)	-0.0011*** (0.0002)
distance (China)	1.83e-06** (7.39e-07)	-6.42e-06*** (2.23e-06)	-5.07e-07 (5.49e-07)
conflict (China)	0.00001 (0.00002)	0.0001 (0.0001)	-2.81e-06 (0.00001)
Chinese aid (log)	0.0012*** (0.0002)	0.0015*** (0.0003)	0.0014*** (0.0001)
constant	0.9033*** (0.0105)	0.9000*** (0.0259)	0.8934*** (0.0074)
observation	1,555	347	1,717

P<0.1:*
P<0.05:**
P<0.01:***

and China decreases, China and non-democratic states have less similar opinions on global issues. China with improved digital technology innovation does not share policy preferences with authoritarian states. This result rejects Hypothesis H1a and supports Hypothesis H2a. According to Model II, the ratio of the number of Chinese patents is negatively associated with UN vote similarity with rogue and pariah states violating global norms, and is statistically significant. The relative increase in Chinese digital innovativeness leads to China's position on global issues diverging from those of rogue and pariah countries. The results demonstrate that China, as the digital giant, does not diplomatically support rogue and pariah countries, therefore rejecting Hypothesis H1b and supporting Hypothesis H2b.

Model III analyzes the relationship between the ratio of Chinese patents for digital technologies to the total number of the US and Chinese patents for digital technologies and UN vote similarity with states having an antagonistic relationship with the US. The model reveals a significant negative relationship between the proportion of Chinese patents for digital technologies and UN vote similarity. Thus, with a relative increase in China's digital competitiveness, its diplomatic stance gradually moves away from countries that have an uncomfortable relationship with the U.S. This result proves that China does not seem interested in overthrowing the current international order, therefore, rejecting Hypothesis H1c and supporting Hypothesis H2c.

	Model IV (US sanctioned states)	Model V (the U.S.)	Model VI (democracy)
ratio patent (China)	-0.1237*** (0.0133)	1.8053*** (0.3713)	-0.0144 (0.0135)
GDP growth	0.0006** (0.0002)	0.0046 (0.0076)	0.0006 (0.0008)
GDP/capita (log)	0.0040 (0.0025)	-2.9374*** (0.6919)	-0.0616*** (0.0028)
bilateral trade (log)	0.0023 (0.0018)	0.1713 (0.1114)	0.0071*** (0.0015)
polity2	-0.0023*** (0.0005)	-0.0243 (0.0338)	0.0108*** (0.0024)
distance (China)	2.43e-06 (1.56e-06)		0.00002*** (1.03e-06)
conflict (China)	-0.00004 (0.00003)	4.22e-06 (0.00001)	-0.00006*** (5.08e-06)
Chinese aid (log)	0.0011*** (0.0003)		0.0043*** (0.0005)
constant	0.8776*** (0.0167)	29.3799*** (6.4353)	1.0665*** (0.0259)
observation	333	19	1,342

$P<0.1$:*
$P<0.05$:**
$P<0.01$:***

Empirical results for US-sanctioned states reflected in Model IV are also similar to the results for the US-antagonistic states. The ratio of Chinese patents for digital technologies to the total number of the US and Chinese patents for digital technologies has a significant negative relationship with UN vote similarity with states sanctioned by the US. As the gap in digital technologies between the US and China decreases, China has less similar policy preferences on global issues to enemy countries of the US. The result rejects Hypothesis H1d and supports Hypothesis H2d. Model V examines whether the relative decrease in the digital technology innovation gap between the US and China affects UN vote similarity between the US and China. In this regard, the model reveals a significant positive relationship between the ratio of patents and UN vote similarity between the US and China. The result verifies that Chinese opinions on global issues converge with the US' preferences as there is a relatively improvement in Chinese digital capability. The result rejects Hypothesis H1e and supports Hypothesis H2e. The empirical result above reveals China's tendency to follow the US dominating current global order instead of soft balancing, notwithstanding its competitiveness for digital technologies is developing. Model VI shows the statistical result for a relationship between the gap in digital capability between the US and China and the UN vote similarity between democratic countries and China. It is a negative relationship but is not statistically significant. The gap in digital innovativeness between the US and China does not influence preferences for global issues between democratic states and China.

Given the previously mentioned empirical results and relatively increase in China's digital capability, it tends to respect the status quo rather than adopt a revisionist posture. The relative improvement of china's digital capability allows it to act as a more responsible great power that follows current international orders and norms. Respecting current international orders and norms gives China strong legitimacy to act as a more reliable and responsible great power. Should China's domestic policy advocates for rogue or pariah countries, it would be isolated in international society. In fact, since the 2000s, China has agreed with UN resolutions punishing countries that violated human rights or acquired WMDs (Breslin 2013, 632; Ding 2007, 270; Richmond 2014, 574).

In terms of results for control variables, GDP growth has a significant positive relationship with UN vote convergence between dictatorships and US antagonistic and sanctioned countries. accelerated economic development in these states would result in them sharing similar diplomatic positions with China on global issues. Results for rogue and pariah states and countries with a bad relationship with the US show that logged GDP per capita has a significant positive relationship with UN vote similarity. Rogue and pariah states and US antagonistic countries with more advanced economies appear to have similar stances with China in UN votes. On the contrary, there are significant negative relationships between the logged GDP per capita and UN vote convergence in results for non-democratic and democratic states and the US. In this regard, non-democratic and democratic states and the US have different positions on global issues when they enjoy greater GDP per capita.

The bilateral trade (log) with China is positively related to the UN vote similarity with non-democratic and democratic states and countries maintaining negative relationships with the US, and these relationships are statistically significant. The results demonstrate that economic dependence is an important factor promoting policy

harmonization in global issues (Hirschman 1945, 17). The Polity2 index, representing the level of political freedom, has a significant negative relationship with UN vote convergence among authoritarian states, US antagonist states, and countries sanctioned by the U.S. Among authoritarian countries, US antagonist states and countries sanctioned by the US, countries with lower level of democracy have similar opinions to China on global issues. However, the Polity2 index is positively associated with the UN vote similarity with democratic countries. China has similar policy interests on global issues with democratic states with a higher level of democracy. Furthermore, geographical distance from China has a significant positive relationship with the UN vote similarity with non-democratic and democratic states, while there are significant negative relationships between the distance from China and UN vote similarity with rogue and pariah states. Geographically close authoritarian and democratic states have convergent opinions with China in global issues, but geographically close rogue and
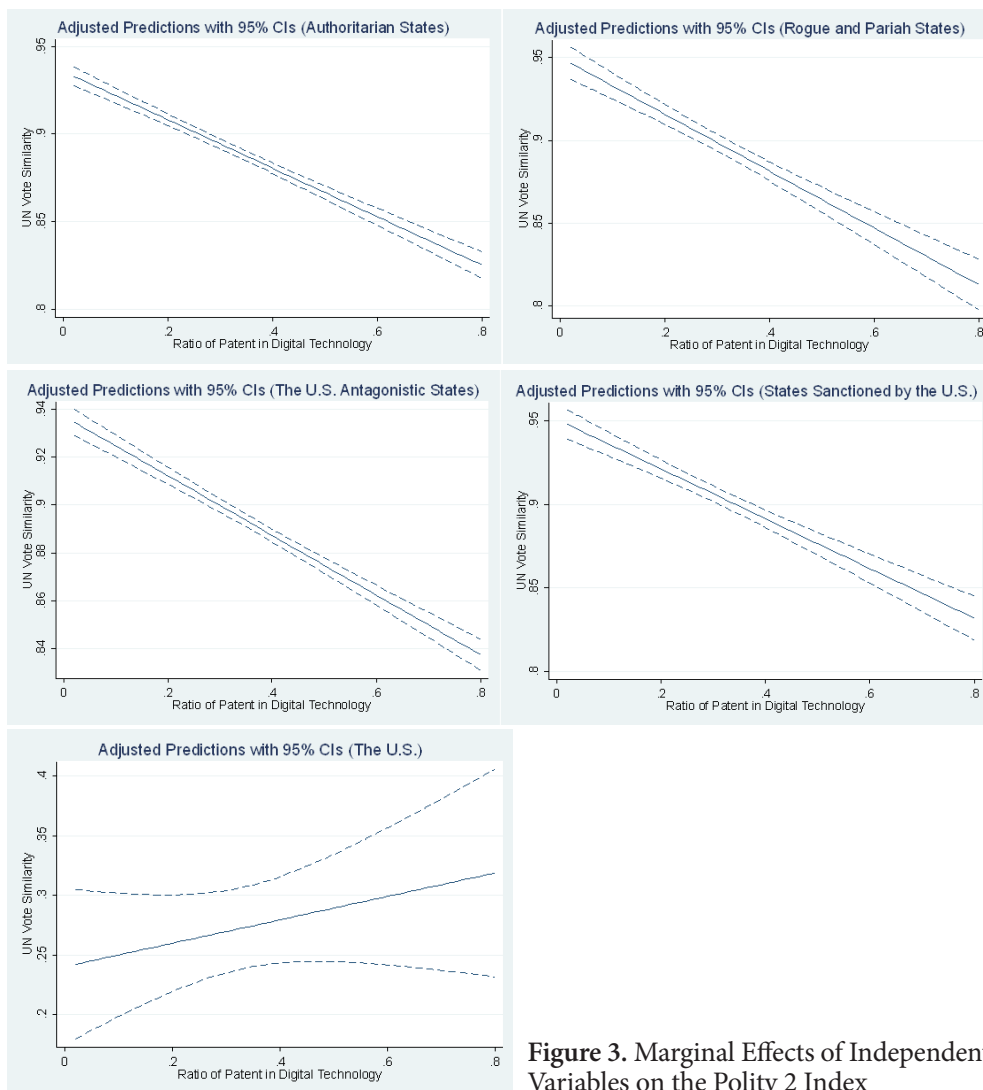

Figure 3. Marginal Effects of Independent Variables on the Polity 2 Index

pariah countries have different UN vote preferences from China.

Although this study originally expected conflicts against China decrease the level of similarity in UN votes, conflicts against China are negatively related to UN vote similarity only between China and democratic countries. Furthermore, interstate conflicts significantly hinder harmony in the UN vote between China and democratic states. Finally, the logged Chinese aid is undoubtedly positively related to UN vote convergence between China and target states, and these relationships are statistically significant. The foreign aid China provides lets recipient countries implement policies that are consistent with China's policy preferences.

Figure3 shows the marginal effects of the proportion of Chinese patents for digital technologies to the sum of US and Chinese patents for digital technologies on UN vote similarity with a 95% confidence interval. The horizontal axis measures the ratio of Chinese patents to the total number of patents in the US and China, and the vertical axis indicates the predicted level of UN vote similarity. The average UN vote similarity between China and all sample countries for each year is 0.82. As the ratio of China's patents for digital technologies to the sum of US and Chinese patents of digital technologies increases from 3.6% to 66.4%, the UN vote similarity between China and non-democratic states decreases from 0.93 to 0.84. The UN vote similarity between China and rogue and pariah countries is reduced from 0.94 to 0.84. The UN vote similarity between China and countries having an antagonistic relationship with the US decreases from 0.93 to 0.85. The UN vote similarity between China and countries sanctioned by the US decreases from 0.95 to 0.85. Lastly, the UN vote similarity between the US and China increases from 0.24 to 0.31. The marginal effects of the ratio of patents for digital technologies on the UN vote convergence between China and target countries are consistent with empirical results in Table2. The marginal effects do not prove that China, the digital giant, is willing to challenge the US.

CONCLUSION

In the last two decades, a lively discussion has ensured among scholars of international relations on China's move to replace the US as hegemon. As China is catching up with the US in having the world's best digital technologies, competition for digital technologies between the US and China has become a hot issue globally. Although technological innovation, a base for national economic and military capability, is a key driving force in the power transition, previous studies about the power transition concentrated on economic or military power. This study tested hypotheses addressing whether the decrease in the digital technology gap between the U.S. and China would lead China to challenge the US by using data for patents and UN votes. Some may disagree that the UN vote similarity indicates China's enthusiasm to support or challenge the US. However, this work assumes that UN votes can partially reflect an emerging power's preference for challenging the hegemon. The power transition starts as the contender country attempts to deny the legitimacy of an existing hegemon global order or system, thereby undermining the hegemon's interests by shaping negative global public opinions on the order. If China shares policy preferences with countries against the US (e.g.,

dictatorships, rogue states, countries with an antagonistic relationship with the US and states sanctioned by the US), then China may be willing to challenge the US. However, if China has different policy preferences from these previously mentioned anti-countries then China's positions are likely to align with those of the US. The empirical analyses showed that the ratio of Chinese patents for digital technologies to the total number of patents for digital technologies generated by the US and China has a significant negative relationship on the UN vote similarity between China and the target states mentioned above. In contrast, the ratio of Chinese patents is positively associated with the UN vote convergence between the US and China. The empirical results reveal that China pursues mutual harmony and similarity global policies rather than direct and extreme confrontation with the US up to this point in time.

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