Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Do vaccines move votes? Chinese COVID-19 donations and UN General Assembly alignment

Neriah Gek Yen Tan

neriah.tangekyen@suou.waseda.jp

Waseda University

Research Article

Keywords:

Posted Date: November 12th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11426026/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Do vaccines move votes? Chinese COVID-19 donations and UN General Assembly alignment

Abstract

When President Xi Jinping declared China's COVID-19 vaccines a "global public good," it ignited a fierce debate over whether Beijing was practicing pure altruism or deploying a strategic tool to buy geopolitical influence. Yet, existing work documents who received these doses rather than the geopolitical impact of their receipt, failing to explain why vaccine donations produced such non-uniform political returns. This paper resolves this puzzle by showing that donation operates as a strategic signal under uncertainty, meaning alignment is strictly conditional on a recipient's initial political distance from China. The model predicts political movement among recipients that begin politically distant, but a saturation effect with limited returns among those with close existing ties. Utilizing a staggered difference-in-differences design applied to UN General Assembly ideal point estimates from 2015 to 2023, I confirm this precise pattern. Politically distant recipients show a statistically significant shift toward China after donation, whereas no comparable effect is observed among countries with close existing ties. Ultimately, material generosity only buys influence within limits set by a recipient's prior beliefs.

Keywords: Vaccine Diplomacy; Foreign Aid; Signaling Game; United Nations General Assembly

JEL Classification: F35; F53; D82; I18

1. Introduction

On May 18, 2020, at the 73rd session of the World Health Assembly, Xi Jinping announced that Chinese COVID-19 vaccines would be made a "global public good" (State Council of the People's Republic of China, 2020). Others have read the vaccine donations as a bid for geopolitical influence, arguing that "political and strategic calculations ... figure prominently in Beijing's decisions to provide medical aid or vaccines"(Center for Strategic and International Studies [CSIS], 2021). Beijing has consistently rejected this reading: a Xinhua commentary attributes such accusations to the malice of certain Western politicians and insists that China "has never sought any geopolitical objectives" in its pandemic cooperation (Xinhua News Agency, 2020). This article provides evidence that Chinese vaccine donations shifted recipients' voting in the United Nations General Assembly towards China, and that this effect was concentrated among recipients that began politically distant from Beijing.

Previous research has shown that Chinese vaccine donation did not produce uniform political returns (Atamanenko & Konopka, 2022; Lee, 2023). Some attributed the unevenness to China's own conduct: aggressive diplomatic messaging, disinformation about Western vaccine efficacy and limited transparency surrounding Chinese vaccine trials and approval processes (Bautista & Herrera, 2023; Zubair et al., 2023). Others point to the properties of the transfer, which moves votes when transfers were discretionary and departs from what a recipient ordinarily receives (Dreher & Sturm, 2012; Dreher et al., 2008; Wang, 1999). Both conditions were common across recipients, so why did the same donation produce different responses? What recipients could not observe was China's motive, and a donation looks the same regardless of what motive produced it. Even when a donation is followed by a shift in the recipient's political alignment, the shift admits two readings. The recipient may be responding to the material value of vaccine doses or what China's willingness to donate vaccine reveals about China as a partner. From the outside these two responses look the same. Distinguishing them requires a theory of what the recipient believes and how donation changes it.

I develop that theory as a formal model of donor reliability. Donations buy influence only where they provide new information about China to the recipient, and not where it did not. Across 104 low- and middle-income recipients between 2015 and 2023, the empirical analysis confirms both halves of my prediction, including where the model predicts no effect at all.

Uncertainty is what gives the donation informational content, because the recipient must infer China's type from China's action. A donor who is genuinely invested in building a long-term relationship bears lower cost of donating than one seeking a quick return, so the act of donating is itself evidence about what kind of donor China is. How strong the evidence needs to be depends on the recipient's initial political distance from China. A country that already maintains dense economic and

diplomatic ties with China gains substantially regardless of China's type and needs little convincing to keep aligning. On the other hand, for a country that is more politically distant, the donation serves as evidence on China's type that the recipient did not previously have and alignment follows.

To test my argument, I estimate an interaction-weighted staggered difference-in-differences model, measuring diplomatic alignment as ideal-point distance from United Nations General Assembly roll-call voting (Bailey et al., 2017). To isolate the effect of what donation revealed, I compare recipients that were politically distant from China before the pandemic with those that were already close. I show that recipients that were politically distant pre-pandemic, in the Middle East and North Africa region, shifted towards China after receiving donation. Ideal-point distance fell by 0.579, or 1.31 standard deviations, in the session immediately following donation, and by 0.462, or 1.05 standard deviations, in the session after, both significant at the one percent level. By contrast, recipients that already maintained strong ties with China in Sub-Saharan Africa, did not exhibit any statistically significant shift towards China. Both results also hold under the group-time estimator of Callaway and Sant'Anna, 2021. I further find no support for the material relief hypothesis, splitting the sample by under-five mortality, neither the highest-need nor lowest-need quartile shows a significant post-donation shift, and the estimated effects do not track the severity of a recipient's vaccine shortfall.

This paper makes two contributions. First, this paper makes contribution to the aid-for-votes literature. While existing literature explains when transfer moves vote by appealing to the properties of the transfer itself, this paper brings attention to the recipient's prior belief of the donor. I demonstrate that recipient's responsiveness to aid also depends on what the recipient already believes about the donor, which is why an identical donation moves alignment in one region but not another. Second, this paper makes an empirical contribution to the study of vaccine diplomacy. Existing literature on vaccine diplomacy during COVID-19 is largely descriptive or case study based (Azzahra, 2024; Filipović, 2024; van Dijk & Lo, 2023)and quantitative work addresses adjacent questions, most notably the determinants of vaccine allocations rather than downstream political effects (Vadlamannati et al., 2024). I provide the first causal estimate of the effect of Chinese vaccine donation on recipient governments' diplomatic alignment.

2. Vaccine Diplomacy in International Relations

2.1 Vaccine Donation: Two Views

Vaccine diplomacy refers to the use of vaccine development, production and distribution to advance foreign policy objectives alongside global health goals (Lee, 2023; Surianta & Dressel, 2025; van Dijk & Lo, 2023). The literature converges on the view that China's provision was not purely an altruistic

act but strategic in nature. Vaccines were scarce and the scarcity made them valuable as instruments of reward, punishment, and extraction rather than pure humanitarian transfers (Apolinário Júnior et al., 2022; Surianta & Dressel, 2025). Beijing's motives can be traced to two sources. The first is reputation repair after criticisms of its early handling of the outbreak (Lee, 2023). The second is an opening for global leadership created by the "America First" posture of the first Trump administration and perceived nationalism of western nations (Barham et al., 2023). Vaccine allocation patterns support this view. Deliveries were channeled towards Belt and Road Initiative partners, states hosting significant Chinese investment (Vadlamannati & Jung, 2023; Vadlamannati et al., 2024) .

If donations were used as strategic instrument, they should have produced strategic returns. The returns were uneven, and the literature explains this unevenness by looking at China's behavior. Aggressive diplomatic communication and disinformation about western vaccine efficacy undercut the goodwill the donations were meant to purchase (Zubair et al., 2023). Limited transparency on clinical trials and approval processes also generated skepticism (Bautista & Herrera, 2023).

These explanations cannot account for the variation. Chinese rhetoric, vaccine technology, and transparency practices were largely common among recipients. The responses were not, they diverged along the regional lines. China gained a first-mover advantage in Southeast Asia when alternative suppliers were scarce at the onset of the pandemic (Cahayani, 2024; Surianta & Dressel, 2025). In Africa, donations were received as an extension of long-standing health cooperation, reinforced by state and non-state actors (Itugbu, 2021) and accompanied by initiatives to establish local vaccine manufacturing (Liu et al., 2022). In Latin America and the Caribbean, explicit vaccine-for-recognition approaches produced diplomatic resistance rather than compliance (Nolte, 2022), and initial Chinese gains were offset as US and European supplies expanded and perception of quality shift in favour of mRNA technologies (Barham et al., 2023; Nolte, 2022). The literature therefore reports that vaccine provision generated goodwill in some while reinforcing distrust in other (Atamanenko & Konopka, 2022; Lee, 2023).

The cause of the variation therefore lies with the recipient, and two mechanisms are plausible. First, a donation may work because the doses were materially valuable and recipient aligned in order to keep receiving vaccines. Second, a donation works through what it reveals about the donor. Recipients align because the donation revealed something about China that they did not previously know, so the effect should be largest where prior beliefs about China were least favorable, and absent where the donation confirms what the recipient already assumed. Only the second mechanism predicts recipients that receive doses and do not shift alignment. The existing literature cannot differentiate between the two, because it asks what China intended by donating rather than what a recipient infers from receiving.

Work on the political impact of Chinese vaccine diplomacy remains predominantly qualitative, resting on case narratives, media discourse, and diplomatic engagements (Azzahra, 2024; Filipović, 2024; van Dijk & Lo, 2023). Quantitative work exists, but it addresses allocation rather than consequences, estimating which countries receive doses rather than the outcome of receiving vaccines (Vadlamannati et al., 2024). Barham et al., 2023 is the closest to a downstream test but it measures citizen perception rather than state behavior. There remains limited evidence on the causal effect of Chinese vaccine donation on the political conduct of recipient government.

2.2 Foreign Aid and Political Alignment

Whether material transfers and foreign aid purchases political alignment is not a new question. A substantial literature in international political economy examines whether foreign aid induces recipient states to vote in alignment with donors at the UNGA, and vaccine diplomacy during COVID-19 pandemic is best understood as a recent instance of this broader phenomenon.

The literature establishes that aid is not allocated at random. Who receives it is often shaped by donors' political ties to recipients, with former colonies and treaty allies favored over states with comparable need but weaker links (Alesina & Dollar, 2000). How much a recipient receives, in turn, responds to the current value of its vote: allocations rise when a state rotates onto the Security Council (Kuziemko & Werker, 2006; Vreeland & Dreher, 2014), and in the post Cold War period the United States has directed more aid to states that oppose its positions at the UNGA, since those are the votes worth buying (Woo & Chung, 2018). Aid receipt thus comprises of the donor's prior assessment of a recipient's voting trajectory. Studies that treat aid as exogenous cannot separate its effect on voting from the selection that produced it (Carter & Stone, 2015).

A second body of work identifies which transfer carry political influence. Two features determine whether recipients shift their political alignment towards the donor. The first is the recipient's discretion over how the transfer can be used. Holding dollar value constant, general budget support and untied grants, which allows recipient government to spend at will, shift recipient voting towards donor while project aid restricted to specified uses does not (Dreher et al., 2008). The second is whether the transfer marks a departure from the recipient's normal flow of assistance, a year on year increase in aid increases voting coincidence while the total volume does not (Wang, 1999). Multilateral lending illustrates both at once, concessional loans, which reach the poorest states as predictable and ongoing support, do not move votes, whereas non-concessional loans, which are discretionary and episodic, do (Dreher & Sturm, 2012). Together these findings show that the political effect of a transfer depends on its properties rather than its dollar value alone.

Vaccines donation exhibit both features. Vaccines were inexpensive relative to financial aid, so

dollar value alone would predict little political effect, yet they arrived as a discrete transfer, in the early period of the pandemic where there is acute scarcity. A transfer with these properties is the kind this literature identifies as capable of shifting recipient alignment, which makes vaccine diplomacy a case where political effect is plausible and has not yet been established.

The association between Chinese aid and UNGA alignment is well established. Recipients of Chinese aid vote more closely with China, and arms transfer show a comparable pattern (Strüver, 2016). These correlations remain vulnerable to endogeneity, since China may give aid to countries that are already aligning with it rather than aid causing them to align. Chinese vaccine donation differs in a way that makes the identification possible. The pandemic was an unanticipated global shock, so recipients had no occasion to adjust their voting in advance, and because donation began at a datable point that differed across recipients. This paper exploits that variation in the timing of the first receipt through a staggered difference-in- differences design, to estimate the effect of donation on alignment.

Uncertainty about the donor's intentions shapes how recipients respond to aid. Formal models of aid and influence have explained which donor give, which recipients receive, and how much a policy concession cost, while assuming that the donor intent is known (Bueno de Mesquita & Smith, 2007, 2016). The assumption of known intensions best fits the cases of explicit conditionality. When Bangladesh abstained on a UNGA resolution condemning Russia's invasion of Ukraine, Lithuania openly withdrew a pledged vaccine donation, leaving no doubt about what it wanted (Hotez, 2022). Recipients of Chinese vaccines faced a different problem, since they did not know China's intention. This article relaxes the assumption of known intentions, modeling vaccine donation as a signal of donor reliability under incomplete information. The following section develops that model.

3. Theory

Whether Chinese vaccine donations during the COVID-19 pandemic functioned as a deliberate instrument of political influence or as an unconditional humanitarian gesture is not directly observable from China's stated intentions alone. A donor who values a lasting relationship and a donor who only wants a favorable vote at the next session both have reasons to send doses, and the donation is the same observable action in either case. Recipient governments had to decide whether to shift alignment on the basis of the donation, and what they needed to judge is not how costly the donation was for China but whether China is a reliable partner.

A formal model addresses this puzzle by making explicit the incentive structure behind the observable action. I model vaccine donation as a signal sent under incomplete information about the donor's motivation. Donation is not equally costly for the two types of donor, so they do not donate under the same circumstances. The recipient reads a donation against the behavior it expects from each kind of donor and China weights the cost of donating against the alignment it expects to induce. Equilibrium analysis allows us to identify when a donation is informative and it yields implication about which recipient align. This logic does not require that China consciously designed its donations as a strategic signal, only that donation is differentially costly across donor types so that a rational recipient's beliefs update accordingly.

3.1 The Model

Consider a signaling game between China and a Recipient state, which I refer to as "vaccine diplomacy game". Figure 1 depicts the structure of the game.

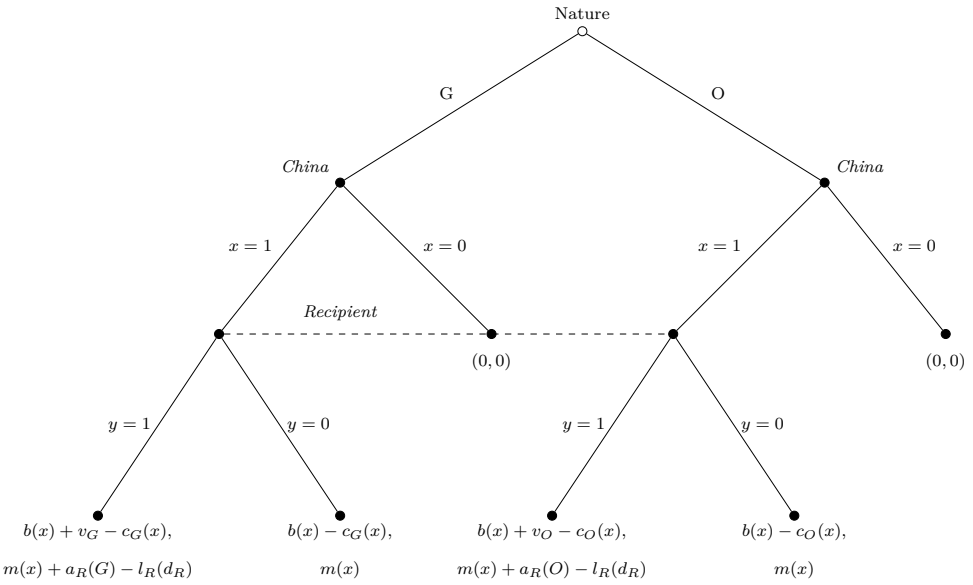


Figure 1. Game Tree for Vaccine Diplomacy Game

Beliefs and Information: The vaccine diplomacy game involves one-sided incomplete information. Nature randomly selects China's type $\theta \in \{G, O\}$, and reveals it to China alone. With probability p Nature selects the genuine (G) type and with probability $1-p$ it selects the opportunistic (O) type. Genuine China values long-term political alignment and sustained cooperation with partner countries; Opportunistic China places greater weight on short-term diplomatic gain and is less committed to future cooperation. The Recipient enters the game holding p as its prior belief that China is the genuine type. Recipient revises this belief by Bayes' rule after observing China's donation decision, yielding the posterior belief $p(x)$.

Sequence of Moves: China moves first, deciding whether to donate vaccines ($x = 1$) or not to donate ($x = 0$). If China does not donate ($x = 0$), the game ends and both players receive a payoff of zero. If China donates ($x = 1$), Recipient observes the donation, forms the posterior $p(x)$, and decides whether to align with China ($y = 1$) or not to align ($y = 0$).

Payoffs: China's utility function is:

$$U_\theta(x, y) = b(x) + yv_\theta - c_\theta(q) \tag{1}$$

where $b(x)$ denotes any reputational or diplomatic benefit China gains from donating vaccines, yv_θ denotes the political value China gains when Recipient aligns ($y = 1$) at the next UNGA voting session, and $c_\theta(q)$ denotes the cost of vaccine provision. Both the benefit and cost of donations are type-dependent: $v_G > v_O$ and $c_G(x) < c_O(x)$. This asymmetry reflects that genuine China places greater weight on long-term diplomatic returns and find upfront investment in vaccine donation less costly. On the other hand opportunistic China, prioritizes short-term gain and is not committed to future cooperation, derive less political value from alignment and cannot justify the same investment.

Recipient's utility function is:

$$U_R(q, y, \theta) = m(x) + y[a_R(\theta) - l_R d_R] \tag{2}$$

where $m(x)$ denotes the short-term public-health benefit of receiving vaccines, which Recipient obtains regardless of its alignment decision. If Recipient aligns ($y = 1$), it receives the additional long-term strategic benefit $a_R(\theta)$, which is type-dependent. Specifically:

$$a_R(G) = \gamma + \phi^H, \qquad a_R(O) = \gamma + \phi^L, \tag{3}$$

where γ denotes the baseline economic or strategic gain from alliance with China, common across

types, and $\phi^H > \phi^L$ captures the additional expected cooperation associated with genuine China, so that $a_R(G) > a_R(O)$. The term $l_R(d_R)$ represents the policy adjustment cost Recipient incurs when aligning with China. The parameter d_R reflects political distance from China: higher d_R indicates greater distance and lower d_R indicates closer prior alignment. The magnitude of $l_R(d_R)$ varies across recipients, reflecting heterogeneity in geopolitical constraints and domestic political context. If Recipient does not align ($y = 0$), its utility solely of short-term public-health benefit $m(x)$.

Table 1. Notation for Vaccine Diplomacy Game

Symbol	Description
Players, types, and actions	
R	Recipient
$\theta \in \{G, O\}$	China's type: Genuine (G) or Opportunistic (O)
$x \in \{0, 1\}$	China's donation decision; $x = 1$ if China donates, $x = 0$ if it does not
$y \in \{0, 1\}$	Recipient's alignment decision; $y = 1$ if Recipient, $y = 0$ if it does not
China's payoff	
$b(x)$	Reputational or diplomatic benefit to China from donating
v_θ	China's benefit from inducing alignment from Recipient R
$c_\theta(x)$	China's cost of donation decision x
Recipient's payoff	
$m(x)$	Recipient's short-term public health benefit from receiving vaccines
$v_G(\theta)$	Long-term strategic value to Recipient R of aligning with China of type θ
d_R	Recipient's political distance from China
$l_R(d_R)$	Recipient's political cost of aligning with China
Beliefs	
p	Recipient's prior belief that China is the Genuine type
$p(x)$	Recipient's posterior belief that China is the Genuine type, given x

3.2 Equilibrium

The equilibrium to the vaccine diplomacy game will be characterized using the perfect Bayesian equilibrium (PBE), which requires that each player's strategy must be sequentially rational given their beliefs and beliefs on the equilibrium paths are derived from the prior using Bayes' rules. The analysis characterizes a unique equilibrium which takes one of three mutually exclusive forms, each arising under a distinct and non-overlapping set of parameter conditions.

3.2.1 Preliminaries

In any equilibrium, Recipient's alignment decision depends on the posterior belief $p(x)$ formed after observing China's donation signal x. Recipient aligns ($y = 1$), if and only the expected utility of alignment weakly excess the utility of non-alignment:

$$EU_R(x, y = 1) \geq EU_R(x, y = 0). \tag{4}$$

Expanding this inequality and solving for the posterior belief yields a threshold condition.

> **Lemma 1** (Recipient's Alignment Threshold)**.** *Recipient aligns with China ($y = 1$) if and only if $p(x) \geq p^*$, where: $p^* \equiv \frac{l_R(d_R) - a_R(O)}{a_R(G) - a_R(O)}$. Recipient never aligns if $l_R(d_R) \geq a_R(G)$, always aligns if $l_R(d_R) \leq a_R(O)$, and alignment depends on the posterior belief $p(x)$ when $a_R(O) < l_R(d_R) < a_R(G)$. See Appendix A for proof.*

The threshold p^* represents the minimum posterior belief in China's genuineness that Recipient must hold before alignment becomes worthwhile. Alignment is certain or impossible at the boundary cases $l_R(d_R) \leq a_R(O)$ and $l_R(d_R) \geq a_R(G)$ respectively. The donation signal is consequential in the intermediate case, where alignment hinges on whether China's signal, x, pushes the posterior $p(x)$ above p^*.

China's Donation Decision: China anticipates Recipient's decision rule in Lemma 1. Donation is only worthwhile for either type if the reputation benefit and value of induced alignment exceeds the cost of the doses.

For genuine China, donating is individually rational if and only if:

$$b(x) + v_G - c_G(x) \geq 0 \tag{IR-G}$$

and for opportunistic China, donation is individually rational if and only if:

$$b(x) + v_O - c_O(x) \geq 0 \tag{IR-O}$$

The two types face structurally different incentives. Genuine China places greater weight on long-term diplomatic returns, benefits more from inducing alignment $v_G > v_O$ and incur a lower cost of provision $c_G(x) < c_O(x)$. This asymmetry is the source of the signaling structure. It creates the possibility that genuine China finds donation individually rational while opportunistic China does not, which creates a structural basis for distinguishing the two types by their donation behavior in equilibrium. The precise conditions sustaining each form of equilibrium is derived in Section 3.2.2, 3.2.3 and 3.2.4.

3.2.2 Separating Case

In a separating case, Genuine China donates ($x = 1$) and opportunistic China does not donate ($x = 0$), so the donation reveals which donor the recipient faces. By Bayes' rule, $p(1) = 1$ and $p(0) = 0$, and Recipient aligns following a donation and withholds alignment otherwise. The equilibrium requires that for genuine China $b(x) + v_G - c_G(x) \geq 0$, and for opportunistic China $b(x) + v_O - c_O(x) < 0$. Vaccine

doses cost opportunistic China more than the reputational benefit and the full value of alignment combined, so mimicking genuine China is too costly even under the most favorable response the recipient could give. Only a donor that values long-term cooperation will donate, and donation acts as evidence of China's genuineness, allowing the recipient to full separate the two types of donor.

> **Proposition 1** (Separating). *If* $b(x)+v_G-c_G(x) \geq 0$ *and* $b(x)+v_O-c_O(x) < 0$ *hold, the following strategies and beliefs constitute a perfect Bayesian equilibrium: genuine China donates* ($x = 1$)*; opportunistic China does not donate* ($x = 0$)*; Recipient aligns* ($y = 1$) *upon observing donation* ($x = 1$)*, with posterior belief* $p(x) = 1$*; and the game ends when no donation is observed* ($x = 0$)*. See AppendixA for proof.*

3.2.3 Pooling Case

In a pooling case, both types of China donate ($x = 1$). The signal does not inform the recipient about China's genuineness, and the recipient's uncertainty about China remains unchanged at the prior, $p(x) = p$. Whether the Recipient aligns or not depends entirely on whether its initial belief about China's genuineness is sufficient to cross the threshold p^* established in Lemma 1.

The equilibrium requires that for both genuine and opportunistic China the benefit from donating must outweigh the cost of providing vaccines. Genuine China donates readily, since providing vaccine cost little and it values the Recipient's alignment highly. Opportunistic China donates for a different reason: when the Recipient's prior is high enough to guarantee alignment, the political gain makes mimicking genuine China worthwhile. If the prior falls below p^*, the Recipient no longer aligns, the gain from imitation disappears, and opportunistic China deviates to not donating.

> **Proposition 2** (Pooling). *If* $p \geq \frac{l_R(d_R)-a_R(O)}{a_R(G)-a_R(O)}$, $b(x) + v_G - c_G(x) \geq 0$ *and* $b(x) + v_O-c_O(x) \geq 0$ *holds, the following strategies and beliefs constitute a perfect Bayesian equilibrium: China donates* ($x = 1$) *regardless of type; Recipient aligns* ($y = 1$) *with probability 1. See Appendix A for proof.*

3.2.4 Semi-Separating Case

The separating and pooling cases in which China's donation either fully reveals or conceals its type. A third case arises when the cost of donating vaccine is low enough for opportunistic China to mimic genuine China but only probabilistically because Recipient's prior belief about China's genuineness is not high enough to guarantee alignment unconditionally.

While genuine China always donate, opportunistic China donates with probability $\tau \in (0,1)$, where

$$\tau^* = \frac{p[a_R(G) - l_R(d_R)]}{(1-p)[l_R(d_R) - a_R(O)]}. \tag{5}$$

Upon observing donation, Recipient aligns with probability $\sigma \in (0,1)$, where

$$\sigma^* = \frac{c_O(x) - b(x)}{v_O}. \tag{6}$$

The mixing probabilities are chosen to make both opportunistic China and Recipient indifferent. The cost of mimicry is low enough to make donating occasionally worthwhile, but not low enough to make it always worthwhile. Opportunistic China therefore bluffs, though only often enough that Recipient cannot infer genuineness from a donation alone. Recipient in turn aligns readily enough to leave opportunistic China indifferent between donating and not donating. The donation is therefore only partially informative.

This case arises only when $b(x) < c_O(x) < b(x) + v_O$, which keeps σ^* strictly between 0 and 1, and when $p < p^*$, which keeps τ^* strictly between 0 and 1. Once the prior reaches p^*, Recipient aligns without needing to infer anything from the donation. Opportunistic China then strictly prefers to donate, and the case collapses to pooling case.

Proposition 3 (Semi-Separating)**.** *Suppose $b(x) < c_O(x) < b(x) + v_O$ and $p < p^*$. The following strategies and beliefs constitute a perfect Bayesian equilibrium. genuine China donates ($x = 1$). Opportunistic China donates with probability $s^* = \frac{p[a_R(G)-l_R(d_R)]}{(1-p)[l_R(d_R)-a_R(O)]}$. Upon observing a donation ($x = 1$), the Recipient align with probability $\sigma^* = \frac{c_O(x)-b(x)}{v_O}$. See Appendix A for proof.*

3.3 Uniqueness of Equilibrium

The three equilibrium cases characterized above, Propositions 1 through 3, are mutually exclusive. No two cases arise under the same parameter value, and the vaccine diplomacy game has a unique equilibrium throughout the parameter space. Figure 2 illustrates this partition.

The vertical axis measures China's cost of provision, $c_O(x)$,, and determine whether bluffing is possible at all. Above the boundary $c_O(x) = b(x) + v_O$, vaccine doses costs opportunistic China more than alignment is worth, so it will not donate regardless of what the Recipient believes. Below the boundary, bluffing becomes possible. As the cost of vaccines decreases $c_O(x)$, bluffing becomes profitable and opportunistic China can exploit the recipient's uncertainty and mimic genuine China.

The horizontal axis measures Recipient's prior belief about China's type, p, and determines how

often bluffing occurs once it is possible. As recipient's belief p rises, recipient are more willing to align, and at $p = p^*$ the recipient's belief is enough that alignment follows with certainty and for opportunistic China bluffing is possible all the time, this is the pooling case. Below $p = p^*$, the recipient's prior belief is too weak to guarantee alignment, and opportunistic China gains from bluffing only some of the time, the semi-separating case hold.

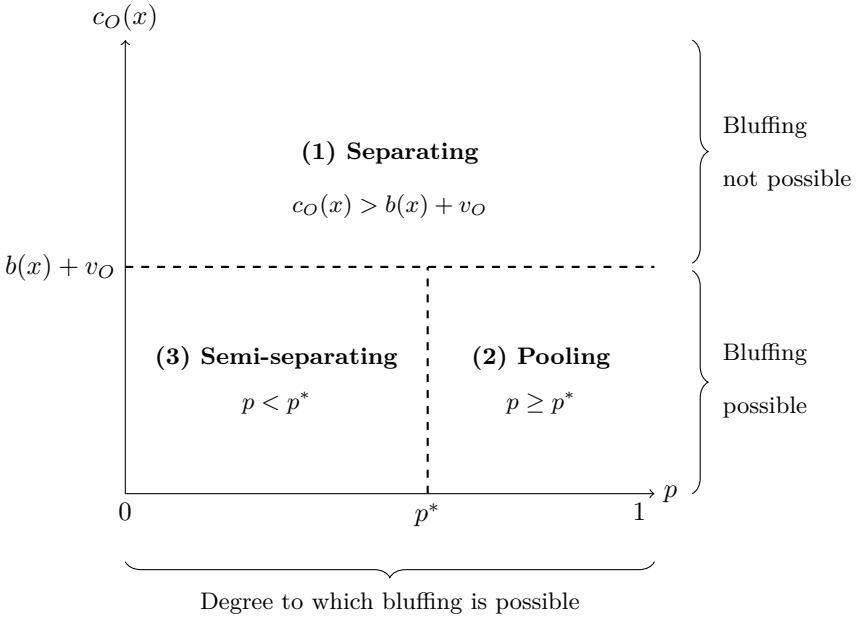


Figure 2. Forms of Equilibrium in the Vaccine Diplomacy Game as a Function of Opportunistic China's Cost of Donating Vaccines ($c_O(x)$) and Recipient's Prior Belief that China is genuine (p.)

3.4 Comparative Static Analysis

The equilibria characterized above are define by where the Recipient's threshold p^* falls. The comparative statics that follow examine how changes in the underlying parameters shifts the alignment threshold p^*. Recall from Lemma1 that:

$$p^* = \frac{l_R d_R - a_R(O)}{a_R(G) - a_R(O)}. \tag{7}$$

Three parameters govern p^*: the political cost of alignment $l_R(d_R)$, the long-term benefits from genuine China $a_R(G)$ and baseline benefits from opportunistic China $a_R(O)$.

> **Proposition 4** (Political Distance and Cost of Alignment)**.** *The threshold p^* is increasing in the post political cost of alignment $l_R(d_R)$.*

Recipients with greater political distance from China face higher adjustment costs and require larger posterior belief updates to align. Conversely, recipients with lower political distance face a lower p^* and require smaller belief updates to align with China.

Proposition 5 (Baseline Benefits from genuine China). *The threshold p^* is decreasing in $a_R(G)$.*

When genuine China offers substantially greater long-term benefits, the expected gain from alignment is large and recipients are willing to align on the basis of moderate belief updating.

Proposition 6 (Baseline Benefits from Opportunistic China). *The threshold p^* is decreasing in $a_R(O)$.*

When the downside risk of alignment is limited because opportunistic China still offers substantial baseline benefits, the threshold decreases. Vaccine diplomacy therefore generates limited additional political leverage in contexts where baseline cooperation is already valuable.

Taken together, these results point to a common mechanism: vaccine donation generates political alignment only insofar as it induces a posterior belief sufficient to cross the recipient-specific threshold p^*. The effectiveness of vaccine diplomacy as a signaling instrument is therefore conditional on the prior state of the bilateral relationship between China and the recipient.

4. Empirical Evidence

This section evaluates whether Chinese vaccine donations generated the political alignment predicted by the signaling model in Section 3. It begins by stating Hypothesis 1, derived from Propositions 4 through 6. It then describes the data and the staggered Difference-in-Differences model used to test the hypothesis. The results are presented along with the the interpretation of the regional pattern and concludes by addressing potential concerns about the robustness of these results, showing that the main findings hold under alternative model specification.

4.1 Hypothesis

The analytical results derived from the vaccine diplomacy game provides a set of empirical implications. Proposition 4 shows that the alignment threshold p^* rises with the political cost of alignment $l_R(d_R)$ incurred by a potential recipient R. Propositions 5 and 6 show that the alignment threshold p^* falls as potential recipient's long-term benefit from genuine China $a_R(G)$, or the baseline benefit from opportunistic China $a_R(O)$, increases. In reality, these three parameters may not be independent of each other. Recipients with high political distance from China typically also lack the economic and diplomatic ties that plausibly generate substantial $a_R(G)$ or $a_R(O)$. Hence, an increase in political distance from China also moves the other parameters in the direction that may raise the alignment threshold p^* for the recipient. Distant recipients therefore have a higher alignment threshold p^*, requiring a larger posterior update before alignment becomes optimal, while recipients that are closer to China have a lower p^* that is easily satisfied.

Hypothesis 1: *The effect of Chinese vaccine donation on recipient's political alignment is dependent on the recipient's baseline political distance from China.*

(H1A): Among recipient with high baseline political distance from China, vaccine donation induces a measurable post treatment shift towards alignment with China.

(H1B): Among Recipients with low baseline political distance from China, vaccine donation does not induce any measurable shift.

4.2 Data and Sample Construction

The empirical analysis draws on a country-session panel dataset covering UNGA Sessions 70 through 78, corresponding to the years 2015 to 2023. The unit of analysis is a country-session pair.

The sample is restricted to low-, lower-middle and upper-middle income countries as classified by World Bank, 2025, collectively referred to as low- and middle-income countries (LMICs). High-income countries are excluded on two grounds. First, among all countries that received Chinese COVID-19

vaccine donations, only 9.1% are high-income countries (Table 2), compared to the 90.9% that are low- or middle-income. Second, high-income countries received just 0.8% of total donated doses. This indicates that China's vaccine diplomacy was overwhelmingly directed at LMIC population both in reach and volume.

Table 2. Chinese COVID-19 Vaccine Donations: Recipient Composition and Dose Share by Income Group

Income group	Countries (N)	Share of recipients (%)	Total doses received	Share of doses (%)
Low / Lower-middle income	59	59.6	335,978,680	82.3
Upper-middle income	31	31.3	69,169,000	16.9
High income	9	9.1	3,104,000	0.8

Notes: Among countries that received at least one Chinese COVID-19 vaccine donation in 2021 or 2022.

Dose counts from Duke Global Health Innovation Centre database.

Income classification from World Bank, 2025

Diplomatic alignment is measured using ideal-point estimates from UNGA roll-call voting. Specifically, the dependent variable is the absolute distance between each recipient country's ideal point and China's ideal point in a given UNGA session, constructed using the Voeten (2025) database. Lower values indicate closer diplomatic alignment with China.

Information on COVID-19 vaccine donations is obtained from the Duke Global Health Innovation Donations Database (Duke Global Health Innovation Center, 2023), which provides country-level records on the source, recipient and timing of vaccine donation. For this analysis, donation record extracted up to January 2022 are used to capture vaccine donations made during 2021, while donation records extracted up to January 2023 are used to reflect donations made during 2022.

Using the World Bank's World Development Indicator (World Bank, 2025), countries are assigned to regions: Southeast Asia (SEA), Latin America and the Caribbean (LAC), Sub-Saharan Africa (SSA) and the Middle East and North Africa (MENA). Hypothesis 1 predicts that the alignment effect is conditional on a recipient's baseline political distance from China. As Figure 3 shows, since the mean pre-treatment ideal-point distance from China differ substantially across these regions, I analyse regional subsamples separately.

4.3 Treatment Definition and Timing

Treatment is defined as the onset of Chinese vaccine donations. A country is coded as treated if it receives any COVID-19 vaccine donation from China, and untreated otherwise. Treatment timing is defined by the first UNGA session in which a country receives Chinese vaccine donations. Chinese vaccine donations first occurred in UNGA Session 76 (2021–2022), with Session 76 serving as the first treatment cohort and Session 77 forming a second treatment cohort.

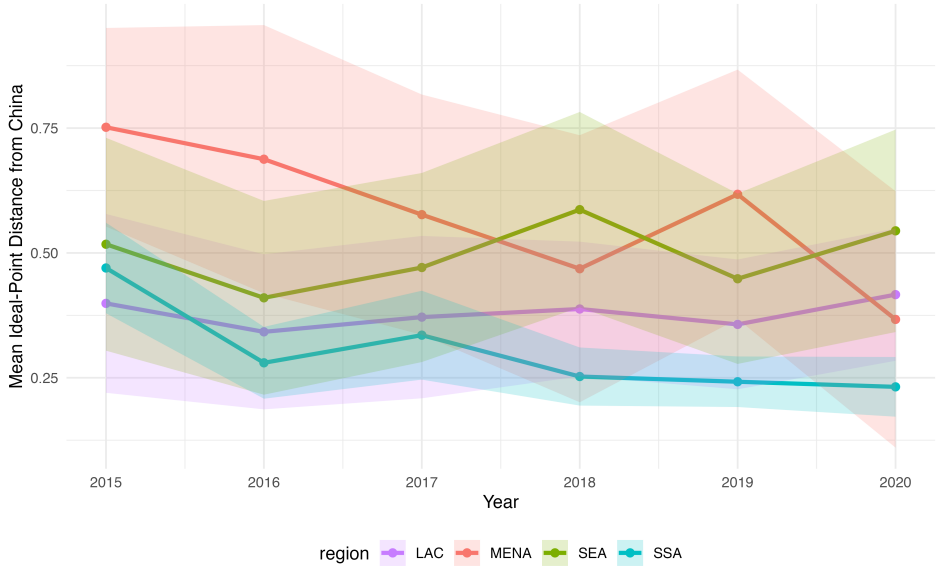


Figure 3. Pre-treatment Ideal Point Distance from China across Regions

Event time is constructed relative to treatment onset for each country. Let $t \in N$ denote the event-time indicator that caputres the number of UNGA session before or after the first receipt of Chinese vaccine donations, with the session immediately preceding treatment ($t = -1$) serving as the reference period.

4.4 Summary Statistics

Table 3 presents the summary statistics for the estimation sample and Table 4 reports sample composition by region and treatment cohort. The first treatment cohort consists of 82 countries that received vaccine donation in 2021 (session 76) and the second cohort consist of 8 countries in 2022 (session 77), 38 countries are never-treated.

Table 3. Summary Statistics: Estimation Sample

Treatment cohort	Period	Countries	Obs	Mean	SD	Min	Max
Session 76 (treated 2021)	Pre-treatment	82	492	0.441	0.398	0.001	1.615
	Post-treatment	82	245	0.522	0.435	0.001	2.188
Session 77 (treated 2022)	Pre-treatment	8	56	0.441	0.468	0.012	1.684
	Post-treatment	8	16	0.752	0.729	0.011	2.399
Never treated	Full panel	38	342	0.487	0.496	0.000	2.634

Pre-treatment and post-treatment periods are defined relative to each cohort's first treatment session.

Never-treated countries are pooled across all sessions (Sessions 70–78, corresponding to 2015–2023).

Table 4. Sample Composition by Region and Treatment Cohort

Region	Cohort 76	Cohort 77	Never treated	Total
Middle East and North Africa	9	1	2	12
Sub-Saharan Africa	34	3	10	47
Southeast Asia	14	0	8	22
Latin America and the Caribbean	8	2	13	23
Other	17	2	5	24
Total	**82**	**8**	**38**	**128**

Notes: Unit of observation is country. Each country appears once.

Regional classification follows World Bank definitions.

Other = countries in the LIC/MIC estimation sample not assigned to the four focal regions.

4.5 Staggered Difference-in-Differences Specification

Vaccine donation were not randomly assigned, and recipient states differ systematically in both their baseline alignment with China and their voting trajectories. A difference-in-differences design addressees this by comparing each country's change in alignment before and after vaccine donation against corresponding change among untreated countries.

Chinese vaccine donations did not reach the recipients all the same times. Recipient countries entered treatment at different time. Under staggered adoption with heterogeneous treatment effects, a conventional two-way fixed effect (TWFE) estimator is biased, since already treated groups can enter the comparison group for later treated units (Goodman-Bacon, 2021). The analysis therefore adopts the interaction weighted estimator of Sun and Abraham, 2021, which constructs cohort specific event time effects using comparisons restricted to never treated and not yet treated countries, avoiding the contaminated comparison that bias TWFE under staggered adoption. As a complementary check, the analysis is also estimated using the group time average treatment effect of Callaway and Sant'Anna, 2021, reported in Appendix B.

Identification relies on the assumption that countries did not strategically alter their UNGA voting behavior in anticipation of vaccine receipt. This assumption is credible on several ground. The COVID-19 pandemic constituted an unexpected global shock, and vaccine diplomacy emerged endogenously as a response to the crisis rather than as a policy instrument that countries could anticipate in advance. Moreover, the compressed timeline of COVID-19 vaccine rollout, in which donation decision were made and executed within months, afforded little opportunity for strategic voting adjustments in advance of receipt.

To estimate the dynamic effect of Chinese vaccine donations on diplomatic alignment, the analysis adopted an event study specification within this staggered DiD framework:

$$Y_{it} = \alpha_i + \delta_t + \sum_{k \neq -1} \theta_k \cdot \mathbf{1}(t - G_i = k) + \varepsilon_{it}, \tag{8}$$

where Y_{it} denotes the ideal-point distance between country i and China in UNGA session t. The country fixed effects, α_i, absorbs time-invariant characteristics. The UNGA session fixed effects, δ_t, captures common global shocks.

The indicator $\mathbf{1}(t - G_i = k)$ equals one if country i is observed k sessions relative to its first receipt of Chinese vaccine donations, where G_i denotes the initial treatment session. The session immediately preceding treatment ($k = -1$) is omitted and serves as the reference period.

The coefficient θ_k measures the dynamic change in diplomatic alignment at each relative session k compared to the pre-treatment baseline. A negative estimate indicates a reduction in ideal-point distance and thus greater political alignment with China.

4.6 Results

Hypothesis 1 predicts that alignment depends on the recipient's baseline political distance from China, which implies that the effect should be estimated by region rather than pooled across all recipients. Figure4 present the Sun and Abraham, 2021 event-study plots for the full low- and middle income countries sample. The pre-treatment coefficient exhibits substantial instability, with several estimates deviating systematically from zero prior to receiving vaccines. Treated and untreated countries were on divergent voting trajectories prior to treatment, and the pooled estimated cannot be interpreted casually.

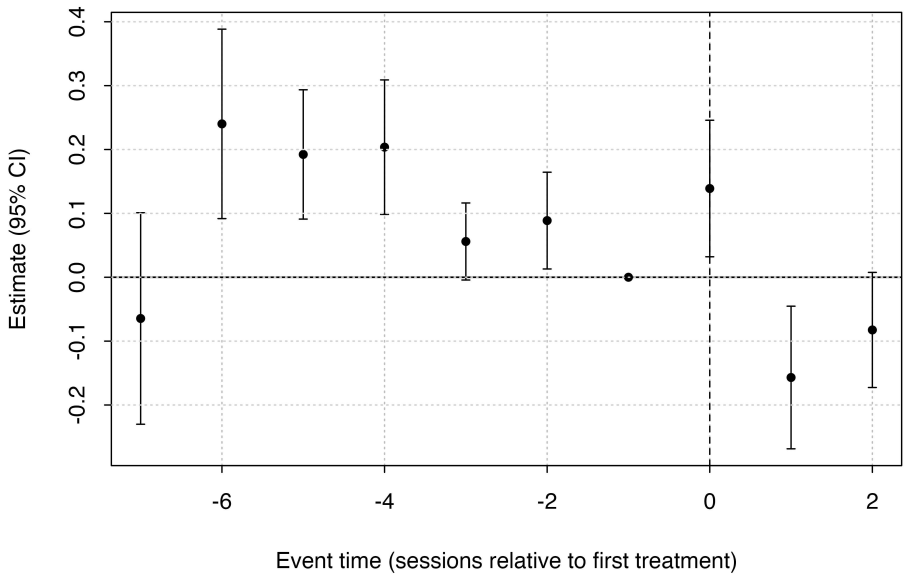


Figure 4. Low-, Middle-Income Countries Event Study Plot

4.7 Middle East and North Africa (MENA)

Figure 5 present the Sun and Abraham, 2021 event-study plot for the MENA region. The pre-treatment coefficients are small and statistically insignificant from zero, with one exception at $t = -5$, indicating that there is no systematic divergence between the treated and untreated countries prior to receiving vaccine donations. The post-treatment coefficient are negative and significant. As reported in Table 5, the estimated coefficient in the period immediately following treatment ($t = +1$), is -0.579 ($p < 0.001$), while in the subsequent session ($t = +2$) the coefficient remains negative at -0.462 ($p < 0.001$). Both magnitudes are substantially larger than any pre-treatment estimate, indicating a robust shift in voting behavior rather than a continuation of prior trends. The Callaway and Sant'Anna, 2021 estimates and event-study plot reported in Appendix B yield a similar post-treatment pattern despite relying on a distinct identification and aggregation approach. The consistency of results across two methodologically distinct estimators strengthens the credibility of the empirical findings.

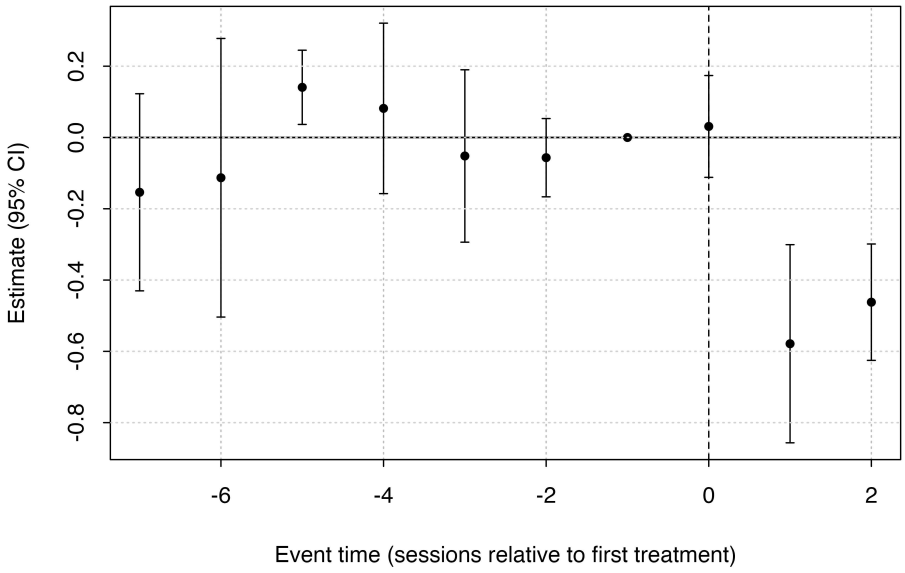


Figure 5. MENA Event-Study Plot: Sun & Abraham Estimator

Table 5. MENA Event-Study Estimates: Sun & Abraham Estimator

Event Time (relative to treatment)	**Estimate**	**(SE)**
−7	−0.154	(0.126)
−6	−0.113	(0.178)
−5	0.141**	(0.047)
−4	0.082	(0.109)
−3	−0.052	(0.110)
−2	−0.057	(0.050)
0	0.031	(0.065)
+1	−0.579***	(0.126)
+2	−0.462***	(0.074)

Notes: Standard errors clustered at the country level.

Model includes country and session fixed effects.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

The shift towards China is consistent with what Hypothesis 1A predicts. It reflects the interaction of two structural conditions that together places MENA recipients where vaccine donations carries the greatest informational content: substantial baseline political distance and a low prior on China's reliability. MENA countries entered the pandemic politically distant from China, reflecting decades of institutionalized security cooperation with the U.S. included military basing, arms transfer and intelli-

gence cooperations (Wechsler, 2019). As seen in Figure 6, MENA countries entered the pre-treatment period with substantially higher mean ideal-point than SSA countries. Proposition 4, establishes that a higher baseline distance d_R raises the alignment threshold p^*, so a MENA recipient would require a larger belief updating about China's reliability before aligning with China becomes optimal.

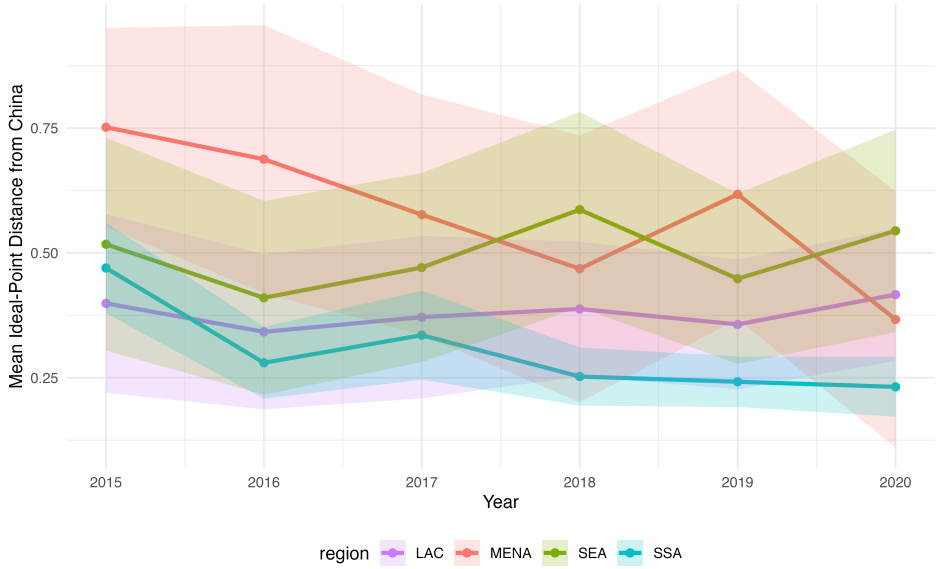


Figure 6. Mean UNGA ideal-point distance from China by region, averaged over session 70-75. MENA countries display substantially higher baseline distances than SSA countries.

The conditions surrounding the vaccine rollout made such a belief updating possible. During the early phase of the global vaccine rollout in 2021, Western governments were widely perceived as prioritizing domestic vaccination needs along with implementing export restrictions on COVID-19 vaccines (Woertz & Yellinek, 2021). This perception of abandonment by traditional partners created an opportunity for China which was less constrained by domestic demand (de Bengy Puyvallée & Storeng, 2022), to position itself as a responsive and capable alternative. In the Vaccine Diplomacy Game, this context corresponds to the separating case in Proposition 1, in which vaccine donations acts as an informative and credible signal of donor reliability. Opportunistic China finds it too costly to donate vaccines relative to its benefits, so only genuine China donates. Observing a donation, recipient will update their posterior belief to towards $p(x) = 1$, which crosses the region-specific threshold p^*, triggering alignment towards China.

The MENA results is therefore not a case of generosity being reciprocated. It reflects a structural situation in which the signal was informative in demonstrating China's reliability as an ally. The post-treatment estimates, which remains negative and statistically significant across at least two sessions, are consistent with a sustained shift in alignment rather than a transient goodwill effect.

4.8 Sub-Saharan Africa (SSA)

Figure 7 present the Sun and Abraham, 2021 event-study plot for the SSA region. The pre-treatment coefficient are tightly centered around zero with wide and overlapping confidence interval, indicating no systematic divergence in voting behavior between treated countries and control countries prior to receiving vaccine donation. As reported in Table 6, The estimate at $t = +1$ is -0.166 and at $t = +2$ is -0.039. There is a directional move towards China after vaccine receipt, but the estimates remain statistically indistinguishable from zero. The Callaway and Sant'Anna, 2021 estimates reported in Appendix B reinforces this conclusion.

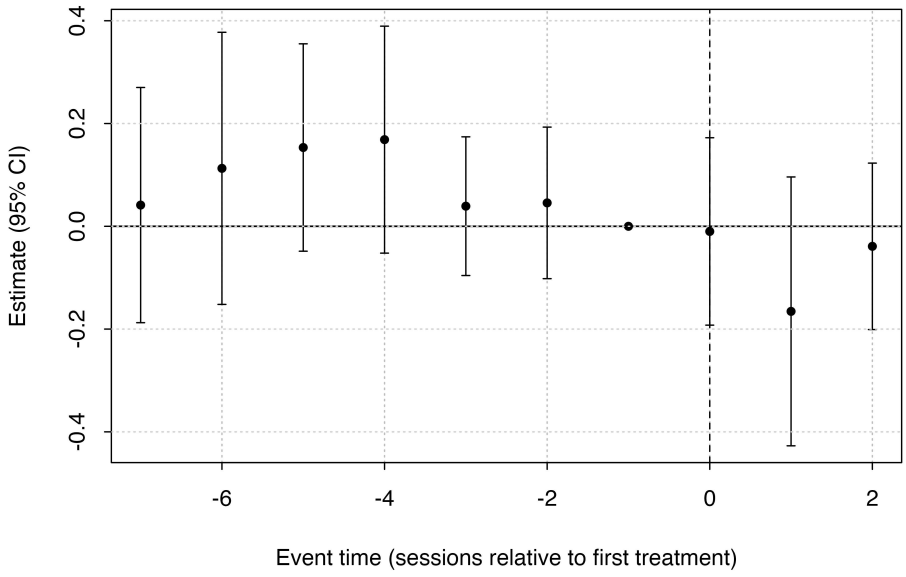


Figure 7. SSA Event-Study Plot: Sun & Abraham Estimator

Table 6. SSA Event-Study Estimates: Sun and Abraham Estimator

Event Time (relative to treatment)	Estimate	(SE)
−7	0.041	(0.114)
−6	0.113	(0.132)
−5	0.153	(0.100)
−4	0.169	(0.110)
−3	0.039	(0.067)
−2	0.046	(0.073)
0	−0.010	(0.091)
+1	−0.166	(0.130)
+2	−0.039	(0.080)

Notes: Standard errors clustered at the country level.

Model includes country and session fixed effects.

$^{***}\,p < 0.01$; $^{**}\,p < 0.05$; $^{*}\,p < 0.10$.

This result is consistent with Hypothesis 1B, which predicts no measurable shift among recipients at low baseline distance from China. Long before the COVID-19 pandemic, many SSA countries had already developed dense economic, diplomatic and political ties with China. China was the region's largest trading partner and major investor supporting infrastructure projects under the BRI (Yatsuzuka et al., 2025). Proposition 4 establishes that a low baseline political distance d_R, through a lower political cost of alignment $l_R(d_R)$ reduces the alignment threshold. Proposition 6 establishes that when baseline benefit form cooperation with China is high even under uncertainty about its type, the threshold further decreases. In SSA both conditions hold, the alignment threshold is low enough that donation is optimal even before any vaccine donation.

Figure 6 shows that SSA countries entered the pandemic with relatively close and stable UNGA alignment with China, in contrast to the higher baseline distance among MENA countries. A recipient in this position has little incentive to condition its alignment on the new signal, because alignment is already optimal across a wide range of beliefs about China's reliability. The vaccine donation therefore carries limited informational content and does not induce the belief updating or political realignment. Instead, such assistance consolidates existing relationships rather than extending them.

4.9 Southeast Asia (SEA) and Latin America and the Caribbean (LAC)

The parallel trend assumption fails in both SEA and LAC, and the post-treatment estimates for these two regions are therefore not interpreted causally. The event-study plots are presented in Appendix B

In SEA, the Sun and Abraham, 2021 pre-treatment coefficients are consistently positive across the pre-treatment window, indicating that treated countries were moving away from China before receiving vaccine donation. This directional pattern holds under the primary estimator, the complementary Callaway and Sant'Anna, 2021 estimates are less stable given the small SEA sample, though both reject parallel trend. The movement most plausibly reflect pre-existing geopolitical tensions in that region, particularly over the South China Sea territorial disputes that generated voting trajectories independent of and prior to the vaccine rollout (van Dijk & Lo, 2023). This variation originates outside the model rather than contradicting it.

In LAC, Figure 3 show that the LAC countries held a low and stable mean level of ideal-point distance from China across the pre-treatment period, comparable to SSA. This baseline places the region in the range where the model predicts limited signaling returns. The event-study estimates, shows volatile pre-treatment coefficients that violate parallel trend. LAC is therefore consistent with the model on its observable baseline, but the identification failure means the design cannot test the prediction.

Causal inference is therefore restricted to MENA and SSA, where the pre-treatment diagnostics are consistent with parallel trends. The exclusion of SEA and LAC does not bear against the theoretical framework.

5. Robustness

While the results in the previous section are consistent with the Hypothesis 1, two alternative accounts could propose the same regional results that the signaling model proposes. The first is that the alignment shift reflects material need rather than than geopolitical signaling. Second, the alignment shift captures concurrent US vaccine diplomacy rather than China's signaling.

5.1 Healthcare Need and Political Distance

If material need rather than geopolitical signaling was driving the alignment shifts, the effects should have been the strongest where the need is greatest. A government with a weak health system faces more consequences from a vaccine shortfall, uncontrolled transmission, hospital capacity exceeded, and domestic pressure over preventable death. The material-need accounts holds that recipients in this position should gain the most from vaccine donations and should therefore respond most sharply,

producing a gradient in estimated effects across recipients ranked by health needs. The signaling framework predicts no such gradient, since recipient's alignment decision depends on the informational content of the donation, governed by baseline political distance rather than public health conditions.

To distinguish the two, the LMIC sample is split into quartile by under-five mortality rate World Bank, 2025, a standard indicator of population health need and health system performance (World Health Organization, 2025). A separate event-study is estimated within each quartile. Figures 8 and 9 shows the event-study plots for the bottom and top quartiles, with full estimates reported in Appendix C. Pre-treatment coefficients are statistically indistinguishable from zero, so parallel trends hold within each subset. Neither quartile yield a statistically significant post-treatment effect. There is no gradient across level of health need, the material-need account requires the effect to track the severity of a recipient's vaccine shortfall, and it does not.

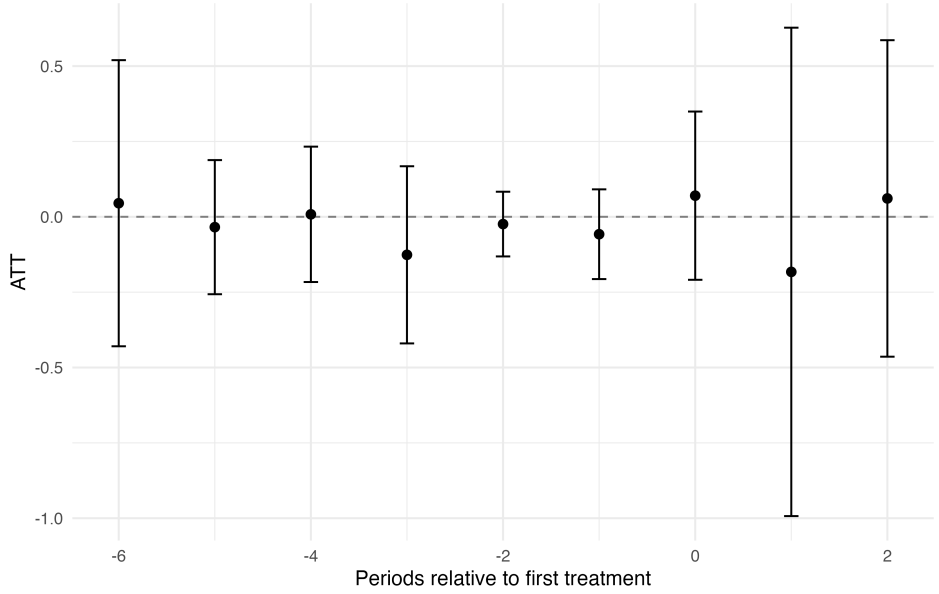


Figure 8. Q1 Under-5 Mortality Rate Event-Study Plot: Callaway & Sant'Anna Estimator

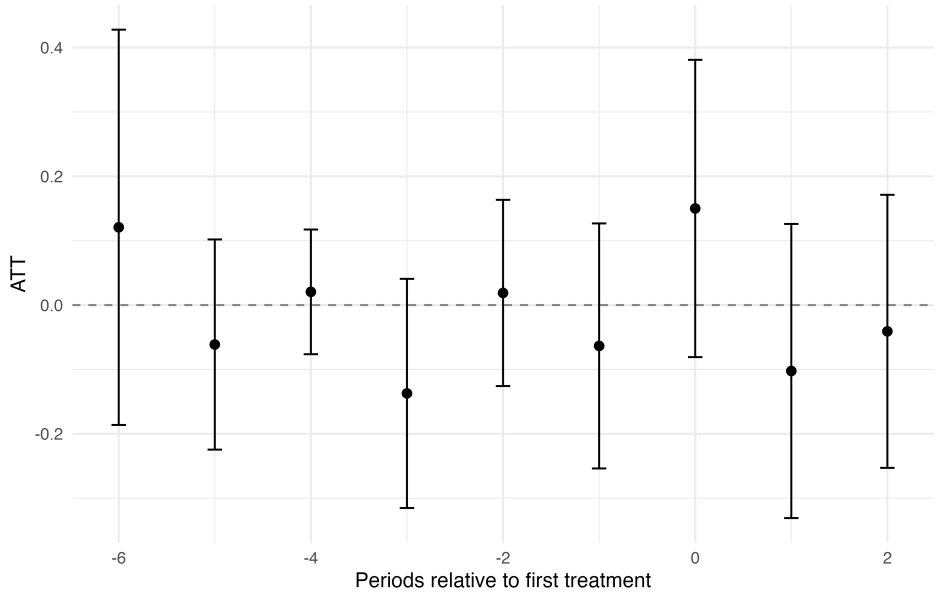


Figure 9. Q4 Under-5 Mortality Rate Event-Study Plot: Callaway & Sant'Anna Estimator

What predicts alignment is not how much a country needs vaccines, but how politically distant the recipient country is from China. This is consistent with the regional pattern. Significant effects concentrate in MENA, a region with large political distance and limited baseline cooperation with China, and are absent in SSA, where long-standing health partnerships reduce the informational content of any donation.

5.2 China-Only Recipients

The main analysis included all LMIC recipients of Chinese vaccine donations, regardless of whether those countries also received donations from other donors, most notably the United States. If the observed alignment shift partly reflect concurrent US vaccine diplomacy rather than the Chinese signal, restricting the sample to recipients of Chinese donations alone should attenuate it. The analysis is therefore re-estimated on a restricted sample comprising only countries that received vaccine donations from China. The restricted sample leaves a single treatment cohort; accordingly, a standard two-way fixed effects event study with country and session fixed effects is employed in place of the staggered estimators used in the main analysis.

Figure 10 presents the event-study plot. Most pre-treatment coefficients are close to zero with overlapping confidence intervals. Two pre-period estimates at t = -5 and t = -4 are positive and marginally significant, suggesting some upward movement in ideal-point distance, meaning a slight shift away from China. Crucially, this movement is in the opposite direction to the post-treatment alignment shift. This pattern does not indicate that treated countries were increasingly inclining towards China prior to receiving vaccine donations. Post-treatment estimates are reported in Table 7

The post-treatment coefficient at t = +1 is -0.318 ($p < 0.05$) and at t = +2 is -0.167, indicating increased alignment with China following vaccine receipt. The direction and timing are consistent with the main findings, and the negative post-treatment shift is substantively larger than the positive pre-treatment deviations, suggesting the post-treatment pattern is unlikely to be an artifact of pre-existing trends alone. Given the pre-trend instability at earlier lags, this robustness check is treated as corroborative rather than independently conclusive.

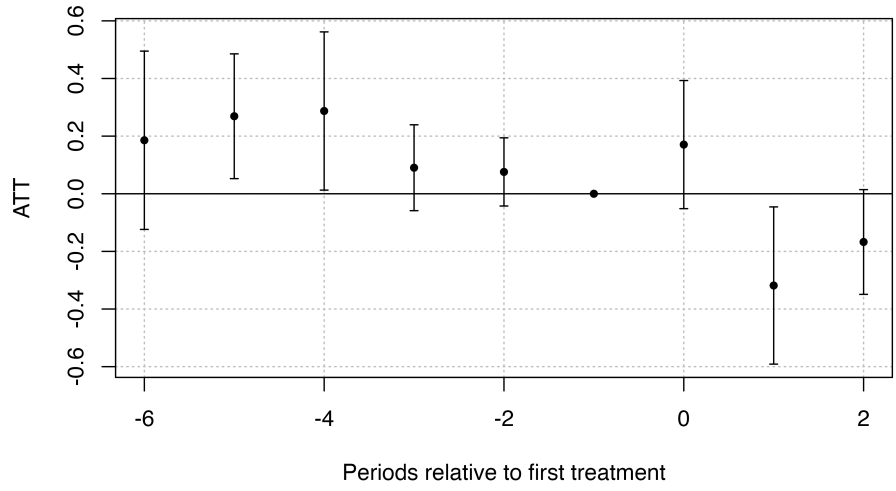


Figure 10. China-Only Recipients Event-Study Plot: TWFE

Table 7. China-Only Recipients Event-Study Estimates : TWFE

Event Time (relative to treatment)	**Estimate**	**(SE)**
−6	0.186	(0.154)
−5	0.269**	(0.108)
−4	0.287**	(0.137)
−3	0.090	(0.074)
−2	0.076	(0.059)
0	0.171	(0.111)
+1	−0.318**	(0.136)
+2	−0.167*	(0.090)

Notes: Sample restricted to LIC/MIC countries receiving Chinese vaccines only. Standard errors clustered at the country level.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

6. Discussion and Conclusion

Did Chinese vaccine diplomacy during COVID-19 actually cause recipients to align more closely with China at the United Nations General Assembly? This paper identified that in some regions donations were followed by a measurable movement towards China, and in others they were not. That variation is not noise, donations shifted alignment in regions that started politically far from China and not in those already close, a pattern the theory predicted.

The vaccine diplomacy game explains why prior political distance, determines whether a recipient align. Where baseline political distance is large and uncertainty about donor commitment is substantial, a donation carries enough informational content to move the posterior beliefs across the threshold. The MENA estimates are consistent with this, donations are followed by a statistically significant reduction in ideal-point distance. When baseline distance is already small, the alignment threshold is low enough that recipient align without further belief updating, so an additional signal produces no observable movement. The SSA null is the prediction of that logic, not a failure of vaccine diplomacy. The two regional results are therefore mirror implications of a single signaling framework.

As such, the findings provide theoretic and empirical contributions both to the literature on vaccine diplomacy, as well as the aid-for-vote literature. While vaccine diplomacy literature has largely documented the motivations behind China's donations and case studies on recipient's response (Barham et al., 2023; Lee, 2023), existing studies stop short of identifying whether the donations produce political returns. This paper provides causal evidence to show that vaccine donations do increase political alignment but are confined to specific relational settings. The findings also refine aid-for-vote literature, which has established that material transfer can shift General Assembly voting and increasingly explains vote-buying not by how much aid was given but by what kind: whether the aid is fungible enough for recipient to spend at its own discretion, what form it takes, and how much immediate value it delivers (Dreher et al., 2008). This paper provides a theoretical model which shows that responsiveness depends on the recipient's prior beliefs about the donor, which is why an identical donation moves in one region and leaves another unchanged.

The findings of this paper are subject to several limitations. The outcome variable captures short to medium-term changes in UNGA voting behavior, and may not capture alignment expressed outside roll-call voting such as trade commitments or shifts in bilateral domestic postures. Causal identification holds only for MENA and SSA, since parallel trends is not satisfied in SEA and LAC. The MENA never-treated control group is thin, and estimates should be read within the scope of that regional sample. More broadly, the setting is a single donor during an acute global health emergency, a setting characterized by unusually high demand for external commitment signals. Whether donation signals

retain informational value outside such conditions is not something this design can establish.

The results also carry important policy implications. In particular, health assistance operates as a conditional instrument of influence rather than a generally effective one, and political leverage does not follow automatically from provision. It depends on whether the assistance conveys new information about the donor reliability to a recipient that does not already possess it, which means that returns diminishes where diplomatic ties are already dense. The absence of measurable political effects in such setting reflect saturation and an extension of current diplomatic relationship rather than ineffectiveness, and exceptions about political returns to bilateral aid should be calibrated accordingly.

The findings highlight several venues for future research. The first would be to examine whether conditional effects identified in this paper extends to bilateral lending, infrastructure investment, or health assistance outside of a crisis context, and whether recipient-side institutional factors moderate the responsiveness of governments to donor signal. The second could be to extend the outcome variable beyond UNGA ideal-point distance, to include other measures of political alignment such as trade agreements, Belt and Road imitative participation, or public diplomatic statements. This would show whether the regional pattern documented here reflects a broader shift in alignment or a narrower adjustment confined to UNGA voting behavior.

Statements and Declarations

Funding. The author did not receive support from any organization for the submitted work.

Competing interests. The author has no relevant financial or non-financial interests to disclose.

References

Alesina, A., & Dollar, D. (2000). Who gives foreign aid to whom and why? *Journal of Economic Growth*, *5*(1), 33–63. https://doi.org/10.1023/A:1009874203400

Apolinário Júnior, L., Rinaldi, A. L., & Lima, R. d. C. (2022). Chinese and Indian COVID-19 vaccine diplomacy during the health emergency crisis. *Revista Brasileira de Política Internacional*, *65*(1), e014. https://doi.org/10.1590/0034-7329202200114

Atamanenko, A., & Konopka, N. (2022). Russia's and China's vaccine diplomacy in Central and Eastern Europe. *Copernicus Political and Legal Studies*, *1*(1), 7–13. https://doi.org/10.15804/cpls.20221.01

Azzahra, A. Q. F. (2024). US–China rivalry in health diplomacy: A case study of COVID-19 vaccine in Latin America. *European Journal of Development Studies*, *4*(5), 1–5. https://doi.org/10.24018/ejdevelop.2024.4.5.379

Bailey, M. A., Strezhnev, A., & Voeten, E. (2017). Estimating dynamic state preferences from United Nations voting data. *Journal of Conflict Resolution*, *61*(2), 430–456. https://doi.org/10.1177/0022002715595700

Barham, E., Daly, S. Z., Gerez, J. E., Marshall, J., & Pocasangre, O. (2023). Vaccine diplomacy: How COVID-19 vaccine distribution in Latin America increases trust in foreign governments. *World Politics*, *75*(4), 826–875. https://doi.org/10.1353/wp.2023.a908776

Bautista, L. E., & Herrera, V. M. (2023). The need for transparency in COVID-19 vaccine trials and vaccination policies: The case of CoronaVac in Latin America. *Journal of Public Health and Emergency*, *7*, 22–22. https://doi.org/10.21037/jphe-23-19

Bueno de Mesquita, B., & Smith, A. (2007). Foreign aid and policy concessions. *Journal of Conflict Resolution*, *51*(2), 251–284. https://doi.org/10.1177/0022002706297696

Bueno de Mesquita, B., & Smith, A. (2016). Competition and collaboration in aid-for-policy deals. *International Studies Quarterly*, *60*(3), 413–426. https://doi.org/10.1093/isq/sqw011

Cahayani, I. (2024). Vaccine diplomacy as new soft power effort of US in dealing with China in Southeast Asia. *Jurnal Ilmiah Hubungan Internasional*, *20*(1), 14–36. https://doi.org/10.26593/jihi.v20i1.6109.14-36

Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, *225*(2), 200–230. https://doi.org/10.1016/j.jeconom.2020.12.001

Carter, D. B., & Stone, R. W. (2015). Democracy and multilateralism: The case of vote buying in the UN General Assembly. *International Organization*, *69*(1), 1–33. https://doi.org/10.1017/S0020818314000186

Center for Strategic and International Studies. (2021, September 23). Is China's Covid-19 diplomacy succeeding? [Updated 9 November 2023]. https://chinapower.csis.org/china-covid-medical-vaccine-diplomacy/

de Bengy Puyvallée, A., & Storeng, K. T. (2022). COVAX, vaccine donations and the politics of global vaccine inequity. *Globalization and Health*, *18*(1), 26. https://doi.org/10.1186/s12992-022-00801-z

Dreher, A., Nunnenkamp, P., & Thiele, R. (2008). Does US aid buy UN General Assembly votes? A disaggregated analysis. *Public Choice*, *136*(1–2), 139–164. https://doi.org/10.1007/s11127-008-9286-x

Dreher, A., & Sturm, J.-E. (2012). Do the IMF and the World Bank influence voting in the UN General Assembly? *Public Choice*, *151*(1–2), 363–397. https://doi.org/10.1007/s11127-010-9750-2

Duke Global Health Innovation Center. (2023). *COVID-19 vaccine data* [Data set]. Launch and Scale Speedometer. Retrieved September 21, 2026, from https://launchandscalefaster.org/node/64

Filipović, A. (2024). Vaccine diplomacy of the United States, China, India, and Russia during the COVID-19 pandemic: A comparative analysis. *Međunarodna Politika*, *75*(1190), 57–90. https://doi.org/10.18485/iipe_mp.2024.75.1190.3

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics*, *225*(2), 254–277. https://doi.org/10.1016/j.jeconom.2021.03.014

Hotez, P. J. (2022). COVID-19 vaccines: The imperfect instruments of vaccine diplomacy. *Journal of Travel Medicine*, *29*(8), taac063. https://doi.org/10.1093/jtm/taac063

Itugbu, S. (2021, December 10). *The politics of China's vaccine diplomacy in Africa*. Australian Outlook, Australian Institute of International Affairs. Retrieved September 21, 2026, from https://www.internationalaffairs.org.au/australianoutlook/the-politics-of-chinas-vaccine-diplomacy-in-africa/

Kuziemko, I., & Werker, E. (2006). How much is a seat on the Security Council worth? Foreign aid and bribery at the United Nations. *Journal of Political Economy*, *114*(5), 905–930. https://doi.org/10.1086/507155

Lee, S. T. (2023). Vaccine diplomacy: Nation branding and China's COVID-19 soft power play. *Place Branding and Public Diplomacy*, *19*(1), 64–78. https://doi.org/10.1057/s41254-021-00224-4

Liu, L., Huang, Y., & Jin, J. (2022). China's vaccine diplomacy and its implications for global health governance. *Healthcare*, *10*(7), 1276. https://doi.org/10.3390/healthcare10071276

Nolte, D. (2022, February 1). *Relativizing the success of China's vaccine diplomacy*. German Council on Foreign Relations. Retrieved September 21, 2026, from https://dgap.org/en/research/publications/relativizing-success-chinas-vaccine-diplomacy

State Council of the People's Republic of China. (2020, May 18). *China announces concrete measures to boost global fight against COVID-19*. The State Council of the People's Republic of China. Retrieved September 21, 2026, from https://english.www.gov.cn/news/topnews/202005/18/content_WS5ec2960bc6d0b3f0e9497ec4.html

Strüver, G. (2016). What friends are made of: Bilateral linkages and domestic drivers of foreign policy alignment with China. *Foreign Policy Analysis*, *12*(2), 170–191. https://doi.org/10.1111/fpa.12050

Sun, L., & Abraham, S. (2021). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*, *225*(2), 175–199. https://doi.org/10.1016/j.jeconom.2020.09.006

Surianta, A., & Dressel, B. (2025). A new era of vaccine diplomacy: Navigating the US–China rivalry in Southeast Asia, 2020–2022. *Geopolitics*, *30*(5), 2408–2435. https://doi.org/10.1080/14650045.2025.2485206

Vadlamannati, K. C., & Jung, Y. S. (2023). The political economy of vaccine distribution and China's Belt and Road Initiative. *Business and Politics*, *25*(1), 67–88. https://doi.org/10.1017/bap.2022.26

Vadlamannati, K. C., Rodrigues Vieira, V. G., & Song, T. (2024). Calling the shots through health diplomacy: China's world-wide distribution of anti-Covid vaccines and the international order. *International Interactions*, *50*(1), 168–187. https://doi.org/10.1080/03050629.2024.2305968

van Dijk, R. J. L., & Lo, C. Y.-p. (2023). The effect of Chinese vaccine diplomacy during COVID-19 in the Philippines and Vietnam: A multiple case study from a soft power perspective. *Humanities and Social Sciences Communications*, *10*(1), 687. https://doi.org/10.1057/s41599-023-02073-3

Voeten, E. (2025). *United Nations General Assembly ideal points* [Data set] (Version 39). Harvard Dataverse. https://doi.org/10.7910/DVN/LEJUQZ

Vreeland, J. R., & Dreher, A. (2014). *The political economy of the United Nations Security Council: Money and influence*. Cambridge University Press.

Wang, T. Y. (1999). U.S. foreign aid and UN voting: An analysis of important issues. *International Studies Quarterly*, *43*(1), 199–210. https://doi.org/10.1111/0020-8833.00117

Wechsler, W. F. (2019, October 10). US withdrawal from the Middle East: Perceptions and reality. In *The MENA region: A great power competition*. Atlantic Council. Retrieved September 21, 2026, from https://www.atlanticcouncil.org/in-depth-research-reports/report/us-withdrawal-from-the-middle-east-perceptions-and-reality/

Woertz, E., & Yellinek, R. (2021, April 14). *Vaccine diplomacy in the MENA region*. Middle East Institute. Retrieved September 21, 2026, from https://www.mei.edu/publications/vaccine-diplomacy-mena-region

Woo, B., & Chung, E. (2018). Aid for vote? United Nations General Assembly voting and American aid allocation. *Political Studies*, *66*(4), 1002–1026. https://doi.org/10.1177/0032321717739144

World Bank. (2025). *World Development Indicators* [Data set]. Retrieved September 21, 2026, from https://databank.worldbank.org/source/world-development-indicators

World Health Organization. (2025). *Under-five mortality rate (per 1000 live births) (SDG 3.2.1)*. Global Health Observatory, Indicator Metadata Registry. Retrieved September 21, 2026, from https://www.who.int/data/gho

Xinhua News Agency. (2020, December 24). *Xinhua shiping: Zhize Zhongguo "yimiao waijiao," juxin xian'e [Xinhua commentary: Accusing China of "vaccine diplomacy" betrays malicious intent]*. Xinhuanet. Retrieved September 21, 2026, from https://www.xinhuanet.com/world/2020-12/24/c_1126903703.htm

Yatsuzuka, M., Nishino, M., Yoshida, T., & Jingushi, A. (2025). *The rising Global South and China* (NIDS China Security Report No. 2025). National Institute for Defense Studies. Retrieved September 21, 2026, from https://www.nids.mod.go.jp/english/publication/chinareport/index.html

Zubair, B., Waseem, S., & Shahid, K. (2023). Soft power and vaccine diplomacy: An analysis of China's global image enhancement during the COVID-19 pandemic. *BTTN Journal*, *2*(2), 107–133. https://doi.org/10.61732/bj.v2i2.73

A. Appendix A

The appendix presents the formal proofs for all results stated in Section 3. The proofs are presented in the order in which they appear in the main text: Lemma 1, Proposition 1, Proposition 3, followed by Implication 1 through 3. The proof of Proposition 2 is omitted, as it follows directly from Lemma 1: when $p \geq p^*$, Recipient align unconditionally and the individual rationality conditions (IR-G) and (IR-O) are sufficient to verify that neither types has an incentive to deviate.

A.1 Proof of Lemma 1 (Recipient Alignment Decision)

The proof derives the minimum posterior belief required for Recipient's alignment decision to be individually rational by expanding and rearranging Recipient's alignment condition.

Recipient aligns ($y = 1$) if and only if the expected utility of alignment weakly exceeds the expected utility on non-alignment:

$$E[U_i|x, y = 1] \geq E[U_i|x, y = 0] \tag{9}$$

The expected utility of Recipient aligning ($y = 1$):

$$E[U_i|x, y = 1] = p(x)[m(x) + a_R(G) - l_R(d_R)] + [1 - p(x)][m(x) + a_R(O) - l_R(d_R)] \tag{10}$$

The expected utility of Recipient not aligning ($y = 0$):

$$E[U_i|x, y = 0] = m(x) \tag{11}$$

Alignment will occur if and only if:

$$E[U_i \mid x, y = 1] \geq E[U_i \mid x, y = 0]$$

$$p(x)[m(x) + a_R(G) - l_R(d_R)] + [1 - p(x)][m(x) + a_R(O) - l_R(d_R)] \geq m(x)$$

Rearranging:

$$p(x)[a_R(G) - a_R(O)] \geq l_R(d_R) - a_R(O) \tag{12}$$

Since $a_R(G) > a_R(O)$ by assumption, $a_R(G) - a_R(O) > 0$. Dividing both sides yield:

$$p(x) \geq p^* \equiv \frac{l_R(d_R) - a_R(O)}{a_R(G) - a_R(O)} \tag{13}$$

A.2 Proof of Proposition 1 (Separating Equilibrium)

This proof verifies that the proposed strategies constitute a perfect Bayesian equilibrium by confirming that no player has a profitable deviation and that beliefs are consistent with Bayes' rule on the equilibrium path. Uniqueness of the separating equilibrium is then established by ruling out the reverse separating equilibrium.

Recipient: Given the proposed strategies, $x = 1$ is sent only by genuine China and $x = 0$ only by opportunistic China. By Bayes' rule, $p(1) = 1$ and $p(0) = 0$. Since $p(1) = 1 > p^*$ by assumption, Recipient strictly prefers to align $y = 1$ upon observing $x = 1$. Since $p(0) = 0 < p^*$, Recipient strictly prefers not to align $y = 0$ upon observing $x = 0$. Recipient has no incentive to deviate.

Genuine China: Given that Recipient align following $x = 1$. Genuine China's expected utility from donating is $EU_R(x = 1) = b(x)+v_G-c_G(x)$ and expected utility from not donating is $EU_R(x = 0) = 0$. If (IR-G) holds, genuine China will have no incentive to deviate to not donate.

Opportunistic China: Given that Recipient does not align following $x = 0$. Opportunistic China expected utility from donating is $EU_O(x = 0) = b(x) + v_O - c_O(x)$ and expected utility from not donating is $EU_O(x = 0) = 0$. If $b(x) + v_O - c_O(x) < 0$ holds, opportunistic China will have no incentive to deviate to donate.

It remains to verify that no other separating equilibrium exists. Consider the reverse separating equilibrium in which opportunistic China donates ($x = 1$) and genuine China does not ($x = 0$) For this equilibrium to be sustained, it requires that opportunistic China finds donation individually rational but genuine China does not. This requires that $b(x)+v_O-c_O(x) \geq 0$ which violates $b(x)+v_O-c_O(x) < 0$ that we have established earlier. Opportunistic China will have the incentive to deviate to not donate. The reverse separating equilibrium is hence ruled out.

A.3 Proof of Proposition 3 (Semi-Separating Equilibrium)

The proof proceeds in four steps:(1) derivation of the Recipient's mixing probability σ; (2) derivation of Opportunistic China's mixing probability τ^*; (3) verification that genuine China has no incentive to deviate; and (4) confirmation of the boundary conditions that define the equilibrium's existence region.

(1) Recipient's mixing probability σ:

For Opportunistic China's mixed strategy to be optimal, it must be indifferent between donating and not donating, so that $EU_O(x = 1) = EU_O(x = 0)$. Given that Recipient aligns with probability σ upon observing $x = 1$, Opportunistic China's expected utility from donating is

$$EU_O(x=1) = \sigma\big[b(x) + v_O - c_O(x)\big] + (1-\sigma)\big[b(x) - c_O(x)\big], \tag{14}$$

and its expected utility from not donating is $EU_O(x=0) = 0$. Setting these equal and simplifying yields:

$$\sigma^* = \frac{c_O(x) - b(x)}{v_O}. \tag{15}$$

For $\sigma \in (0,1)$, two conditions must hold. The lower bound $\sigma > 0$ requires $c_O(x) > b(x)$, which holds by assumption. The upper bound $\sigma < 1$ requires $c_O(x) - b(x) < v_O$, or equivalently $c_O(x) < b(x) + v_O$, which is precisely condition (IR-O).

(2) Opportunistic China's mixing probability τ: For the equilibrium to be internally consistent, the Recipient's posterior belief upon observing $x = 1$ must equal p^*, the threshold at which Recipient is willing to mix. By Bayes' rule, when Opportunistic China donates with probability τ,

$$p(x=1) = \frac{p}{p + (1-p)s}. \tag{16}$$

Setting $p(x=1) = p^*$ and solving for τ yields

$$\tau^* = \frac{p\big[a_R(G) - l_R(d_R)\big]}{(1-p)\big[l_R(d_R) - a_R(O)\big]}. \tag{17}$$

For $s \in (0,1)$, two conditions must hold. For the lower bound to hold requires:

$$p[a_R(G) - l_R(d_R)] > 0 \tag{18}$$

The lower bound $s^* > 0$ holds when $a_R(G) > l_R(d_R)$.

For the upper bound, $s^* < 1$ requires

$$p\big[a_R(G) - l_R(d_R)\big] < (1-p)\big[l_R(d_R) - a_R(O)\big]. \tag{19}$$

Expanding and collecting terms in p gives $p\big[a_R(G) - a_R(O)\big] < l_R(d_R) - a_R(O)$, which rearranges to

$$p < \frac{l_R(d_R) - a_R(O)}{a_R(G) - a_R(O)} = p^*. \tag{20}$$

The condition $\tau^* < 1$ therefore holds if and only if $p < p^*$, which is the existence condition stated in Proposition 3.

(3) No-deviation condition for genuine China:

genuine China donates with probability one. Given that Recipient aligns with probability $\sigma > 0$ upon observing $x = 1$, genuine China's expected utility from donating is $EU_R(x = 1) = b(x) + \sigma v_G - c_G(x)$, and its expected utility from deviating to $x = 0$ is $EU_R(x = 0) = 0$. Since condition (IR-G) ensures $b(x) + v_G - c_G(x) \geq 0$ and $\sigma > 0$ adds a strictly positive term, $EU_R(x = 1) \geq b(x) + v_G - c_G(x) \geq 0 = EU_R(x = 0)$. genuine China has no incentive to deviate.

(4) Uniqueness within the semi-separating region:

To confirm that no other semi-separating configuration constitutes a perfect Bayesian equilibrium, consider the candidate in which genuine China mixes with probability $\tau \in (0, 1)$ and Opportunistic China donates with probability one. By Bayes' rule, the posterior following $x = 1$ is

$$p(x = 1) = \frac{p\tau}{p\tau + (1 - p)} < \frac{p\tau + (1 - p)\tau}{p\tau + (1 - p)} = \tau \leq 1, \tag{21}$$

and since $p < p^*$ in the semi-separating region, this posterior falls strictly below p^*, so Recipient does not align. Opportunistic China's expected utility from donating then reduces to $b(x) - c_O(x) < 0$ by assumption, giving Opportunistic China a strict incentive to deviate to not donate ($x = 0$). This candidate is therefore not an equilibrium. The remaining candidate, in which genuine China mixes with probability $s \in (0, 1)$ and Opportunistic China does not donate, collapses to the separating equilibrium upon observing that the off-path signal $x = 1$ is sent exclusively by genuine China, and is ruled out on those grounds.

A.4 Proof of Implications (Comparative Static Analysis)

This proof derives the comparative static analysis presented in Section 3.4.

Proof of Implication 1 $l_R(d_R)$: Political Distance and Political Cost of Alignment

From Lemma 1, taking the partial derivative of p^* with respect to $l_R(d_R)$:

$$\frac{\partial p^*}{\partial l_R(d_R)} = \frac{1}{a_R(G) - a_R(O)} \tag{22}$$

Since $a_R(G) > a_R(O)$ by assumption, $a_R(G) - a_R(O) > 0$:

$$\frac{\partial p^*}{\partial l_R(d_R)} > 0 \tag{23}$$

Proof of Implication 2 $a_R(G)$: Benefits from genuine China

From Lemma 1, taking the partial derivative of p^* with respect to $a_R(G)$:

$$\frac{\partial p^*}{\partial a_R(G)} = -\frac{l_R(d_R) - a_R(O)}{\big[a_R(G) - a_R(O)\big]^2} \tag{24}$$

Since $a_R(G) - a_R(O) > 0$ and $a_R(O) < l_R(d_R)$:

$$\frac{\partial p^*}{\partial a_R(G)} < 0 \tag{25}$$

Proof of Implication 3 $a_R(O)$: Benefits from Opportunistic China

From Lemma 1, taking the partial derivative of p^* with respect to $a_R(O)$:

$$\frac{\partial p^*}{\partial a_R(O)} = \frac{-a_R(G) + l_R(d_R)}{\big[a_R(G) - a_R(O)\big]^2} \tag{26}$$

Since $a_R(G) - a_R(O) > 0$ and $l_R(d_R) < a_R(G)$:

$$\frac{\partial p^*}{\partial a_R(O)} < 0 \tag{27}$$

B. Appendix B

This appendix provides three sets of supplementary results referenced in Section 4. First, Figure 11 reports the conventional two-way fixed effects (TWFE) event-study plot for the full low- and middle-income country sample. This is included as a diagnostic baseline to illustrate the pre-trend instability that motivates the regional disaggregation. Secondly, Figure 12 to 14 presents the event-study plot for SEA and LAC. Lastly, Figure 16,17 and Tables 8 and 9 report event-study estimates obtained using Callaway and Sant'Anna, 2021 estimator for SSA and MENA. These results serves as a robustness check on the primary Sun and Abraham, 2021 estimates reported in the main text. Since the two estimators rely on distinct identification and aggregation approaches, consistency of results across both estimator strengthens confidence in the main findings.

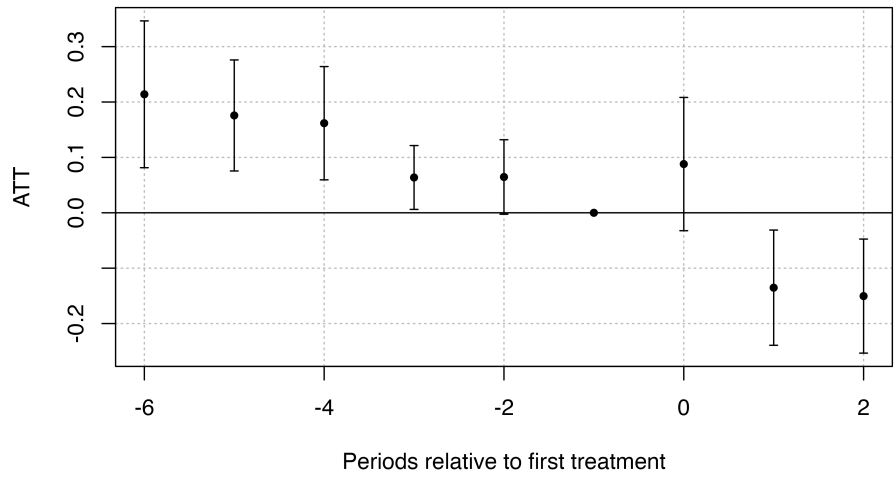


Figure 11. Low-, Middle Income Countries : TWFE

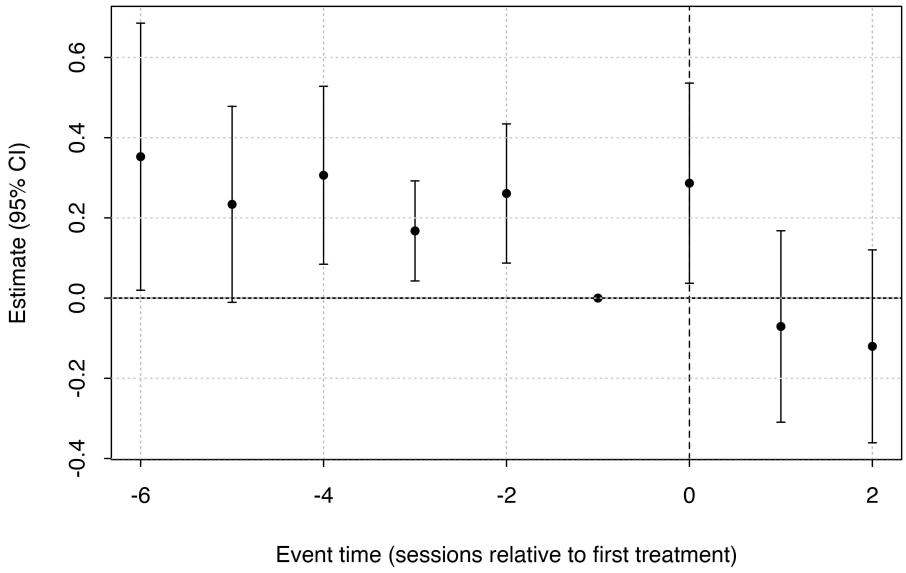


Figure 12. SEA Event-Study Plot: Sun & Abraham Estimator

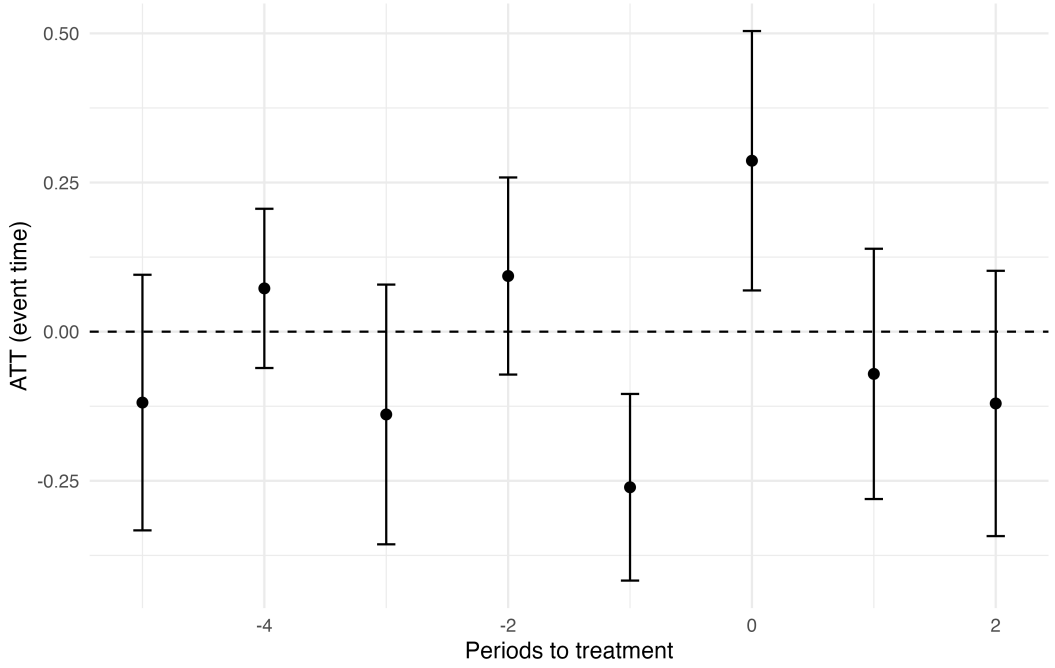


Figure 13. SEA Event-Study Plot: Callaway & Sant'Anna Estimator

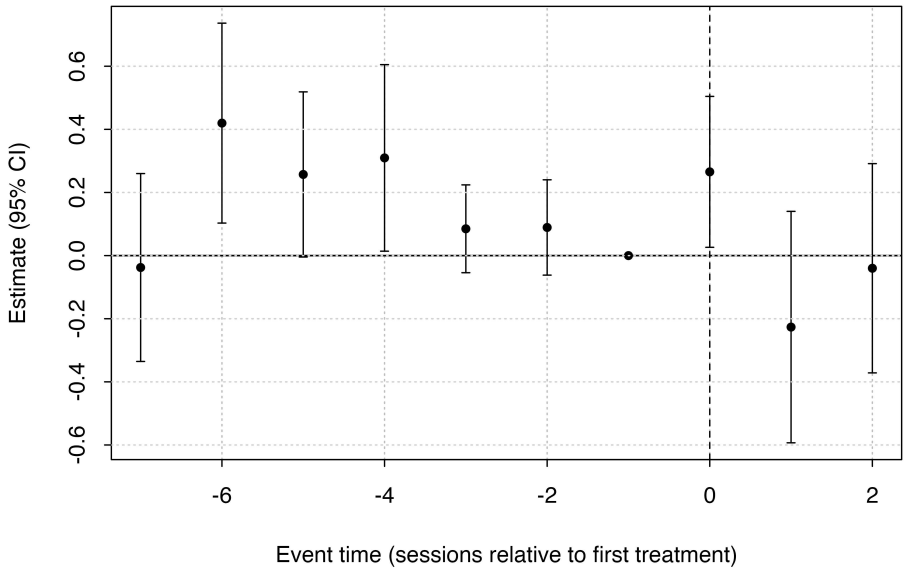


Figure 14. LAC Event-Study Plot: Sun & Abraham Estimator

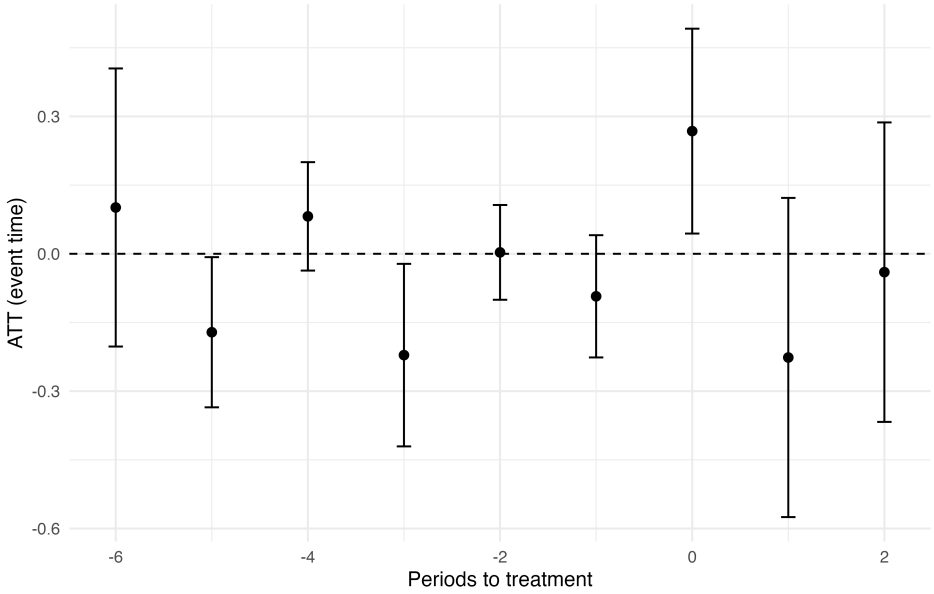


Figure 15. LAC Event-Study Plot: Callaway & Sant'Anna Estimator

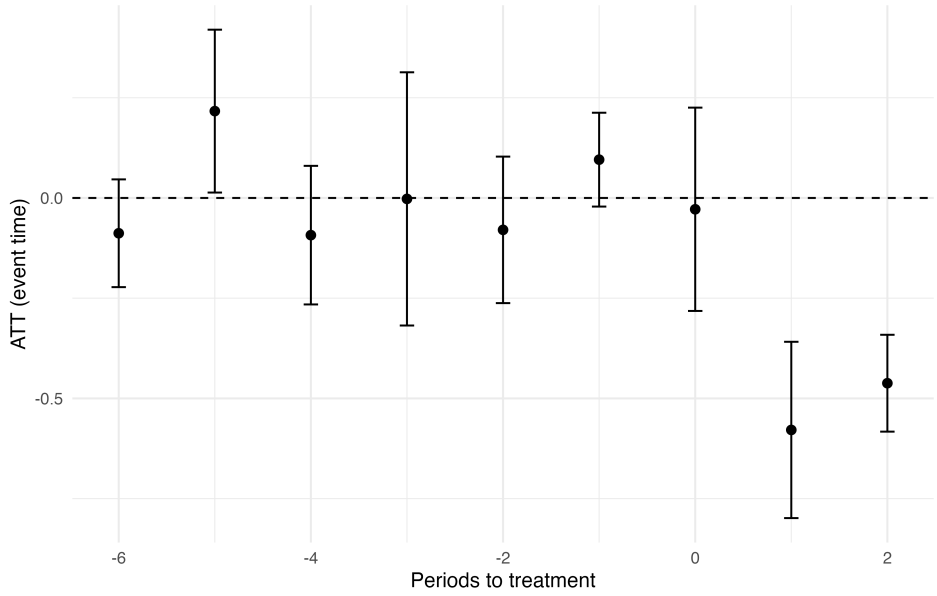


Figure 16. MENA Event-Study Plot: Callaway Sant'Anna Estimator

Table 8. MENA Event-Study Estimates : Callaway & Sant'Anna Estimator

Event Time (relative to treatment)	**Estimate**	**(SE)**
-6	-0.088	(0.069)
-5	0.217^{**}	(0.104)
-4	-0.093	(0.088)
-3	-0.002	(0.161)
-2	-0.080	(0.093)
-1	0.096	(0.060)
0	-0.028	(0.129)
$+1$	-0.579^{***}	(0.112)
$+2$	-0.462^{***}	(0.062)

Notes: Standard errors clustered at the country level.

Callaway & Sant'Anna (2021) DID; est_method = dr; control_group = notyettreated.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

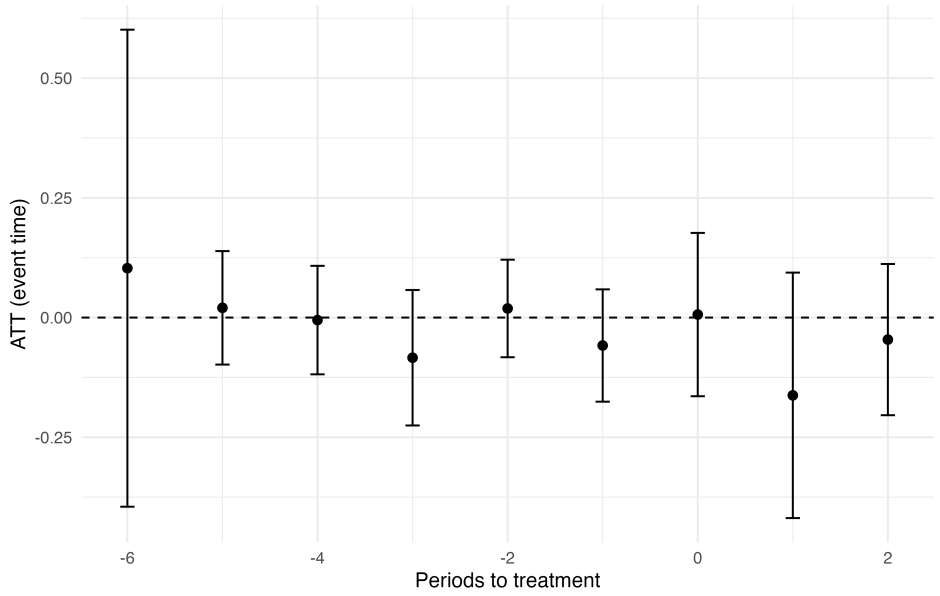


Figure 17. SSA Event-Study Plot: Callaway & Sant'Anna Estimator

Table 9. SSA Event-Study Estimates: Callaway & Sant'Anna estimator

Event Time (relative to treatment)	**Estimate**	**(SE)**
-6	0.103	(0.254)
-5	0.020	(0.060)
-4	-0.005	(0.058)
-3	-0.084	(0.072)
-2	0.019	(0.052)
-1	-0.058	(0.060)
0	0.006	(0.087)
$+1$	-0.162	(0.131)
$+2$	-0.046	(0.081)

Notes: Standard errors clustered at the country level.

Callaway & Sant'Anna (2021) staggered DID; est_method = dr; control_group = notyettreated.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

C. Appendix C

This appendix reports the full event-study estimates underlying the healthcare level robustness check in Section 5. Tables 10 and 11 present the Callaway and Sant'Anna, 2021 coefficient estimates for the bottom quartile (Q1, worst health capacity) and top quartile (Q4, best health capacity) subsample respectively.

Table 10. Q1 Health (Worst) Event-Study Estimates: Callaway & Sant'Anna estimator

Event Time (relative to treatment)	**Estimate**	**(SE)**
−6	0.045	(0.242)
−5	−0.034	(0.114)
−4	0.008	(0.115)
−3	−0.126	(0.150)
−2	−0.024	(0.055)
−1	−0.058	(0.076)
0	0.070	(0.142)
+1	−0.183	(0.413)
+2	0.061	(0.268)

Notes: Standard errors clustered at the country level.

Callaway & Sant'Anna (2021) staggered DID; est_method = dr; control_group = notyettreated.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table 11. Q4 Health (Best) Event-Study Estimates: Callaway & Sant'Anna estimator

Event Time (relative to treatment)	**Estimate**	**(SE)**
−6	0.121	(0.157)
−5	−0.061	(0.083)
−4	0.021	(0.049)
−3	−0.137	(0.091)
−2	0.019	(0.074)
−1	−0.063	(0.097)
0	0.150	(0.118)
+1	−0.102	(0.117)
+2	−0.041	(0.108)

Notes: Standard errors clustered at the country level.

Callaway & Sant'Anna (2021) staggered DID; est_method = dr; control_group = notyettreated.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

D. Appendix D

To examine whether treatment effects vary systematically with baseline diplomatic orientation towards China, the global LIC and MIC sample is stratified based on the mean pre-treatment ideal-point distance from China, computed over session 70 through 75. The Callaway and Sant'Anna, 2021 staggered difference-in-differences estimator is applied separately to each quartile subsample.

The quartile stratification is motivated by the vaccine diplomacy game developed in Section 3. Countries in quartiles that are already in close diplomatic proximity to China prior to the pandemic face lower adjustment cost and derive substantial baseline benefits from maintaining ties with China even under uncertainty about donor reliability. The alignment threshold is therefore already low for such recipients, such that vaccine donations carry limited informational content and generate little additional belief updating. This mirrors the saturation mechanism identified in the Sub-Saharan Africa analysis, where alignment remains optimal across a wide range of beliefs and leaves little margin for further convergence in response to a new signal. Consistent with this prediction, event-study plots for Q1 through Q3, as shown in Figures 18, 19 and 20 show pre-treatment coefficients centered around zero and post-treatment estimates that are small and statistically insignificant. The absence of a significant effect in these subsamples reflects a ceiling on alignment rather than evidence against vaccine diplomacy.

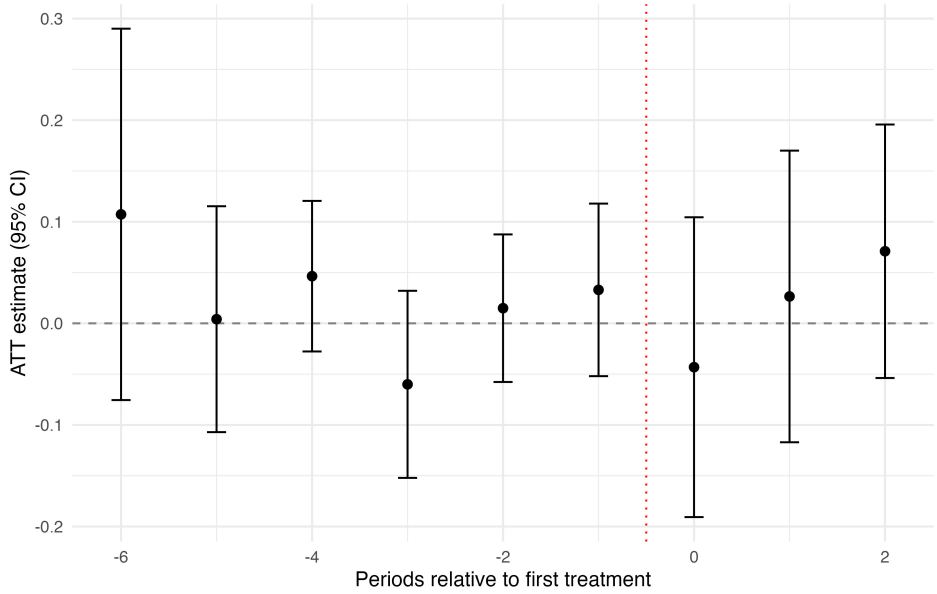


Figure 18. Q1 Pre-Treatment Ideal-Point Distance Event-study Plot: Callaway and Sant'Anna Estimator

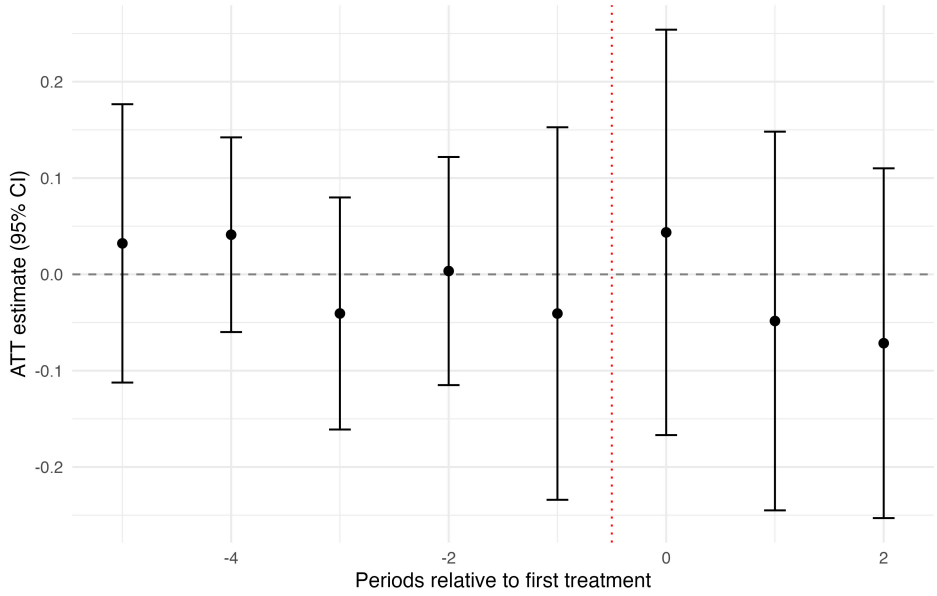


Figure 19. Q2 Pre-Treatment Ideal-Point Distance Event-study Plot: Callaway and Sant'Anna Estimator

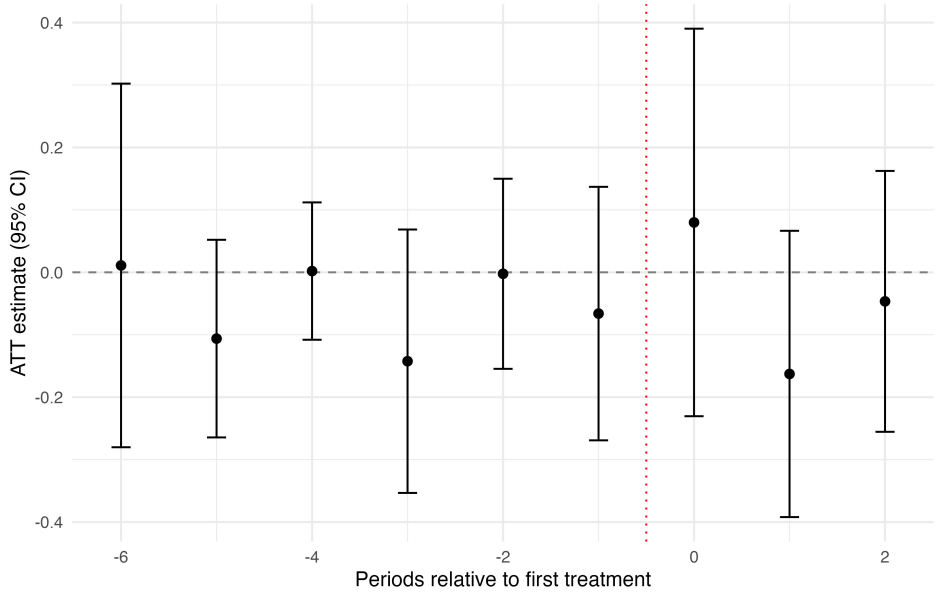


Figure 20. Q3 Pre-Treatment Ideal-Point Distance Event-study Plot: Callaway and Sant'Anna Estimator

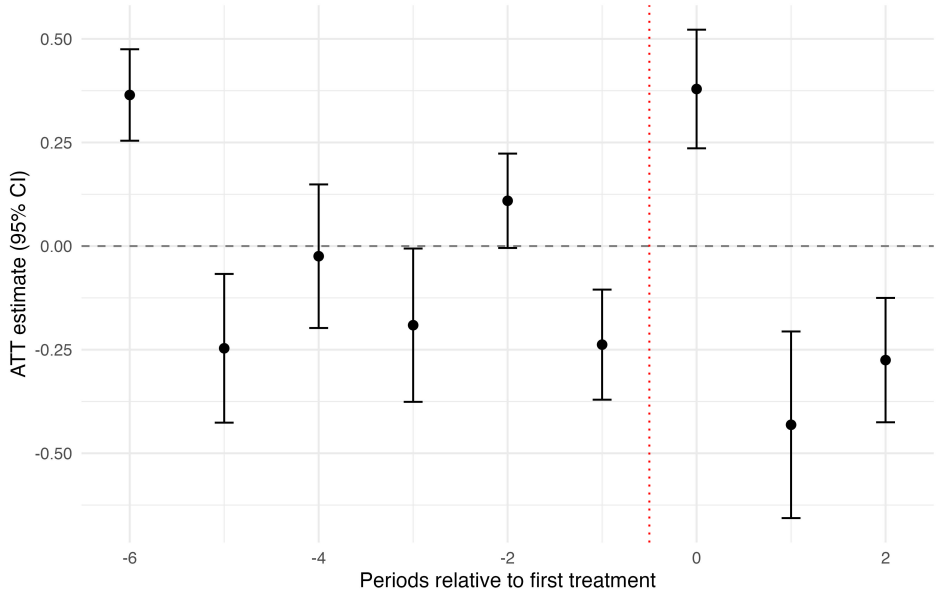


Figure 21. Q4 Pre-Treatment Ideal-Point Distance Event-study Plot: Callaway and Sant'Anna Estimator