

Common Benefit, Threat to Withdraw and Order in Global Club Goods Provision

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Unlike membership of IOs, membership of global club goods is often unobserved, but still affects state behavior. Sharing global public and club goods can increase common benefits and threatening power of the dominant state, which can both shape states' behavior. Employing social network analysis, we use network community to capture global club good membership and use hierarchy to measure the structure of club good provision. Focusing on global financial safety, we argue that states sharing financial safety through bilateral swap agreements vote closer in the UN and sanction each other less. More importantly, swap agreement communities with flatter structures have stronger order. Using an original dataset on swap agreements, empirical results support our arguments and we claim that collective resource-sharing provides stronger incentives for order maintenance which cannot be made up by the dominant's threat to withdraw.

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Introduction

How does sharing global club goods shape international order? Global public goods and club goods as public health, climate change mitigation, and financial safety are playing a crucial role in shaping states' preferences and actions as they become increasingly interdependent in resolving problems exceeding boundaries of nation states (Oldekop et al., 2020; Frieden, 2016; Battig & Bernauer, 2009). Sharing such club goods indicates high interdependence among states. For example, in this paper, we focus on financial safety as global club goods, where a set of financial agreements pools foreign reserves of a group of states and secures common safety. Specifically, we will consider bilateral swap agreements (BSAs), where states sign agreements to share liquidity with each other unconditionally. In this case, when financial crisis occurs in one state, states sharing the same club good lose reserves simultaneously, and is exposed in greater risk of financial crisis. Thus, a group of states either facing common threat of crisis or sharing benefits of common stability, which means that they share financial safety as a club good. Some studies argue that states signing BSAs share common benefits and are interdependent on each other (Frieden, 2016; Xun & Chong, 2020; Gavin, 2020; Liao & McDowell, 2015), which indicates possible order among states sharing financial safety. Meanwhile, scholars also argue that dominant club good providers hold asymmetric power because they can make threats to withdraw the good (Xun & Chong, 2020; McDowell, 2019; Armijo & Katada, 2015), which suggests an alternative possible mechanism of order formation.

However, regarding how this order is formed, there remain questions unanswered. First, it is spurious to study financial safety as a public or club good by only considering dyadic

relations without clearly identifying states that actually share the good¹. For instance, China had a bilateral swap agreement with both Pakistan and Canada in 2018, but Pakistan only signed one swap agreement with China while Canada is linked with China, the U.S., the U.K., and Switzerland at the same time. In this case, it is clear that Canada does not share financial safety as a club good with China to the same extent as Pakistan. On the other hand, it is also unreasonable to consider Sri Lanka and Bhutan as financially isolated since they all share India as a common lender-of-last-resort. Thus, it is important to take third-order effects into account when studying order formation in club goods membership.

Second, there are potential conflicts between the two explanatory mechanisms when one state is clearly the dominant provider of the club good in a club, which is often the case in global club goods provision. Such conflicts arise from the reliance of the two mechanisms on the structure of club goods provision. In this case, some prior studies argue that although states now share less common benefit and may free ride, which endangers the order, this danger can be relieved by the dominant's threat to withdraw the good. Armijo and Katada (2015) called this threat to withdraw "currency coercion", while Vaughn (2019) further adds that such credible threats can also be formed through dominant states threatening to cut off political relations, which can relieve free riding in BSAs. Xun & Chong (2020) considered both mechanisms independently and argued that they together shaped states' U.N. voting preferences. However, it is not clear whether the loss of common benefit can be compensated by credible threat in hierarchical structures, and it can be problematic to either assume both mechanisms exist independently or that one mechanism can make up for the other without

¹ For example, Xun & Chong (2020) studied the effect of China's BSAs on its partners' U.N. voting preferences without considering third-order effects.

examining their relative strength.

This paper answers the two questions by considering BSAs as a network and employing two network measures: community and hierarchy. First, we use community to capture membership of global club goods. Community in concept captures which group of states are more closely connected to each other than connected with states outside the group. In case of BSAs, community membership means that states are more connected in pooling liquidity with states within their community than states outside the community, and thus share the club good of financial safety. Returning to the example of China, Pakistan, and Canada, it is clear that Pakistan shares financial safety with China, since China is the only state sharing liquidity with it whenever in crisis, while this is ambiguous and requires further calculation for Canada since it can also turn to many other states for help.

Second, we use hierarchy measures to capture the structure of BSA communities and examine the relevant strength of “benefit” and “threat” mechanisms. Hierarchy measures the extent to which one state is closely connected with all other states, while other states are sparsely connected with each other. The more hierarchy a club good community is, the more that the good is asymmetrically provided by a dominant state, which implies lower common benefit and stronger threat by the dominant. Thus, the relative strength of “benefit” and “threat” mechanisms can be captured by the strength of order in hierarchy and non-hierarchy communities.

By using the two network measures, this study contributes to relevant literature in two ways. First, we make theoretical contributions by explaining international order formation in global club goods provision. Building on two streams of prior research on how benefits and

threat takes place in the global financial safety net, we make clear identification of financial safety sharing in BSA networks, and our results show that states sharing the same financial safety club good tend to vote closer in the UNGA, as well as sanction each other less. Therefore, sharing financial safety club goods leads to international order. Importantly, we also study whether order within BSA communities get stronger or weaker as they become more hierarchy. This aims to explain the relative strength of “benefit” and “threat” mechanisms and answer the critical question of whether dominant power can make up for lower compliance incentives due to loss of common benefit in a more hierarchical club. In the sense of order maintenance, which is critical for long-term public goods provision, our results also speak to the puzzle of whether global public goods and club goods are better provided by a dominant state or by collective action.

Second, we also contribute by proposing new approaches of studying global club goods and public goods through employing network measures like community and hierarchy. Such measures help us go beyond the manifest and isolated agreements among state dyads and address the theoretical underpinnings of global club goods, which is sharing some form of common resources within a group, not dyads. In addition, the hierarchy measure we use can identify strength of different mechanisms within public and club goods, which are dependent on community structure. This in turn lends support to hypothesis testing on public and club goods that could only been ambiguously discussed before. Therefore, we not only use the two network measures to test our theory on BSAs and global financial safety net, but also provides a useful method for studying a broad range of theories on global public and club goods in future research.

This paper proceeds as follows: we first discuss theory on BSAs, financial club goods and international order, and derive two hypotheses based on our theory. In the following section, we introduce the two network measures used in this study, which is community and hierarchy. Then we employ the network measures to the main regression model and present the results. The last section is a discussion and conclusion of this paper.

Bilateral Swap Agreements and International Order

Interdependence and International Order

On the broader aspect, scholars have looked at how interdependence can shape international order. First, building on the liberal theory, interdependence between states indicates common benefits and can increase the expected cost of conflict. Mansfield and Pevehouse (2000) found that states are less likely to have military disputes with their preferential trade agreement (PTA) partners, because they expect high future economic co-benefits. Hegre et al., (2010) found empirical evidence supporting the argument of interdependence reducing conflicts. This consideration of common benefits is further incorporated into domestic institutions and foreign policymaking. Since conflicts between interdependent states can damage the extensive economic and financial links between them and hurt common benefits, economic agents seek to affect state behavior to reduce conflicts (Gartzke & Li, 2003). This branch of literature focused largely on how interdependence increases states' common interest in maintaining order.

Second, interdependence also facilitates credible threats since states suffer from higher loss when actual political shock takes place, and this makes states more likely to strike deals

and leads to international order. Gartzke et al. (2001) breaks from previous literature by arguing that interdependence fosters order through enabling costly signaling, thereby promotes effective communication and reduces conflict. More generally, sanctions are also less likely to occur between states with higher levels of trade interdependence since interdependence itself indicates credible threat and makes it unnecessary to use sanctions anymore (Lektzian & Souva 2007).

However, not only interdependence between two states can lead to order, third party effects and interconnection also matters. The underlying theoretical claim made here is that the connection states share can transmit costs and benefits, indicating a latent map of interdependence that goes beyond prior definition. For example, one state in turmoil can lead states that it is interdependent with, but not directly involved in the matter, to maintain the order (Powell & Chacha, 2016; Beardsley et al., 2020). This is because their economic or financial benefits are also put at risk. Lupu and Traag (2013) extended the argument on common benefit and order by considering indirect interdependence. They argue that conflict not only decreases probability of conflict between states directly connected in trade, but also increases opportunity costs for states indirectly connected as competitors or trade partners, making them less likely to conflict. Also, taking the full network into consideration, states more integrated in the trade network also initiate less conflicts (Kinne, 2012).

In summary, interdependence leads to international order. This can be explained by both increase of common benefits or the ability to make credible threats, and the effect extends to third parties. In later sections, we argue that apart from direct economic linkages like trade and capital flows proposed by prior research, global club good memberships can create and

maintain order as well, and we further explain its specific mechanisms.

BSAs, Financial Safety, and Club Goods

The global financial safety net (GFSN) is a set of policy arrangements that protects states from financial crises. It contains four layers, namely country reserves, BSAs, regional financing arrangements (RFAs) and the IMF (IMF, 2011). Among the four layers, BSAs are attracting increasing interest because of its rapid expansion in recent decades, especially after the 2008 financial crisis. BSAs are agreements signed between the central bank of two states (or the European Central Bank), which allows for a certain amount of unconditional liquidity exchange. Upon swapping for liquidity, the borrowing state borrows at the market exchange rate and then repays at the same exchange rate (IMF, 2016).

Thus, BSAs provide a safe yet costless bailout opportunity for states in a financial turmoil or financial crisis. On the one hand, since liquidity provided by BSAs are repaid at the exchange rate that it is borrowed, it eliminates exchange rate risks for the borrower in crisis. More importantly, contrary to the IMF, liquidity is provided to borrowing states without conditionalities. Developing states, especially states in Asia, have suffered from “IMF stigma”, meaning that it is hard for some states to receive IMF lending and even if a state receives the lending, they are often treated with unbearably stringent conditionalities which leads to painful economic outcomes (Ito, 2012). This has led states unfavored by the IMF to shy away from IMF assistance and to seek financial safety either through increasing their own reserves or joining bilateral and multilateral arrangements outside the IMF. BSAs is one of such policy arrangements that states fled to (Grimes, 2011), although some states

avored by the IMF like Mexico also join BSAs to get double-secured. Since BSAs are effective in protecting financial safety, BSAs have proliferated to cover more than 50 states. States like the U.S. are especially active in signing BSAs in years with high risk of financial instability, for example, in 2008 and 2020. Emerging economies like China have also been actively expanding BSAs, reaching more than 20 agreements in place in 2019. Since BSAs are pooling states' reserves together to combat financial crisis in collective effort, states signing BSAs are essentially sharing financial safety as a common resource.

However, financial safety provided by BSAs should be considered as club goods instead of public goods, because the resource is restricted to a limited group of states. First, this is obvious for states that have never signed a BSA. In fact, there are more than one hundred states that have never signed a BSA since 2008. For those states has never signed a BSA, they cannot seek for liquidity from any other state in form of swaps. In contrast, the case is less evident for states that have signed a BSA but is not directly linked to one of the other BSA participants we consider. An individual state can borrow from any of its linked partners, but since BSAs pools reserves, it is sharing liquidity and thus financial safety of many other states that it is indirectly linked to. Then, from the reserve pools an individual state has access to, we can compare its accessibility to each pool based on how close it is connected with states in each group. Therefore, the financial safety clubs should be defined as a group of states more closely connected in terms of receiving liquidity through BSAs, where "more closely connected" will be measured in later sections through community membership. Therefore, financial safety provided by BSAs are clearly club goods, but how lines are drawn between these clubs needs further identification.

As we have discussed, states that are more connected through BSAs with states in the club than outside the club are considered as sharing the club good of financial safety. Based on this map of latent financial safety clubs, we argue that states within the same club form international order through two mechanisms: common benefits and the dominant state's threat to withdraw.

BSAs, Common Benefits and order

As BSAs provides financial safety as club goods, we argue that states with the same club membership share additional common benefits of financial safety. Although it is suggested that states signing BSAs are states that are economically and financially interdependent, for example, Liao and McDowell (2015) suggested that trade and direct investment interdependence explains China's decision on signing BSAs; Broz (2015) and McDowell (2017) supports this argument by showing that the U.S. provides swaps to states that are economically and financially important to the U.S.. However, beyond the economic and financial interest already in place before BSAs are signed, financial safety club memberships created by BSAs lead to additional common benefits.

First, financial risk is now more correlated between states within the same club due to reserve sharing. Foreign reserves are the basic tool for fighting against financial crisis and states stabilize their currency with reserves through repeatedly purchasing and selling their own currencies in the international currency market (Higgins and Klitgaard, 2004).

Therefore, besides IMF lending, the amount of reserves a state holds is crucial for its

financial safety. Since states in the same club are states that are more likely to turn to each other for exchange of liquidity in a crisis, it is equivalent to pooling together a part of their reserves. Thus, when financial risk rises in one state, it is likely to swap liquidity from other connected states, which increases financial risk in its partner states. This effect also matters in indirect BSA ties. For example, Russia had a swap with China in 2014, when it was in a financial crisis. If China provides liquidity to Russia through the swap line, then China's foreign reserve falls, making China's partner states like Uzbekistan riskier. This is first because with lower reserves, China now has lower ability of providing Uzbekistan with liquidity when Uzbekistan is in a crisis. This can be especially risky since states that are harder to receive lending from the IMF have greater incentives to sign BSAs ex-ante (Grimes, 2011; Vaughn, 2019), and if the protection from BSAs grows uncertain, these states are exposed to the risk of dealing with financial risks alone. In addition, since China itself now becomes more vulnerable to financial risks due to drop in reserves, it even increases the probability of drawing reserves from Uzbekistan and thus increasing Uzbekistan's financial risk. Therefore, although Russia and Uzbekistan did not sign a BSA, it is clear that their financial risk is highly correlated through their links with China.

Second, in addition to actual transmission of financial risk through reducing reserves, financial contagion can also occur between states sharing financial safety simply due to changes in investors' behavior. As reserves drop simultaneously in states sharing financial safety, investors' confidence on market stability drops as well. Theories on herding suggest that as the global financial market expands, individual investors are faced with higher cost of information collection, and thus they often mimic the behavior of other investors or even

investors in related markets instead of using their own information based on actual market conditions (Calvo & Mendoza, 1998; Calvo & Mendoza, 2000; Cipriani & Guarino, 2008). This indicates that even when the macroeconomic foundation change is inadequate to lead to crises, a group of investors becoming more cautious due to reserve loss can itself cause financial crises. In addition, states with simultaneous falls in reserves are demonstrating a similar macroeconomic pattern to international investors. This can also lead to crisis contagion according to “wake-up call hypothesis” in international finance, which suggests that investors tend to reevaluate market conditions and withdraw their money from markets that show similar patterns in the foundations with states in crisis (Morris, 1998; Bekaert et al., 2014). Thus, states sharing the same financial safety club good are not only highly correlated in financial risk, but also more likely to pass on crises from each other.

Third, club good members connected through BSAs also share common benefits in maintaining market calmness. As Aizenman et al. (2011) suggested, BSAs can signal liquidity sufficiency to investors, restore investor confidence, and thus prevent “flight to liquidity” in a financial turmoil. Then, if a state runs into higher financial risk, its ability of liquidity signaling falls, and states within the same club will decrease in market confidence.

Finally, beyond financial stability benefits, states within the same financial safety club formed by BSAs also share common benefit in reducing currency risk and transaction costs for trade and investment. Since U.S. dollar is used for international trade and investment, states using foreign currencies face the risk of currency turbulence and liquidity shortages that can disturb trade and investment flows (Aizenman et al., 2011; Goldberg et al., 2010; Avdjiev et al., 2019). BSAs can be categorized into two types: dollar swaps and domestic

currency swaps. The former provides unconditional exchange of a domestic currency into dollar, and the latter exchanges domestic currency of the two states signing the agreement. Signing swap agreements reduces this currency risk and lead to smoother trade and investment flows. First, dollar swaps provide liquidity that can be used in trade and investment across the international market and can help relieve dollar shortage pressures during crises. On the other hand, domestic currency swaps reduce risk specifically for trade and investment between two states. For instance, swap agreements signed by China is largely promoted by this incentive (Liao and McDowell, 2015). Brazil's Central Bank Governor Alexandre Tombini also supported this argument by saying that "swap agreement would ensure that trade volumes between the two nations did not suffer if a financial crisis in the future hurt global liquidity¹".

Therefore, overall, states closely connected through BSAs are sharing financial safety as a club good, and this leads to their increased common benefits beyond their initial financial linkages. This common benefit ranges from financial stability to broader aspects like trade and investment. Since states within the club now share greater common benefits, the cost of conflict, sanctioning, and also voting against the other club members now induce a higher opportunity cost. This is related to literature on interdependence and common benefits, which implies order within the club (Mansfield and Pevehouse, 2000; Hegre et al., 2010; Gartzke & Li, 2003).

BSAs, Threat to Withdraw and order

¹ China and Brazil sign \$30bn currency swap agreement: <https://www.bbc.com/news/business-21949615>

International order can also be formed in financial safety clubs through dominant states' threat to withdraw the good. If a few states dominate the provision of liquidity in their clubs, then they have the incentive to enforce order to reduce conflicts, sanctions, and UN voting conflicts among their club members. This is because conflicts, sanctions and UN voting conflicts that may lead to unfavorable UN decisions can induce financial crisis or at least increase financial risk in relevant states. For instance, Iran's financial crisis was aggregated in the 1990s due to U.S. sanctions, since loans to Iran was interrupted (Torbat, 2005). Empirics have also shown that economic sanctions increase the possibility of banking crisis in the targeted state (Hatipoglu & Peksen, 2018). Conflict also leads to financial instability due to investors' rational expectations, and the effect further spreads to states that are not involved in the conflict (Schneider & Troeger, 2006). Since conflicts, sanctions and UN voting conflicts can increase financial risk, the dominant liquidity provider will be put in greater risk as well. Take Russia for example, Russia was sanctioned by the western states from 2014 following its conflict with Ukraine. This led to recession, currency crash¹, and eventually a financial turmoil in Russia (Viktorov & Abramov, 2020). During Russia's turmoil, China had a BSA with Russia, and was its dominant liquidity provider through swaps. However, since they share financial safety, people in China worried about the sanctions on Russia inducing a cost on China². The risk and cost faced by the dominant state is even higher when two member states or more are involved in conflict or sanctions. Thus, dominant liquidity provider in the

¹ <https://www.cfr.org/in-brief/have-sanctions-russia-changed-putins-calculus>

² See Yuan Xiong (Chinese Academy of Social Sciences)'s article on Tsinghua Financial Review: "As an important partner of Russia's economic and trade ties, people naturally focus on how China will be affected. Among them, the bilateral local currency swap agreement with the scale of 150 billion yuan / 815 billion rubles just signed by the central banks of China and Russia in October 2014 has triggered extensive discussion, and many people even think that "this is a free gift to Russia"."

financial safety club has incentives to enforce order on member states to prevent political, economic, and financial instability.

We argue that this enforcement is achieved through threatening to withdraw the swap line. This is also seen as BSAs used as financial statecrafts for dominant states (McDowell, 2019). McDowell (2019) argued that since most swap lines are not standing lines, dominant providers can threaten to withdraw BSAs after they expire and achieve foreign policy goals in this way. Similar arguments are documented in Armijo and Katada (2015) and Xun and Chong (2020).

This threat is effective for several reasons. As discussed above, “IMF stigma” contributed to BSAs’ proliferation. However, in contrast to IMF’s rich resources, bailing out other states in crisis can be demanding for an individual state, and the role of lender-or-last-resort can only be played by a few states. First, this is because foreign reserves, the basic tool for bailout, is stocked up in a few states. According to the European Central Bank, throughout 1995-2001, five central banks accumulated 57% of the total reserves. China and Japan held half of the world’s stock of reserves in 2002-2004 (ECB, 2006). Therefore, individual states have few choices to choose from, which makes them willing to conform to order enforced by the dominant. Second, even if states are free to choose among different partners, the benefits provided by BSAs is higher in a few states with stronger central banks. This is especially true for boosting investor confidence, where only connecting with strong creditor states can serve the goal. In addition, strong creditors often reject requests for BSAs, which makes threats from the dominant more effective. For instance, the U.S. has rejected swap requests from

Korea and Indonesia. Thus, dominants can enforce order by threatening to withdraw.

Therefore, it is both tempting and possible for dominant liquidity providers in financial safety clubs formed by BSAs to enforce order by threatening to withdraw the line. From both perspectives of common benefit and dominant states' threat, we come to the same conclusion that international order can be formed in financial safety clubs shaped by BSAs. We then derive our first hypothesis:

H1: States within the same financial safety club shaped by BSAs have closer voting preferences in the UN and sanction each other less.

Club Structure and Trade-off: Common Benefits or Effective Threat

Despite that both common benefits and effective threat lead states within the same club to form order, the question becomes more complicated when we consider the origin of the two mechanisms. For common benefits, its enforcing power is greater when states are more closely interconnected. This is because the opportunity cost of increased financial risk, financial contagion, loss in investor confidence and interruption in trade is all higher when states' connection is closer. Returning to our example on the BSA between China and Russia in 2014, it is extremely costly for China to conflict with, sanction or vote against Russia in the UN because this will only lead to Russia swapping more reserves directly from China. However, although as we discussed, there is also a cost on indirect members, the cost is much lower. Take Turkey as an example, its only swap partner is China in 2014 but its increased

financial risk only becomes salient when rescuing Russia has become over-costly for China, for instance, mass investors in China has started to flee, which clearly needs to pass a high threshold. Thus, the more liquidity is jointly provided, and the more states are directly interconnected with each other, the greater common benefits are.

However, the power of threat, in contrast, is determined by the extent to which liquidity in a club is provided by a dominant state. The more centralized liquidity provision is in a club, the more effective the dominant's threat to withdraw is. In an extreme case where all states are connected with, and only with one dominant state, it implies that they only share reserves with this dominant state, but do not share reserves with other states directly. Then, liquidity is mostly passing through one dominant state, and other states have lower access to sharing the overall reserves in the pool. Thus, the dominant cutting off the line and turning to connect with other non-dominant states would be costly and risky for a subordinate state because it will be less likely to maintain the same liquidity flow and less protected.

Therefore, there are potential conflicts in order enforcement between the two mechanisms when we consider the structure of club good provision. The strength of the common benefit mechanism is stronger in a more interconnected club structure, while the threatening mechanism is strongest when one dominant state provides all. In other words, we face the question of whether a club good is better maintained when resources are provided by a dominant state, or when states collectively share their resources. Prior studies on financial club goods have also crossed this puzzle. Frieden (2016) suggested that states need to overcome their incentives to free-ride to provide global financial public goods. Vaughn

(2019) addressed this puzzle partly by arguing that in case of China's BSAs where China is a single dominant liquidity provider, China leverages its power over subordinate states to overcome their free-riding incentives. However, it is unclear whether this additional power gained in a dominant-led structure is sufficient to make up for the reduced incentives of compliance due to loss of common benefit. If we observe clubs where liquidity is provided by a dominant state better maintained in order, then we can conclude that effective threatening in a dominant-led structure makes up for the reduced incentives of compliance. If we observe the opposite, then we should instead conclude that in financial club goods, collective resource sharing provides stronger incentives for order maintenance which cannot be made up by dominants' threat. This leads to our second horse-racing hypothesis:

H2 (horse-racing): the more/less hierarchical a BSA community is, the stronger the effect of BSA community membership is on UN voting/sanctioning.

Network Measures

We use two network measures, which are also independent variables in the following section. All data on the BSA network is collected by Xun and Chong (2020) and the author from official documents of central banks and major media releases.

Community

Community is an important aspect of networks which capture the clustering structure of nodes within a network. It essentially divides the network into different groups of nodes,

where the concentration of edges within the group is high, while concentration of edges between groups is low (Fortunato, 2010). Specifically, states identified to be within the same community should be more connected with states in the community than with states outside the community (Fortunato & Hric, 2016; Beardsley et al., 2020). Since our definition of club good membership is based on states that depend on each other more in terms of liquidity swapping than with states outside the club, community membership fits our definition of club good membership. Therefore, we use communities in the BSA network to identify groups of states that share financial safety as club goods.

We use the commonly used modularity maximization method to detect communities in the BSA network based on Newman and Givan (2004). The modularity of a network is defined as:

$$Q = \frac{1}{2m} \sum_i \sum_j (g_{ij} - \frac{k_i k_j}{2m}) \delta_{ij}$$

Here i and j are states, m is the number of edges. g_{ij} is 1 when i and j are connected and is 0 otherwise. $\frac{k_i k_j}{2m}$ is the chance of connection at random. δ_{ij} is 1 if i and j are in the same community and is 0 otherwise. Since there exists randomness in community detection, we conduct community detection 100 times for each network, and take each node's most frequent community membership as our result of detection¹.

Our data on BSA networks start from 2008 and ends in 2019 because the global financial

¹ Although randomness exists, there is not much randomness in our specific networks and the results are quite robust.

safety net changed dramatically after the 2008 financial crisis, and thus we focus only on the post-crisis period. For each year, we detect network membership for all states, and each network usually consists of 3 to 5 communities. In addition, the communities showed high variation across years due to new states joining BSAs, expiration of existing BSAs, and existing states altering their edges.

Hierarchy

Hierarchy captures a network's structure by measuring the relative influence a most influential node has to other nodes. Therefore, the more hierarchy a network is, the more that one state has a higher closeness centrality and is more influential than all other states¹.

Following Beardsley et al. (2020), we use Global Reaching Centrality (GRC) from Mones et al. (2012) to measure hierarchy. GRC is calculated as:

$$GRC = \frac{\sum_{i \in V} (C_R^{max} - C_R(i))}{N - 1}$$

Here, i is node index and N is the number of nodes in the network. C_R^{max} is the closeness centrality of the node with the largest centrality, and $C_R(i)$ is the closeness centrality of node i . We calculate a GRC score for each BSA community detected in each year.

Model

¹ Closeness centrality is $(1/\text{average path length})$, which measures the ability of a node to reach all other nodes. It essentially captures how influential a node is.

Now we incorporate community membership and hierarchy into our model to test the two hypotheses.

Dependent Variables

The first dependent variable in our model is *IdealPointDistance*. Ideal point measures single states' voting preferences in UNGA, and has a mean of 0 and a standard deviation of 1. Ideal point distance is calculated as the absolute difference of two states' ideal point (Bailey et al., 2017), and measures states' voting similarities in UNGA. *IdealPointDistance* is particularly popular in studying political alignment and policy preferences since it provides more information than dyadic scores like S scores (Bailey et al., 2017). The data here is from Bailey, Strezhnev, and Voeten's "United Nations General Assembly Voting Data" dataset, which provides yearly ideal point distance estimates for state dyads (Bailey et al., 2017). Our second dependent variable is *sancboth*, which is a binary variable measuring whether there are ongoing sanctions within a dyad in a given year. *sancboth* is coded as 1 in a dyad if either of the states sanctioned by another state and coded as 0 otherwise. The data comes from the Global Sanctions Database (GSDB) (Kirilakha et al., 2021).

Although we have discussed that the order created through sharing club goods should also reduce conflicts, we do not include conflicts as our main topic of study here. Despite that no conflict has occurred between two states within the same BSA community from 2008 to 2019, which supports our theory, there are only 12 dyad-year interstate conflicts within this period. Within the 12 cases, only the conflict between India and Pakistan occurred between two states which have ever signed BSAs since 2008. Therefore, this leaves no variance in the

dependent variable when we control for BSAs, and thus we choose to test the theory only on sanctioning and UNGA voting¹.

Independent Variables

We are interested in two independent variables, which comes from calculation in the previous section. The first one is *samecom*, which is a binary variable coded as 1 if two states are in the same community in a given year, and 0 otherwise. The second independent variable is *GRC*, which is the GRC score of the community a state dyad is in in a given year if the two states are in the same community.

Control variables

In addition to our dependent and independent variables, we also add control variables that are confounders correlated with both the dependent and independent variables. First, we control for *BSA*, which is a binary variable indicating whether the state has ever signed a BSA in our period of study. *BSA* is controlled because BSAs are additional financial insurance measures beyond the IMF, and there is possible heterogeneity among states that sign BSAs and do not sign BSAs. Typically, states signing BSAs are more developed and have more stable financial institutions. Therefore, we control for BSAs to account for this difference.

Then, we control for two variables to account for political and economic similarity between states. First, we control for *politydiff*, which is the polity2 score difference between

¹ Data for Interstate conflicts between 2008 to 2019 is from UCDP Dyadic Dataset of the Uppsala Conflict Data Program (Harbom et al., 2008; Pettersson and Oberg, 2020).

states in a dyad. *polity2* score ranges from -10 to 10 and a higher score indicates that the state is more democratic. Therefore, *politydiff* measures how different two states in a dyad are in terms of political regime. It is controlled because a lower *politydiff* can both lead to fewer sanctions, closer voting preferences, and also a higher possibility of states to be in the same community, which may cause bias. The data comes from the Polity IV project¹. Second, we control for *lgdpdiff*, which is the difference between logged GDP per capita of two states. *lgdpdiff* signals similarity of development levels and is controlled for the same reason as *politydiff*. Here the data for GDP per capita comes from the World Bank's WDI database².

We also control for four variables accounting for existing linkages between states. First, we control for *allyb*, which is a binary variable indicating whether two states are allies. The alliance data used here is from Alliance Treaty Obligations and Provisions (ATOP) project³. Second, we control for *ldist*, which is the geographic distance between two states and the data is also from the WDI database. Third, we control for *ltrade*, which measures the trade flow between two states in a year. Finally, we add *rta* to control whether two states have signed trade agreements. The data for bilateral trade flow and trade agreements are both from CEPII's Gravity database⁴. These four variables are controlled because they capture the existing geographic, economic, and political links between states. We include them to reduce bias and deal with possible homophily because closer links in these four aspects indicate closer latent relations and common interests between states. Controlling for these

¹ See INCSR <http://www.systemicpeace.org/inscrdata.html>

² See WDI database <https://datacatalog.worldbank.org/public-licenses#cc-by>

³ See <http://www.atopdata.org/>

⁴ See http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=8

confounders also help eliminate possible bias caused by endogeneity of BSA membership.

States with similar traits and interests may both join the same BSA club and be more friendly with each other, and controlling for these similarities and existing connections can help deal with such endogeneity. This possible concern will also be further treated in the next section.

Model

We use a linear regression model to see the effect of community membership and hierarchy on UN voting preferences, and use a logit model to see their effect on sanctioning. For both dependent variables, we first regress them on community membership for all states, and then regress them on GRC for dyads that are in the same community.

Results

BSA Community Membership and Order

To test our first hypothesis on financial club goods sharing and international order, we examine the effect of BSA community membership on UN voting and sanctioning. First, we regress UNGA voting preferences on BSA community membership. The regression results in **Table 1** supports our *H1*. Model (1) controls only for *BSA*, model (2) controls for similarity variables, model (3) controls for all confounders except *ltrade* and *rta*, because including data on trade and trade agreements will lead to a relatively large number of missing data. Model (4) is the full model controlling for all confounders. In **Table 1**, the coefficient for *samecom*

is always negative and statistically significant, which suggests that states within the same community are more likely to vote closer in UNGA and lends support to our *H1*. In the full model, all else equal, two states within the same BSA community vote 0.217 closer at the UN compared with two states not in the same community. Moreover, this difference is substantially important. Since the standard deviation of states' ideal point distance in 2019 is 0.78, being in the same BSA community moves two states more than a quarter of the standard deviation closer in voting.

Table 1 *Ideal point distance on community membership*

	<i>Dependent variable:</i>			
	IdealPointDistance			
	(1)	(2)	(3)	(4)
samecom	-0.160*** (0.031)	-0.106*** (0.031)	-0.098*** (0.031)	-0.217*** (0.033)
politydiff		0.015*** (0.001)	0.013*** (0.001)	0.017*** (0.001)
lgdpdiff		0.262*** (0.003)	0.246*** (0.003)	0.258*** (0.004)
BSA	0.130*** (0.013)	0.178*** (0.013)	0.237*** (0.013)	-0.026* (0.015)
allyb			-0.290*** (0.011)	-0.310*** (0.013)
ldist			-0.066*** (0.006)	0.037*** (0.007)
rta				-0.016 (0.013)
ltrade				0.059*** (0.002)
Constant	0.969*** (0.003)	0.436*** (0.008)	1.117*** (0.053)	-0.258*** (0.068)

Observations	66,344	36,870	36,870	24,353
R ²	0.002	0.150	0.166	0.227
Adjusted R ²	0.002	0.150	0.166	0.227
Residual Std. Error	0.803 (df = 66341)	0.752 (df = 36865)	0.745 (df = 36863)	0.752 (df = 24344)
F Statistic	50.860*** (df = 2; 66341)	1,624.488*** (df = 4; 36865)	1,222.833*** (df = 6; 36863)	893.042*** (df = 8; 24344)

Note: *p<0.1; **p<0.05; ***p<0.01

To see the results more clearly, we present a coefficient plot for model (4) in **Figure 1** and a prediction plot of *samecom* on *IdealPointDistance* in **Figure 2**. As Figure 2 suggests, the ideal point distance of two states' voting at UN is smaller when states are in the same community.

Figure 1 Coefficient plot for model (4) in Table 1

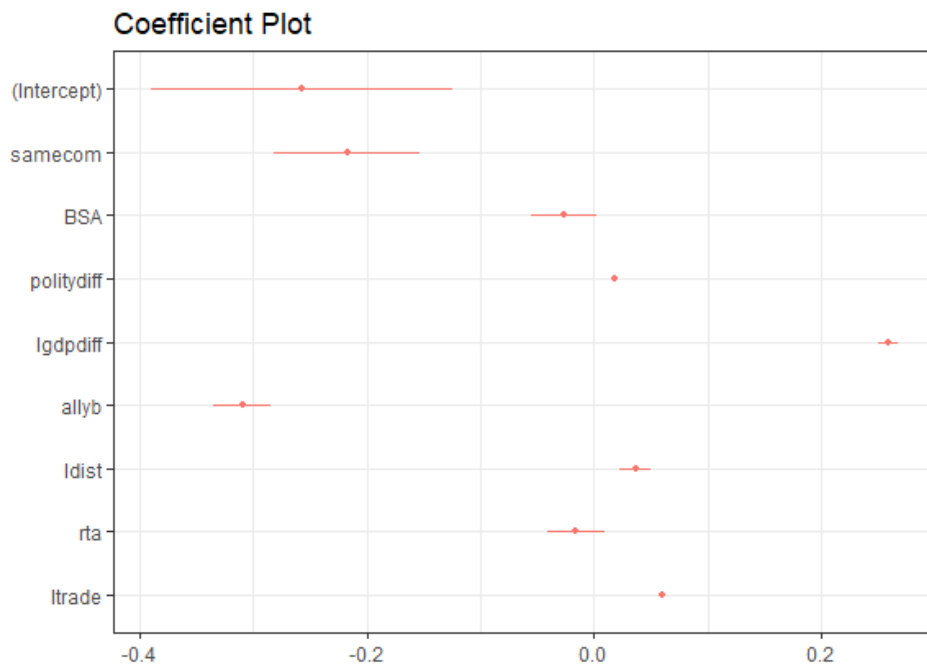
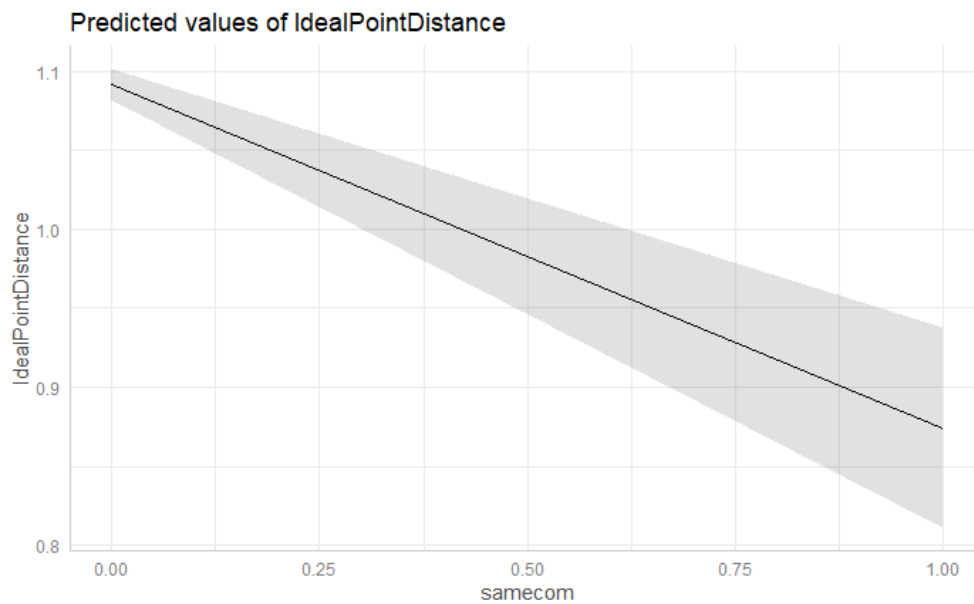


Figure 2 *Prediction of IdealPointDistance on samecom in model (4)*



Similar to the analysis on UN voting, we now test the hypotheses on sanctioning. **Table 2** again shows that the coefficient on *samecom* is negative, although it is only significant on the 95% in model (4) when we include a complete set of control variables. In the full model, being in the same BSA community reduces the odds of sanctioning by nearly 30% percent. Thus, we conclude that states within the same BSA community tend to have lower possibility of sanctioning each other, which is in line with our results on UN voting, and also supports *H1*.

Table 2 *Sanctioning on community membership*

	<i>Dependent variable:</i>			
	sancboth			
	(1)	(2)	(3)	(4)
samecom	-0.242* (0.137)	-0.228 (0.150)	-0.294* (0.152)	-0.315** (0.155)
BSA	-0.411*** (0.050)	-1.104*** (0.055)	-1.110*** (0.057)	-0.768*** (0.061)
politydiff		0.025***	0.025***	0.039***

		(0.002)	(0.002)	(0.003)
lgdpdiff		0.273***	0.285***	0.263***
		(0.010)	(0.011)	(0.015)
allyb			-0.238***	-0.228***
			(0.035)	(0.043)
ldist			-0.649***	-0.788***
			(0.018)	(0.024)
ltrade				0.005
				(0.005)
rta				-0.561***
				(0.048)
Constant	-2.955***	-1.674***	3.963***	4.883***
	(0.008)	(0.026)	(0.165)	(0.226)
Observations	366,923	37,341	36,870	24,353
Log Likelihood	-71,442.470	-19,804.350	-19,003.110	-11,459.150
Akaike Inf. Crit.	142,890.900	39,618.700	38,020.220	22,936.310

Note: * p<0.1; ** p<0.05; *** p<0.01

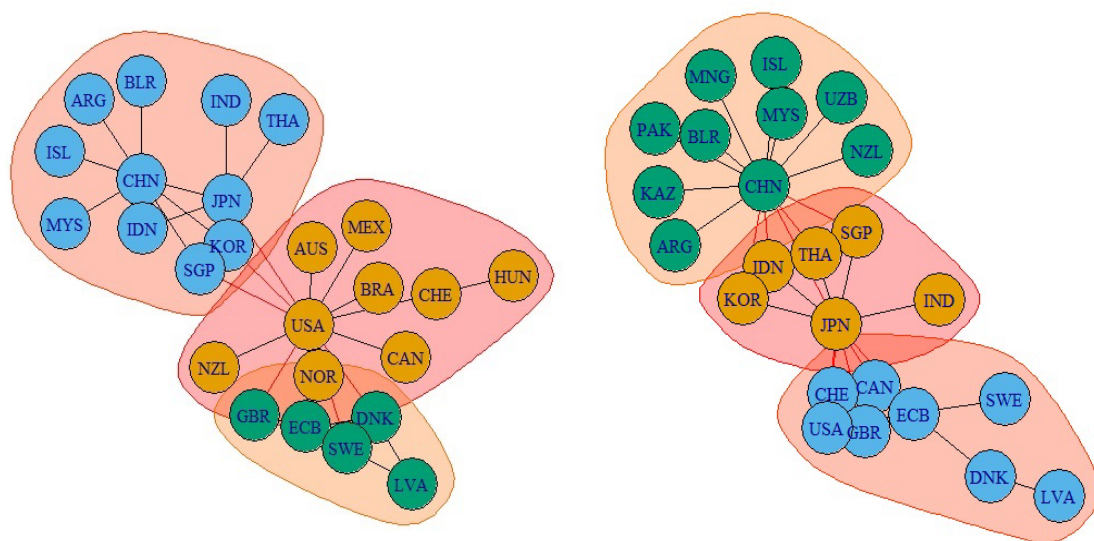
We visualize the coefficients of model (4) in **Figure 3**. The results clearly supports our hypothesis.

Figure 3 Coefficient plot for model (4) in Table 3



We further support our argument by accounting for possible homophily, which is a possible threat to our results on *H1*. Homophily refers to a common phenomenon in social network formation where actors tend to form ties with actors that are similar to them (McPherson et al., 2001; Fowler et al., 2011). In international relations, homophily implies that states with common interests, with same democratic norms, and with cultural similarities are likely to form ties (Maoz, 2012). In our case, homophily is unlikely to drive the results particularly because our analysis is based on community membership. States can form ties with others based on similarity, but communities are formed after each states' individual decisions are made and thus community memberships cannot be intentionally chosen. For example, China is a member of the BSA community formed by Japan, South Korea, Indonesia, and others in 2010, but as China signed more BSAs in 2010, it is identified as a member of another community with Argentina, Malaysia and others in 2011 although it is still linked with Japan and South Korea.

Figure 4 *BSA communities in 2010 (left) and 2011 (right)*



In addition, community membership cannot be pre-determined even for the most

intentionally formed BSA groups. The U.S., the U.K., Canada, European Central Bank, Switzerland, and Japan have pooled their reserves together in response to the 2008 financial crisis. Each of the six states signed BSAs with other five states, and the arrangements are transformed into standing and unlimited swaps in 2013. However, even if designed intentionally, the ties formed by the six states and third parties outside this clique often change this structure. From 2013 to 2019, the six states are in the same community in only 2 years.

However, we do realize that even if community membership suffers less from homophily, we cannot root out homophily completely since community membership still stems from bilateral ties. Thus, we further deal with this problem by controlling for possible sources of homophily as suggested by Maoz (2012). Trade, RTA and alliance control for common interests, polity score difference controls for regime similarities, and geographic distance controls for cultural similarities. As shown in **Figure 3**, controlling for these sources of homophily does not affect our results.

Community Hierarchy and Order

Since the results supported our hypothesis that BSA community membership creates international order, we now test the second hypothesis on hierarchy and the strength of order. First, we examine the effect of GRC on UN voting. We filter out all dyads that are in the same community, and then regress *IdealPointDistance* on GRC in this subsample. **Table 3**

presents the results.

Table 3 *Ideal point distance on GRC for dyads in the same community*

	<i>Dependent variable:</i>			
	IdealPointDistance			
	(1)	(2)	(3)	(4)
GRC	5.300*** (1.609)	5.518*** (1.561)	5.778*** (1.552)	3.995** (1.749)
politydiff		0.020*** (0.004)	0.018*** (0.004)	0.003 (0.004)
lgdpdiff		0.172*** (0.029)	0.157*** (0.029)	0.123*** (0.028)
allyb			-0.102* (0.059)	-0.075 (0.063)
ldist			0.058* (0.030)	0.009 (0.028)
ltrade				0.023** (0.009)
rta				-0.171*** (0.060)
Constant	0.782*** (0.054)	0.416*** (0.068)	0.0002 (0.277)	0.276 (0.272)
Observations	774	695	695	631
R ²	0.014	0.114	0.130	0.071
Adjusted R ²	0.013	0.110	0.124	0.061
Residual Std. Error	0.692 (df = 772)	0.662 (df = 691)	0.657 (df = 689)	0.598 (df = 623)
F Statistic	10.846*** (df = 1; 772)	29.720*** (df = 3; 691)	20.584*** (df = 5; 689)	6.808*** (df = 7; 623)

Note:

*p<0.1; **p<0.05; ***p<0.01

From Table 3, we can see that all else equal, for dyads within the same community, dyads in less hierarchical communities (with lower GRC) tend to vote closer at the UN. Thus, our

second horse-racing hypothesis turns out to be: the less hierarchical the BSA community is, the stronger the effect of BSA community membership is on UN voting. This questions the common argument that dominant states can overcome the subordinates' free-riding incentives by playing asymmetric power and threatening to withdraw public or club goods. Instead, we show that in more hierarchy financial club good communities, the power gained by the dominant is far from making up the loss of common interest incentives that push states act coordinatively. As a result, BSA communities with a flatter structure is in better order and financial safety is better maintained.

Similarly, we filter out all dyads that are in the same community, and then regress *sancboth* on GRC in this subsample. The results are shown in **Table 4**.

Table 2 *sancboth on GRC for dyads in the same community*

	<i>Dependent variable:</i>			
	sancboth			
	(1)	(2)	(3)	(4)
GRC	0.936 (6.791)	7.096 (7.168)	5.372 (7.458)	12.283 (8.768)
politydiff		-0.011 (0.021)	0.009 (0.023)	0.015 (0.025)
lgdpdiff		-0.113 (0.165)	0.045 (0.167)	0.072 (0.171)
allyb			0.768** (0.365)	0.981** (0.394)
ldist			-0.419*** (0.153)	-0.553*** (0.170)
ltrade				-0.012 (0.052)
rta				-1.268***

				(0.385)
Constant	-3.637***	-2.442***	0.322	1.611
	(0.248)	(0.348)	(1.407)	(1.590)
Observations	2,387	695	695	631
Log Likelihood	-291.135	-193.831	-183.133	-173.233
Akaike Inf. Crit.	586.271	395.662	378.265	362.466
<hr/>				
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01			

In **Table 4**, the coefficients of *GRC* are consistently positive, which also suggests that states in less hierarchy BSA communities tend to have lower probability of sanctioning each other. This leads to the same conclusion as UN voting. However, the coefficients here are no longer statistically significant. We conjecture that this is because sanction data is less sensitive and time-variant compared with UNGA voting data. Many sanctions started in early years and transforming them into yearly data may cause problems. Specifically, the cost for states to terminate existing sanctions that started earlier can be higher than coordinating current behavior. This may explain why although some states are in flatter BSA communities and share more common interests, they are still reluctant to terminate their sanctions so that the coefficient is not significant.

In summary, the results lend support to both of our hypotheses. States within the same BSA community vote closer in UNGA and have lower possibility of sanctioning each other. In addition, this effect is stronger for states in less hierarchy BSA communities. In other words, order is formed among states sharing financial safety as a club good through BSAs, and more importantly, collective resource-sharing provides stronger incentives for order maintenance which cannot be made up by dominants' threat.

Discussion and Conclusion

Sharing global financial club goods through BSAs can lead to order. We use community membership to capture global financial club goods sharing, and use hierarchy to measure the extent to which the good is provided by a dominant state. We find that states within the same BSA community tend to vote closer at the UNGA, and also sanction each other less. Moreover, this effect is stronger in communities with a flatter structure where liquidity is jointly provided. On the one hand, this is because states sharing financial safety share more common benefits. On the other hand, order can also be enforced by a dominant state which provides most liquidity by threatening to withdraw swaps. However, our findings also suggest that common benefit is a stronger incentive in maintaining financial club goods, while dominants' threat can hardly make up for increasing free-riding incentives when the good is provided by a dominant state.

We offer two possible explanations for why common benefit provides stronger incentives than threat from the dominant state for future research. First, different from arms trade (Beardsley et al., 2020), since the global financial safety net consists of four layers, states can also turn to the IMF, RFAs and its own foreign reserves in a crisis, and thus threats from the dominant state to withdraw is not as strong as previous studies suggested. This also suggests that common benefit can be more enforcing than threat in cases where global governance is multi-layered, and dominant states will have more room to enforce order when the club they are in is the major provider of certain resources. Further studies can explore whether “outside options” can affect states' susceptibility to threats to withdraw. Moreover, this can be related to IMF's political bias, where states have disproportionate influence over the IMF and thus have

different levels of dependence on BSAs. Second, it may be the dominant states making threats selectively. It is possible that some dominant states only choose to threaten states that are most important to them because crisis in these states can affect the home market directly, while crisis in other states only lead to a limited amount of liquidity loss. This again, can infer political bias of BSAs itself, where states more important to the dominant state have lower incentives to maintain the public good. Future studies can examine whether strategic importance plays an important role in order maintenance of global financial club goods. Third, it is also possible that central bank independence has restrained some dominant states' ability to make threats (Vaughn, 2019), which makes common interest more important overall.

Membership of global club goods are hard to observe. Besides analyzing BSAs and financial club goods, our study also provides a way for future research on other global club goods to identify club members and structure of club good provision by employing network measures, and further study the economic and political effects of such latent memberships.

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