

**Extraterritorial Trade
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Theory and Application to the
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Abstract

Under extraterritorial sanctions the sanctioning country extends its policies to trade of third countries with the sanctioned country. A prominent example is former US President Trump's decision to leave the Joint Comprehensive Plan of Action (JCPOA), a multilateral agreement with Iran. The decision led to a shutdown of EU trade with Iran. In this paper, I develop a game-theoretic model to explain the emergence of extraterritorial sanctions. Such trade sanctions i) do not arise when the harmful activity of the sanctioned country ("build a nuclear bomb") is verifiable even if monetary transfers are ruled out, but ii) emerge if a second activity ("sponsor international terrorism") is not verifiable, and the sanctioning countries differ in their gains from trade with the sanctioned country, their harm from the non-verifiable, and their reputational cost from abandoning the international economic order. In the context of the US-Iran-EU conflict, I argue that the oil and gas fracking boom in the US together with former President Trump's ignorance of his international reputation are key factors in the emergence of extraterritorial trade sanctions.

JEL-Codes: F020, F510, K330.

Keywords: international trade, sanctions, extraterritorial sanctions, US-Iran conflict.

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1 Introduction

Over many decades sanctions have played an important role in international economic relations, for example against the Apartheid regime in South Africa during the 1980s and 1990s, in US trade policy against Cuba, and in conflicts of the US and the EU with Russia, North Korea, and Iran. More recently, extraterritorial sanctions have gained prominence (see, European Parliament, 2012) and raised concerns among businesses about the freedom to trade (International Chamber of Commerce, 2018) and the sovereignty of countries (see European Council on Foreign Relations, 2019, Lohmann 2019). While ordinary (primary) sanctions impose restrictions on bilateral trade between a sanctioning country and the sanctioned country, under extraterritorial sanctions (also called secondary sanctions) the sanctioning country extends its sanctions to the trade of third countries with the sanctioned country, and thereby puts pressure on firms in third countries to follow the own sanction regime.¹

A prominent example of extraterritorial sanctions are those invoked by former US President Trump in 2018 when he decided (Executive Order 13876) to leave the Joint Comprehensive Plan of Action (JCPOA), an agreement signed in 2015 between Iran and the five permanent members of the UN Security Council, plus the EU and Germany, that lifted trade sanctions in exchange for control of nuclear developments. The US policy was effectively implemented by threatening non-cooperating firms in third countries to cut their business relationships with American firms or to freeze their assets in the US. Facing the choice between either trading with Iran or the US, European firms opted for the latter because the US is the larger and more attractive market.

The above observations are somewhat puzzling. Why are conventional sanctions not strong enough to induce desirable behavior, given that both the US and EU share an interest in containing Iran's military ambitions? Moreover, why is the mere threat of extraterritorial sanctions not strong enough to deter the sanctioned country from pursuing harmful activities, so that those sanctions don't need to be carried out in the end? In this paper I answer these questions with a game-theoretic model of conventional and extraterritorial sanctions, which can be used to contain harmful activities by the sanctioned country. The findings are then applied in the context of the US-Iran-EU conflict, where the harmful activities consist of the building of nuclear bombs and the sponsorship of international terrorism.

There are two connected insights from the theoretical model. First, the contractibility of the harmful activity by the sanctioned country plays a crucial role. If the activity is (largely) verifiable and thus contractible, extraterritorial sanctions do not arise. The assumption seems to be a good approximation in the context of Iran's nuclear programme, where inspections of Iranian nuclear facilities by the International Atomic Energy Agency (IAEA) were carried out to monitor the Iranian nuclear program. By contrast, if the activity is not verifiable, such as sponsorship of

¹The Jacques Delors Institute (2018) states: "Extraterritoriality generally refers to the unilateral use of measures that are taken under a state's sovereign powers to enforce its own law, in a territory other than its own, for actions committed outside its territory by entities or people from other countries."

international terrorism, then secondary sanctions emerge under certain conditions. The sanctions are not only threatened, but in fact are carried out in equilibrium, in order to reduce resources available to the sanctioned country that would be otherwise channeled into the non-verifiable activity. This may explain the observation that some sanctions are only threatened, but others are actually carried out (see Aseforghor, 2019, for an empirical analysis).

The second insight explains why joint conventional sanctions by two sanctioning countries are not emerging but extraterritorial sanctions by one of the two do. This is the case when there exist strong enough asymmetries in the cost-benefit analysis of sanctions by the sanctioning countries. I identify three dimensions: i) the distribution of the bilateral gains from trade with the sanctioned country, ii) the distribution of losses among the sanctioning countries from harmful activities carried out by the sanctioned country, and iii) the reputational cost to a sanctioning country that arise when extraterritorial sanctions violate the traditional international economic order.

In the context of the US-Iran-EU conflict, asymmetries occur in two of these three dimensions: energy imports in the US have declined dramatically due to the fracking boom in the US, whereas many EU countries, including France and Germany, still import more than half of their energy consumption. Hence Iran is a more important trading partner for European countries than for the US. Moreover, former US president Trump changed the country's pursuit of US interests. Instead of using international institutions and cooperating with its traditional allies, his "America first" policy has led to an abandoning of international institutions. By contrast, the EU and its large member states have emphasized the role of international institutions to regulate political conflict. For this reason, the political cost of sidestepping the traditional international economic order appear to be quite asymmetric between the US and the EU. The two aspects may have created sufficient asymmetries so that - despite similar perceptions in the EU and the US about the threats of Iran sponsored international terrorism - have led to different trade policy decisions.

The theoretical modeling is inspired by the US-Iran-EU conflict. However, extraterritorial trade sanctions are not limited to this well known case. The US threatened secondary sanctions on firms involved in building Nord Stream 2, an underwater gas pipeline between Russia and Germany, that would make European countries more dependent on Russian energy exports, and on firms trading with Cuban state enterprises (Helms-Burton Act of 1996). Bradford (2011) argues that certain EU policies have are also extraterritorial in nature: for example, by setting standards such as on data protection, US firms that want to do business in the EU are pushed to apply these standards with customers elsewhere because it is too costly or technically impossible to apply different standards within the same firm.²

While there is a sizeable theoretical literature (for early contributions see Kempfer and Lowenberg, 1988, Tsebelis, 1990, Eaton and Engers, 1992 and 1999), and empirical literature (Hufbauer et al. 1997, Torbat, 2005, Aseforghor 2019, Felbermayr et al. 2019) on conventional sanctions, there is almost no (theoretical) work in economics on extraterritorial trade sanctions. The only other

²For a legal and political assessment of EU data protection policy see Svantesson (2014) and Ciriani (2015).

paper I am aware of that models extraterritorial trade sanctions in a game-theoretic framework is Han (2018). In an infinitely repeated game, he shows the existence of two types of equilibria: the first is one in which the sanctioning country sanctions the target country for being uncooperative but does not punish a third country for backfilling the void in trade left by the sanctioning country. In the second, cooperative equilibrium the use of a grim strategy leads to punishment of the target country by both the sanctioning and a third country when the target country does not cooperate enough, and the sanctioning country punishes the third country if that backfills the void left in trade. These threats are strong enough to induce “good” behavior by the target and the third country. In both equilibria, secondary sanctions on the third country are threatened but not carried out along the equilibrium path. This is a key difference to the present paper, where I show that secondary sanctions are actually carried out.

The paper is related to the literature on issue linkage in international trade. Maggi (2016) surveys the literature and defines coercive trade sanctions as part of the broader area of issue linkage. In this context, a seminal paper is Eaton and Enders (1992) who model a game between a sender (sanctioning) and a target (sanctioned) country, where the sender sets periodically certain demands from the target country to avoid sanctions, while the target country periodically commits to fulfilling them for a certain time period. The extent to which the sender can extract desirable behavior from the target is shown to depend on the cost of sanctions to both sides and their patience. Unlike the present paper there is no third country involved in Eaton and Enders (1992). Similar to them, I assume that there is commitment to follow through with sanctions, although in Eaton and Enders (1992) this time period of commitment is endogenously chosen, while here it is fixed. Falvey and Lloyd (1999) discuss extraterritoriality in the context of competition policy.

This paper is structured as follows. Section 2 briefly describes the regime of extraterritorial trade sanctions by the US in the context of Iran. Section 3 sets up the base model with activity X only, while in section 4 the model with additional activity Y is developed. I discuss the theoretical results in the context of the US-Iran-EU conflict in section 5, before concluding in section 6.

2 US extraterritorial trade sanctions against Iran

The conflict between the US and Iran goes back to the late 1970s, when a theocratical regime was established in Iran that was hostile to the US, and led to a dramatic hostage of US citizens in Teheran. Ever since the US has fought the Iranian government and tried to contain its power and influence by various sanctions.³ A particular concern for the US and also the EU has been the development of nuclear weapons by Iran. To stop further development, the Joint Comprehensive Plan of Action (JCPOA) was agreed upon in 2015, an agreement between Iran and the five permanent members of the United Nations Security Council (China, France, Russia, United Kingdom,

³For a documentation of US laws and policy actions see the website of the US Department of State at <https://www.state.gov/iran-sanctions/>.

United States) plus Germany together with the European Union.

Under JCPOA, Iran agreed to substantially reduce its nuclear program. In particular, it agreed to eliminate or reduce its stockpiles of various uranium items, reduce the number of gas centrifuges for 13 years, and to not build any new heavy-water facilities. The agreement was monitored through inspections of the International Atomic Energy Agency (IAEA), which got access to Iranian nuclear facilities. In exchange for these measures Iran received relief from U.S., European Union, and United Nations Security Council nuclear-related sanctions.

In 2018, US President Trump revoked the US participation of JCPOA and reinstated sanctions previously lifted under the agreement, which included the curtailing of revenues of the Iranian government by selling oil, the purchase of US dollars by Iran, and restrictions on the Iranian automobile industry (see Lohmann (2019) for a summary of legal actions; Nazareth (2019) for a political analysis of US policy). In further measures, detailed in Executive Order 13876 of 2019, President Trump referred to Iran's ballistic missile program as well its promotion of international terrorism as reasons for additional sanctions on Iran.⁴

The key feature of the US measures was that it affected not only institutions US persons and entities (primary sanctions). Besides individuals or firms that have their residence or headquarters in the US, individuals and firms in other countries are also covered (secondary sanctions). The implementation of secondary sanctions occurs through the threat of blocking payments transactions between a non-US and Iranian bank cleared in the US (Lohmann, 2019). It also means that goods fall under US scrutiny if more than 10% of its components are US made. Many non-US firms, including the international payment clearance company SWIFT, have withdrawn their business relationships with Iran, as the US threatened to cancel their business relationships in the US or assets of related persons. The US policy is enforced via US government agencies, in particular the Office of Foreign Assets Control (OFAC), which handles a list of specifically designated nationals (SDN), a black list of dangerous/blacklisted individuals. Secondary sanctions affect everyone who deals with SDN.

While the EU has formulated a response strategy that should allow European firms to keep trading relationships with Iran, the strategy has largely failed (Jacques Delors Institute, 2018). As part of its strategy, the EU amended the blocking regulation 2271/96 of 1996 which prohibited European firms from complying with extraterritorial sanctions and allowed these firms to claim compensation in European courts from damages inflicted on them through US sanctions. However, the former was never applied and no court filings have been undertaken. Moreover, the implementation of an own payment systems INSTEX, which would allow for bartering between Iranian and

⁴*"I, DONALD J. TRUMP, President of the United States of America, in order to take additional steps with respect to the national emergency declared in Executive Order 12957 of March 15, 1995, in light of the actions of the Government of Iran and Iranian-backed proxies, particularly those taken to destabilize the Middle East, promote international terrorism, and advance Iran's ballistic missile program, and Iran's irresponsible and provocative actions in and over international waters, including the targeting of United States military assets and civilian vessels, hereby order:"*

European firms never took off at a large scale.

3 Model

The world economy consists of three countries, $i = 1, 2, 3$, where countries 1 and 2 consider sanctions against country 3 that pursues a non-trade related activity, which is harmful to countries 1 and 2. Think of the first two countries as the US and the EU, respectively, while country 3 represents Iran. Economic benefits from international trade among the three countries are represented by a utility function $U_i, i = 1, 2, 3$. Utility depends on all bilateral trading relationships. To simplify things there are only two extreme cases of the trading regime considered, $t \in \{T, N\}$, where T stands for free trade and N for no trade.

Country 3 has the option to pursue activity $X \in \{0, 1\}$ (“develop nuclear weapons”), which is a binary decision. If country 3 does so ($X = 1$), it obtains net benefit $B > 0$, additively separable from the utility from trade-related activity U_3 . Countries 1 and 2 experience a loss of $L_i > 0, i = 1, 2$ if activity is pursued ($X = 1$). There is no harm if $X = 0$. Activity X is observable and contractible. While a contract over activity X is hard to perfectly enforce in reality, the JCPOA seems to suggest that it is largely feasible. In section 4, I introduce an additional activity by country 3, Y (“sponsor international terrorism”), which is not verifiable and hence not contractible.

In the current setup, with activity X only, overall utility levels for countries $i = 1, 2$ are

$$V_i = U_i - \begin{cases} L_i & \text{if } X = 1 \\ 0 & \text{if } X = 0 \end{cases} \quad (1)$$

while for country 3 it is

$$V_3 = U_3 + \begin{cases} B & \text{if } X = 1 \\ 0 & \text{if } X = 0 \end{cases} \quad (2)$$

Note again, that U_i depends on trade relationships, which are considered in more details below. From a global welfare perspective, no activity ($X = 0$) is preferable to having the activity ($X = 1$) if and only if

$$L_1 + L_2 \geq B, \quad (3)$$

that is, the social costs of X exceed the social benefit.

I now consider the policy options of the sanctioning countries (1 and 2), and afterwards of the sanctioned country. Each country i ($i = 1, 2$) has three trade policy P options against country 3:

- No sanctions/free trade (NS)
- Unilateral sanctions (S)

- Extraterritorial sanctions (ES).

The first one (NS) is equivalent to a policy of free trade between i and country 3. Unilateral sanctions (S) by country i against country 3 are sanctions of the conventional type and have the consequence that all trade between the two countries ceases. By contrast, extraterritorial sanctions (ES) involve the following: If country $i \in \{1, 2\}$ imposes sanctions against country 3 with extraterritorial reach, then firms in country $j \in \{1, 2\}, j \neq i$, must choose to either continue trade with firms in country 3, in which case these firms are shut out from trade with country $i \in \{1, 2\}, i \neq j$, or to trade with i and not with country 3. Consistent with the evidence in the US-Iran-EU case, I assume that switching to trade with the other sanctioning country (i.e., the US or the EU) is preferable for firms in these two countries over trade with Iran.⁵

In addition, I assume that any additional trade is welfare improving, which together leads for the sanctioning country i to the ranking

$$U_i(T \text{ with both}) > U_i(T \text{ with } 2, N \text{ with } 3) > U_i(N \text{ with } 2, T \text{ with } 3) > U_i(N \text{ with both}). \quad (4)$$

Given (4), I can focus on the trade relationship of country $i = 1, 2$ with country 3, as countries 1 and 2 always trade with each other. Let denote by U_i^t the trade relationship of $i = 1, 2$ with country 3, where $t \in \{T, N\}$. Thus, U_i^T and U_i^N represent utility levels of country i when trading and not trading with country 3, respectively.

“Regular” or conventional sanctions differ in another way from extraterritorial sanctions. Extraterritorial sanctions lead to (additively separable) cost for the invoking country of $\delta > 0$, possibly very small, due to a reputation loss, while there are no additional cost under conventional sanctions. The additional costs are meant to represent the loss from abandoning the traditional rules of international economic order. I assume that the cost occur whenever extraterritorial sanctions are threatened, even if later country 3 abandons activity X . In that sense it is the threat of extraterritorial sanctions that matters, not only the actual application.

Turning now to country 3, I assume that free trade with both countries is better than trade with either of the two countries, which in turn is better than no trade bith both. In this sense more trade is always better. If there is only trade with one country, it could be trade with either country 1 or 2 that is preferred. To indicate the trade regime of country 3 with countries 1 and 2, I use the notation U_3^{tt} , $t \in \{T, N\}$. For example, U_3^{TN} indicates the utility of country 3 when trading with country 1 (“ T ”) but not with country 2 (“ N ”), while U_3^{NN} stands for the utility of country 3 when it has neither trade with country 1 nor with country 2. Using this notation, the

⁵This setup assumes that a country cannot escape the reach of extraterritorial sanctions. The assumption is in line with the failed effort of the EU to set up an extra payment system (INSTEX) that would allow European firms to make deals with Iranian firms in face of US extraterritorial sanctions, while maintaining US trade relations.

assumption on country 3's ranking of trade relationships can be written as

$$U_3^{TT} > \max\{U_3^{TN}, U_3^{NT}\} > \min\{U_3^{TN}, U_3^{NT}\} > U_3^{NN}.$$

Country 3 has the option to pursue activity X or not. It is guided in its decision by a cost-benefit analysis. The benefits B are exogenously given (and might include the expenditure for pursuing the activity, in this sense a net benefit), while the costs (loss in trade) depends on how many countries invoke or follow sanctions if X is pursued.

I analyze the following game:

1. Countries 1 and 2 choose non-cooperatively and simultaneously their sanction policy from the set of options $\{NS, S, ES\}$, possibly contingent on the choice of X by country 3.
2. Country 3 decides on $X \in \{0, 1\}$.
3. Activity X is carried out if $X = 1$ decided in stage 2, and in that case sanctions are carried out if threatened in stage 1; any non-sanctioned trade is taking place.

Several remarks are in order. Implicit in this setup is the assumption that countries 1 and 2 can credibly commit to carrying out sanctions *ex post*. This is an important assumption because if country 3 chooses $X = 1$ in stage 2, sanctions are no longer beneficial for the country imposing them in stage 3: sanctions just cut trade, which reduces utility by assumption. Without the commitment assumption, however, sanctions would never work in this setup.⁶ At the same time, the commitment assumption can be motivated as a shortcut for a repeated game, in which misbehavior by country 3 is punished by the other countries in subsequent periods. This is shown below.

The role of making the sanction policy contingent on X , and thus the sequential move structure, is essential for influencing behavior of country 3. Consider, by contrast, non-contingent policies that are either simultaneously chosen by all three countries, or sequentially with country 3 following the decisions of countries 1 and 2. In those cases, country 3 has no incentive to give up on X , as the payoff does not vary with the pursuit of X . Hence, at least one country has to offer a better deal when $X = 0$ is chosen compared to $X = 1$. In line with this argument, I consider contracts that offer NS for $X = 0$ and either S or ES when $X = 1$.⁷

Finally, I assume in the base model that (monetary) transfers cannot be paid to country 3. This restriction should make the emergence of (extraterritorial) sanctions more likely, as gains from trade may not be realized through a free trade regime with transfers. Instead, restricting

⁶See Maggi (2016) on the need for differential commitment power between sanctioning and sanctioned country in the context of coercive trade sanctions.

⁷The alternative package - offer S for $X = 0$ and ES for $X = 1$ - is inferior because the incentive for country 3 to not pursue X is higher, the greater is the utility difference between $X = 0$ and $X = 1$. The maximum difference is reached when a country offers NS for $X = 0$ and ES for $X = 1$. This is also in the interest of the country imposing sanctions because sanctions are costly in the sense of forgone trade.

trade becomes relatively more likely. The assumption of no transfers may be plausible in the case of US-Iran conflict. I discuss the role of transfers though at the end of section 4.

An equilibrium is a choice of sanction policy by countries $i = 1, 2$, possibly contingent on the choice of X , and a decision of country 3 on its non-economic activity X , such that i) country 3's choice in stage 2 is optimal given the sanctions policy of the other two countries, and ii) the sanctions choices by countries 1 and 2 form a Nash equilibrium in stage 1, when anticipating correctly how country 3 behaves in response to them (and assuming that sanctions are carried out in stage 3). I therefore solve for the subgame perfect equilibrium.

In the following, I use notation (P_1, P_2) to denote the choice of policy by country 1 and 2 for $X = 1$. This means, for example, that (S, NS) denotes sanctions by country 1 but no sanctions by country 2 (and NS by both countries for $X = 0$).

Inducing "good" behaviour by country 3 is a collective action problem from the viewpoint of countries 1 and 2 together. The danger of free riding exists, as with any public good. Extraterritorial sanctions may limit free riding though. On the downside, extraterritorial sanctions involve additional cost δ for the imposing country.

Stage 2

Country 3 weighs costs and benefits of its action regarding X . The benefits are fixed at B and the costs come in the form of lost trade. It is then straightforward to see that country 3's choice in stage 2 is as follows:

Sanction Regime	Choice of X by country 3
(NS, NS)	$X = 1$
(S, NS)	$X = \begin{cases} 0 & \text{if } B \leq U_3^{TT} - U_3^{NT} \\ 1 & \text{else} \end{cases}$
(NS, S)	$X = \begin{cases} 0 & \text{if } B \leq U_3^{TT} - U_3^{TN} \\ 1 & \text{else} \end{cases}$
all other	$X = \begin{cases} 0 & \text{if } B \leq U_3^{TT} - U_3^{NN} \\ 1 & \text{else} \end{cases}$

Table 1: Choice of harmful activity X by country 3 in stage 2

When at least one country threatens one type of sanctions, country 3 acquiesces and gives up on activity X if the benefits B are small relative to the gains from trade, with either one of the two countries or with both. However, when benefits are sufficiently large, that is

$$B > U_3^{TT} - U_3^{NN}, \quad (5)$$

country 3 sticks to $X = 1$ regardless of the sanction regime. Recall that by assumption more trade

is better: $U_3^{TT} - U_3^{NN} > \max\{U_3^{TT} - U_3^{TN}, U_3^{TT} - U_3^{NT}\}$.

I assumed that countries 1 and 2 have commitment power regarding sanctions. In a repeated game setting, a similar condition to (5) emerges and thus the static game can be seen as a shortcut for a repeated game (see Maggi (2016) for an application of this dynamic modeling in an international trade context). To see this, consider a country's deviation from the cooperative outcome (free trade and $X = 0$) which is punished forever by no trade. One condition for a cooperative outcome to be sustainable is that it does not pay for country 3 to deviate and choose $X = 1$. This condition is $B \leq \frac{\Delta}{1-\Delta}(U_3^{TT} - U_3^{NN})$, where Δ is the discount factor.⁸ Deviation thus pays when the condition is violated, which differs from (5) only by the term involving the discount factor. Qualitatively, the two conditions are the same, because the discount factor is simply a rescaling of the benefit B .

Stage 1

I now turn to the choice of policies by countries 1 and 2. It is helpful to start with the derivation of the best response function of country 1 given a policy choice by country 2.

- Country 2 chooses NS when $X = 1$, that is, country 2 offers a flat contract. Only country 1 can induce country 3 to induce $X = 0$. Sanctions S are best when $B < U_3^{TT} - U_3^{NT}$, because then country 3 chooses $X = 0$. Extraterritorial sanctions are best when $U_3^{TT} - U_3^{NT} < B < U_3^{TT} - U_3^{NN}$ and δ is small, because sanctions by country 1 alone are not sufficient to induce $X = 0$, but the threat of no trade with both countries are, and this is advantageous for country 1 if $\delta < L_1$. NS is optimal if $B > U_3^{TT} - U_3^{NN}$, as even the threat of autarky for country 3 is not enough to compensate it for gains from activity X .
- Country 2 chooses S for $X = 1$. Country 1 is indifferent between S and NS for $B < U_3^{TT} - U_3^{TN}$, because sanctions by country 2 are sufficient to deter country 3. When $U_3^{TT} - U_3^{TN} < B < U_3^{TT} - U_3^{NN}$, however, S is the best choice for country 1, as this induces $X = 0$. By contrast, NS dominates when B is too large, that is $B > U_3^{TT} - U_3^{NN}$, as $X = 1$ is always chosen by country 3. Note that extraterritorial sanctions play no role, because ordinary sanctions by country 1 are sufficient to deter $X = 1$ when parameters are right, and extraterritorial sanctions inflict further harm on the sanctioning country because of the loss δ .
- Country 2 chooses ES for $X = 1$. Country 1 is indifferent between S and NS because it always leads to own sanctions, either voluntarily or imposed. Therefore country 1 does not influence the decision of country 3. ES is never optimal for country 1 because of the cost δ .

Note that the utility level of country 1 is weakly declining in B in all three cases. Furthermore, the situation for the decision of country 2, given the choice of country 1, is analogous to the above

⁸Cooperation pays for country 3 if $U_3^{TT} + \Delta U_3^{TT} + \Delta^2 U_3^{TT} + \dots \geq (U_3^{TT} + B) + \Delta U_3^{NN} + \Delta^2 U_3^{NN} + \dots$, which can be rewritten in terms of B as indicated in the text.

characterization.

Summarizing the above reasoning, the equilibrium outcome of the sanctioning game is shown in the following *Table 2* and illustrated in *Figure 1*.

(P_1, P_2) for $X = 1$	Range of benefits B	Choice of X	Welfare country $i = 1, 2$	Welfare country 3
(NS, NS)	$B > U_3^{TT} - U_3^{NN}$	$X = 1$	$V_i = U_i^T - L_i$	$V_3 = U_3^{TT} + B$
(S, NS)	$B \leq U_3^{TT} - U_3^{NT}$	$X = 0$	$V_i = U_i^T$	$V_3 = U_3^{TT}$
(NS, S)	$B \leq U_3^{TT} - U_3^{TN}$	$X = 0$	$V_i = U_i^T$	$V_3 = U_3^{TT}$
(S, S)	$B \leq U_3^{TT} - U_3^{NN}$	$X = 0$	$V_i = U_i^T$	$V_3 = U_3^{TT}$
(ES, NS)	$U_3^{TT} - U_3^{NT} < B \leq U_3^{TT} - U_3^{NN}$	$X = 0$	$V_1 = U_1^T - \delta, V_2 = U_2^T$	$V_3 = U_3^{TT}$
(NS, ES)	$U_3^{TT} - U_3^{TN} < B \leq U_3^{TT} - U_3^{NN}$	$X = 0$	$V_1 = U_1^T, V_2 = U_2^T - \delta$	$V_3 = U_3^{TT}$

Table 2. Sanction policy choice in stage 1 by countries 1 and 2

The remaining pairs (ES, S) , (S, ES) and (ES, ES) do not appear in equilibrium when $\delta > 0$, as there is no additional gain from extraterritorial sanctions to be reached due to the reputation loss.

Notice that there are multiple equilibria for certain parameter conditions: For example, the (S, S) equilibrium as well as the (ES, NS) equilibrium hold simultaneously for $U_3^{TT} - U_3^{NT} < B \leq U_3^{TT} - U_3^{NN}$. Another case is $B \leq U_3^{TT} - U_3^{NT}$, when the (S, NS) and (S, S) equilibria occur simultaneously. The case of multiple equilibria is seen in *Figure 1* by stacking vertically the equilibria in certain parameter ranges.

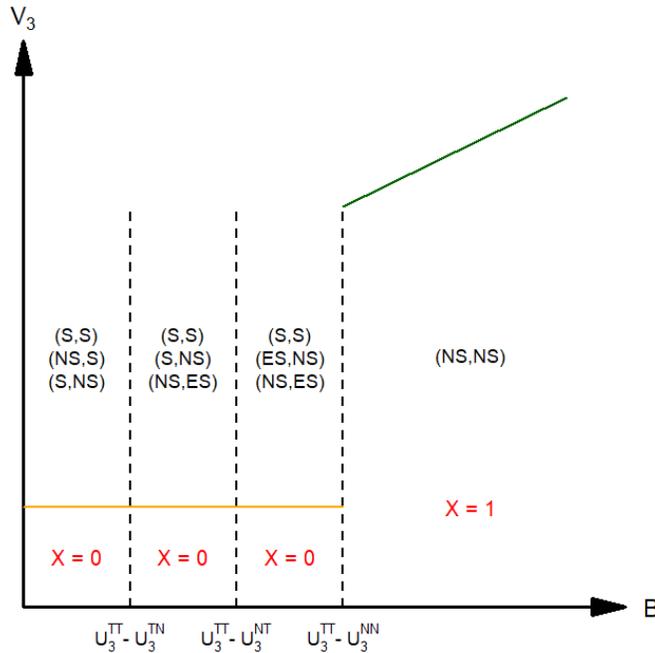


Figure 1. Illustration of Sanctioning Policy Tuples and choice of X (Ass. $U_3^{NT} < U_3^{TN}$)

Any equilibrium involving extraterritorial sanctions is inefficient from the viewpoint of the sum of welfare of countries 1 and 2, because such sanctions entail the cost δ . Hence, the equilibrium involving ordinary sanctions by both countries is welfare dominant: $X = 0$ is chosen and the threat of sanctions is enough to deter $X = 1$. Finally, note that there is no situation where an equilibrium involving extraterritorial sanctions is unique.

Proposition 1. *Consider the model with contractible activity X (“build nuclear bomb”) and no monetary transfers between countries.*

a) *In any non-cooperative equilibrium, in which in stage 1 country 1 and/or country 2 threaten extraterritorial sanctions, no such sanctions are carried out in stage 3 because country 3 gives in and chooses $X = 0$ in stage 2.*

b) *If model parameters are such that as part of an equilibrium extra-territorial sanctions are threatened in stage 1, then there exists a welfare-superior equilibrium, in which both countries threaten ordinary sanctions and country 3 gives in and chooses $X = 0$.*

Proposition 1 suggests that extraterritorial sanctions should not play a role even if monetary transfers between countries are ruled out as an instrument. Extraterritorial sanctions are either not sufficient to induce good behavior, or are welfare dominated by conventional sanctions, or are only threatened by not actually carried out.

4 Model with non-contractible activity Y

I now extend the model to allow additionally for activity Y (“sponsor international terrorism”), which similar to activity X is beneficial for country 3, but harmful for countries 1 and 2. To distinguish benefits and losses by activity, I denote by B_X and B_Y the benefits of country 3, and by L_{Xi} and L_{Yi} the losses of country i from activities X and Y , respectively. In contrast to X , activity Y is not contractible, that is, trade policy cannot be made conditional on activity Y . Indirectly, however, countries 1 and 2 may influence activity Y through income effects from international trade.

Specifically, I assume that the benefits for country 3 from Y are a function of the amount of money M spent on it, $B_Y(M)$ with derivatives $B'_Y(M) > 0$ and $B''_Y(M) \leq 0$. The spending decision occurs at stage 2, together with the decision X , and affects the other two countries' size of losses $L_{Yi}(M)$ with $L'_{Yi}(M) > 0$. Let M^{tt} be the spending of country 3 under trade regime tt with countries 1 and 2, where as before $t = N, T$. Total utility of country 3 therefore becomes

$$V_3 = U_3^{tt}(M^{tt}) + B_Y(M^{tt}) + \begin{cases} B_X & \text{if } X = 1 \\ 0 & \text{else} \end{cases} \quad (6)$$

I assume that $U_3^{tt}(M)$ is declining in M , $U_3^{tt'}(M) < 0$, that is, money spent on terrorism reduces net utility from trade: For example, a reduction in exogenous income allows less consumption of goods. Moreover I assume $U_3^{tt''}(M) < 0$, that is, money spent on terrorism not only reduces the power to buy goods, but is also increasingly harmful, i.e., the marginal utility of a consumption is diminishing. Activity X remains a binary variable, as before. M is optimal chosen by country 3 and due to the separability assumptions shown in (6) can be inferred from the optimality condition

$$U_3^{tt'}(M^{tt}) + B_Y'(M^{tt}) = 0.$$

A key assumption relates to the impact of trade on spending M .

Assumption 1.

$$M^{TT} > \max\{M^{TN}, M^{NT}\} > \min\{M^{TN}, M^{NT}\} > M^{NN}.$$

Assumption 1 may or may not hold, that is, spending on M could be higher or lower under complete free trade compared to autarky. In the appendix, I sketch a simple Ricardian model of international trade with two consumption goods to illustrate the relationship of Assumption 1 to the interaction of a country's comparative advantage and household preferences. In the following I focus on the situation when Assumption 1 holds. This makes the emergence of extraterritorial sanctions more likely because sanctions make the pursuit of X more costly.

Countries 1 and 2 cannot directly affect activity Y because it is not contractible. However, through sanctions or compensation payments conditional on activity X they may reduce the amount of resources M devoted to Y by country 3 (if Ass. 1 holds). Could extraterritorial sanctions play a role in this situation? To analyze this, I consider the case in which the following condition holds

$$V_3[TT, X = 0] = U_3(M^{TT}) + B_Y(M^{TT}) < U_3(M^{NN}) + B_X + B_Y(M^{NN}) = V_3[NN, X = 1]. \quad (7)$$

The left hand side is the utility of country 3 under unconstrained trade with countries 1 and 2, $X = 0$, and optimal spending on Y , while the right hand side represents utility under no trade at all and $X = 1$. Under condition (7), country 3 cannot be induced to give up on X without additional compensation, as even sanctions by both countries are not enough of a threat to induce $X = 0$. Condition (7) is analogous to the condition $B > U_3^{TT} - U_3^{NN}$ in section 3, which led to free trade and $X = 1$.

Consider now the policy options for countries 1 and 2 if condition (7) holds. If in this situation, both countries offer a flat policy without any sanctions (NS, NS), resulting in free trade and

$X = 1$, the utility levels of countries $i = 1, 2$ become

$$V_i = U_i^T - L_{Xi} - L_{Yi}(M^{TT}). \quad (8)$$

An alternative option is that one country, say country 1, imposes extraterritorial sanctions on country 3, which forces country 2 to abandon trade with country 3 as well. This will not affect activity X , as country 3 still finds it advantageous to pursue it (condition 7 holds), but it does affect activity Y , as country 3's income is going to decline when international trade ceases (under Ass. 1). Country 1 finds extraterritorial sanctions advantageous relative to a flat contract with no sanctions if and only if

$$V_1[ES, X = 1] = U_1^N - L_{X1} - L_{Y1}(M^{NN}) - \delta \geq U_1^T - L_{X1} - L_{Y1}(M^{TT}) = V_1[NS, X = 1],$$

which is equivalent to

$$L_{Y1}(M^{TT}) - L_{Y1}(M^{NN}) \geq (U_1^T - U_1^N) + \delta \quad (9)$$

Condition (9) is the key condition of the paper. Extraterritorial sanctions are advantageous for country 1 if the increase in experienced damage from activity Y , when country 3 moves from no trade to free trade, is larger than country 1's gains from bilateral free trade with country 3 plus the reputational cost of imposing extraterritorial sanctions. Note that the right hand side is strictly positive by assumption. The left hand side is positive under Assumption 1, but negative (or zero) if Assumption 1 does not hold. Note furthermore, that the loss from X does not enter (9), as activity X is always carried out and thus the term cancels. If country 1 threatens extraterritorial sanctions Country 2 is indifferent between S and NS , as its trade with country 3 is blocked in any case. Hence under condition (9) the tuple (ES, NS) is an equilibrium.

But could country 1 achieve the same thing with conventional sanctions, assuming that country 2 does not sanction itself? The advantage of doing so comes in form of saving the reputational cost. On the other hand, country's 3 trade with country 2 boosts spending on Y . Ordinary sanctions (S) are not better than no sanctions (NS) from the viewpoint of country 1 if $L_{Y1}(M^{TT}) - L_{Y1}(M^{NT}) < (U_1^T - U_1^N)$. Note the slight difference in the second term on the left hand side in comparison to (9) resulting from different spending on Y . Together with condition (9) this leads to the condition

$$L_{Y1}(M^{TT}) - L_{Y1}(M^{NN}) - \delta \geq U_1^T - U_1^N > L_{Y1}(M^{TT}) - L_{Y1}(M^{NT}). \quad (10)$$

In other words, the gains from trade for country 1 with country 3 must be bounded by the change in damage from the trade induced increase in spending on Y , adjusted by the reputational cost, in order to make conventional sanctions not attractive for country 1. Under condition (10) then, conventional sanctions are not sufficient, but extraterritorial sanctions are advantageous, assuming that country 2 chooses no sanctions itself.

Similar to section 3, I now check whether there are multiple equilibria, in particular whether (S, S) could be an equilibrium as well, which would be welfare superior because it avoids reputational cost δ . Suppose S is imposed by country 1. Country 2 chooses sanctions S itself in that case, if

$$L_{Y2}(M^{TT}) - L_{Y2}(M^{NN}) \geq U_2^T - U_2^N. \quad (11)$$

Condition (11) mirrors (9) without the reputational cost, and complements the key condition of the paper.

Obviously, conditions (9) and (11) need not hold simultaneously because of asymmetries in harm from Y or the size of benefits from bilateral free trade. This is discussed in the context of the US-Iran-EU conflict in section 5. Here I note that if (11) does not hold, but (9) does, extraterritorial sanctions by country 2 and no sanctions by country 1 is an equilibrium outcome: Country 2 cannot affect actions by country 3. Country 3 sticks to $X = 1$ due to (7). An (S, S) policy tuple is not an equilibrium because country 2 finds trade with country 3 superior to joint sanctions (condition (11) does not hold).

If condition (11) is violated, it is not attractive for country 1 to impose extraterritorial sanctions.

Proposition 2. *Consider a model with activities X (“build nuclear bomb”) and Y (“sponsor international terrorism”), where X is contractible but Y is not. Assume condition (7) holds and country 3’s optimal spending M on activity Y rises with the level of free trade with countries 1 and 2 (Assumption 1). Assume furthermore that (10) holds and (11) is violated. Then the unique equilibrium involves extraterritorial trade sanctions threatened by country 1 and no own sanctions by country 2. In equilibrium, extraterritorial sanctions are carried out, that is, there is no trade with country 3, activity X is pursued ($X = 1$), and spending on Y is M^{NN} .*

Proposition 2 thus shows the conditions under which extraterritorial sanctions are threatened and carried out in equilibrium. Uniqueness can be established using further restrictions on parameters.

Obviously, the equilibrium is not efficient from a world perspective. There is waste from the reputational cost, and potential gains from trade are not realized. In this situation, where country 3 is in autarky due to extraterritorial sanctions by one country, could countries 1 and 2 either jointly or individually offer compensation to country 3 in exchange for $X = 0$? In the context of the simple model with activity X only, a “bad” outcome where countries find themselves in a (NS, NS) equilibrium because $B > U_3^{TT} - U_3^{NN}$, can be overcome through transfers. While sanctions by countries 1 and 2 together are not sufficient to deter country 3 from pursuing activity X , a Pareto improvement through transfers is feasible if (3) holds, that is, $L_1 + L_2 \geq B$.⁹

⁹Formally, consider a game, in which in stage 0 countries 1 and 2 have the option to sign an agreement that specifies free trade among all countries and a compensation payment P to be paid from countries 1 and 2 to country 3 if it abstains from X . The costs of the compensation payment are split between 1 and 2, Z_1 and Z_2 , with $Z_1 + Z_2 = Z$. If no agreement is reached in stage 0, the game continues as described in section 3. To see whether

The model with activity X and Y is more complicated because compensation payments affect also spending on M . To see that compensation payments may have some bite though, consider holding spending on M fixed for a moment. The key question is whether the benefits of country 3 from X are greater or less than the joint losses, $B_X \gtrless L_{X1} + L_{X2}$. If greater, no compensation can work, while compensation could work in the opposite case. However, once feedback effects on M are accounted for, even the latter case is not clear cut, as country 1 is very much concerned about any increase in spending on M , and therefore might not participate in the transfer scheme. In that case, country 2 would need to finance the compensation alone, which requires that L_{X2} is large relative to B_X .

5 Discussion and Application to the US-Iran-EU Conflict

The emergence of extraterritorial trade sanctions hinges on three components according to the theoretical model: The benefits of trade (see right hand sides of (9) and (11)), the loss from the non-contractible activity (left hand sides of (9) and (11)), and the reputational cost from threatening extraterritorial sanctions (the last term on right side of (9)). What is more, there is a need for some asymmetry in these dimension between the sanctioning countries. In this section I evaluate these aspects in the context of the US-EU-Iran conflict. The evidence presented is rather circumstantial, because the theoretically correct terms involve non-observable counterfactual aspects. The following analysis is therefore illustrative.

Benefits of imports from Iran

Iran's export are heavily concentrated on oil and mineral fuels. Between 2010 and 2019 the export share of this (HS2) was at least 53,5%, and up to 79% (www.oec.world). Although this could be distorted due to various trade restrictions and sanctions, it is plausible to assume that the export pattern would not be totally different under free trade. How much would the EU and US benefit from energy imports from Iran? To measure this, I take a look at the import intensity of energy consumption in key countries, which is shown in Figure 2.

an agreement is attractive for all sides, note that under the agreement welfare levels become $V_i = U_i^T - Z_i$, $i = 1, 2$, and $V_3 = U_3^{TT} + Z$. Obviously, Z must be larger than B for the agreement to be attractive, and $Z_i \leq L_i$ for all $i = 1, 2$. Since the sum of losses is bigger than B by condition (3), there exist levels of Z_1 and Z_2 that fulfill this. By contrast, if (3) is violated, no Pareto improvement is feasible, as country 3 cannot be convinced to give up X without making countries 1 and 2 worse off.

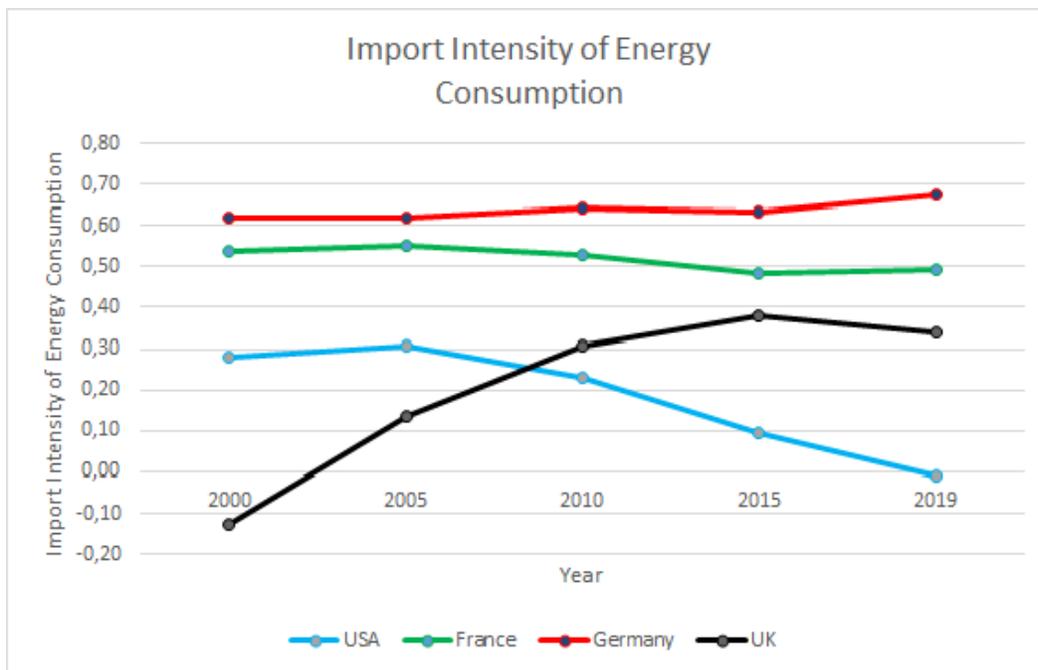


Figure 2. *Import Intensity of Energy Consumption*. Source: U.S. Energy Information Administration, download from <https://www.eia.gov/>; import intensity is calculated as difference between total consumption and total production, divided by total consumption. All energy sources are included and measured in BTU. Data for UK in 2019 is from 2018.

Several aspects stand out: The three European countries tend to be much more dependent on energy imports than the US, in particular France and Germany. The US dependence has been generally lower, but what is more, it has been sharply declining over the last fifteen years. In fact, the US has become a net energy exporter lately, due to the fracking boom (Feyrer et al. 2017), where with the help of new drilling techniques massive oil and gas resources have become accessible. This observation is consistent with the right hand side of (9) becoming smaller over time, while the right-hand side of (10) staying roughly the same.

Reputational cost of extraterritorial sanctions

Extraterritorial sanctions inflict damage on the multilateral economic order that has been in place in recent decades. International trade has been governed by the rules laid down in the framework of the World Trade Organization. Threatening extraterritorial trade sanctions undermines the multilateral effort to resolve trade conflicts in a rules based system, in which each country cannot impose measures that impact other countries without approval of the WTO. The reputational cost is in the eye of the government that threatens such sanctions. In this context, it is useful to see the perception of the countries that are affected by those sanctions, as this is a potential indicator for the reputational cost. This can be done by looking at the favorability of the US and its president in Europe. Notice that presidents Obama and Biden adhere to a multilateral approach, while president Trump did not. In fact, in his term he withdrew from the

Paris climate agreement, canceled JCPOA, and blocked the the appointment of appeals judges for WTO dispute settlement mechanism, among other things. Figure 3 shows that President Trump suffered dramatically in external reputation during his office for his handling of international affairs.

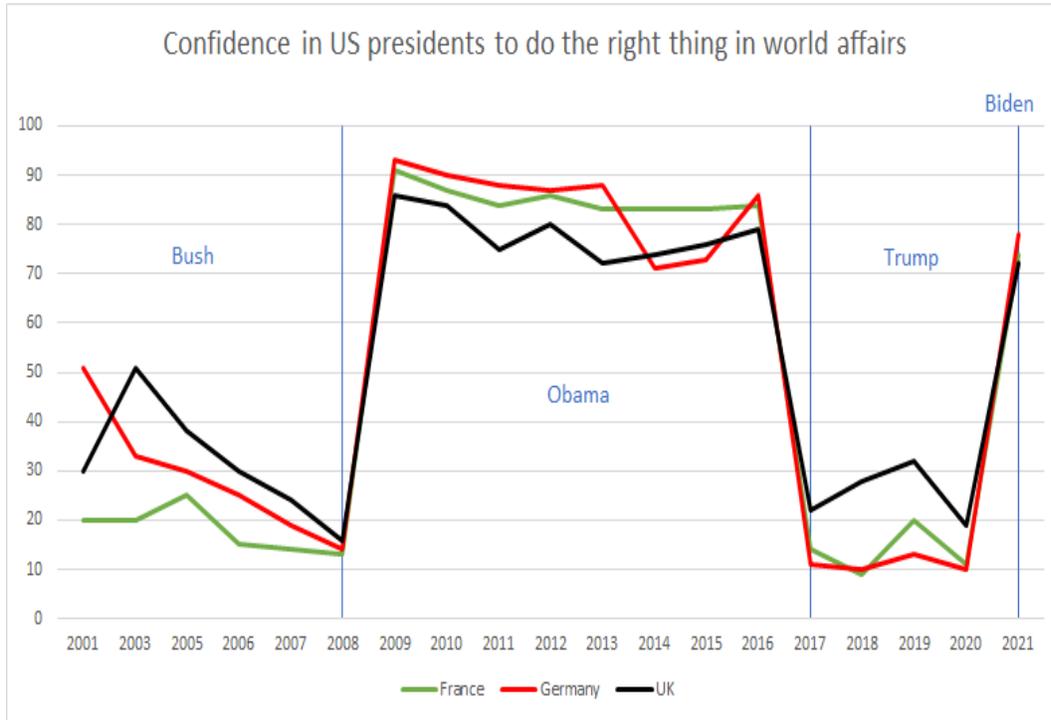


Figure 3. Confidence in US presidents. Source: Pew Research Center, June 2021, “America’s Image Abroad Rebounds With Transition From Trump to Biden”, combining answers “a lot of confidence” and “some confidence”

As mentioned before, what matters from a theoretical point of view is the perceived reputational cost, not the actual change in opinion in the rest of the world. If we plausibly assume that President Trump didn’t care much about his international reputation, as expressed in his “America first” policy, while Obama and Biden do care, then the evidence suggest that the perceived cost would be large under the latter but low under the former.

By contrast, due to its relative military weakness, the EU’s approach to international affairs has always been a multilateral one. Reputational cost would be high for European countries if they imposed extraterritorial sanctions.

The suffering from international terrorism

The last element relates to the left side of the inequalities (9) and (11), which correspond to the losses in the US and the EU from increased spending on international terrorism. For this purpose, I draw on international survey data relating to the threat of terrorist attacks. World Value Survey (WVS) data suggest that worries about terrorist attacks are larger in the US than in Germany:

Worries terrorist attack	Germany 2010-14	USA 2010-2014	Germany 2017-2020	USA 2017-2020
Very much	9.4	18.2	18.3	27.6
a great deal	26.1	34.5	39.5	40.2
not much	45.0	36.0	34.6	26.1
not at all	18.7	9.8	7.3	5.3

Table 3. Source: World Values Survey. Data not available for France and UK. Data for 2010-14 wave from question V184, for 2017-2020 wave from Q147. When answers do not add to 100%, rest is due to answer categories “don’t know” or “no answer”. Wording of survey question: “To what degree are you worried about the following situations? A terrorist attack”

The WVS provides further insights into possible suffering from terrorism. In the 2017-2020 wave (question Q126), participants were asked about an increasing risk of terrorism through immigration. Here Germans agree with that hypothesis much more than Americans (64.5% vs. 41.3%).¹⁰ A similar picture arises from PEW survey data. In 2017, the answer “very” to the question “How concerned are you about extremism in the name of Islam in our country these days?” was 42% in the US, 47% in Germany, 46% in France and 43% in the UK. Taking the answers “very” and “somewhat” together, concerns in Europe were slightly higher (Germany 82%, France and UK 79% each) compared to 72% in US. All of these numbers need to be taken with a grain of salt, as they reflect particular moments in time, which are often heavily influenced by particular events. Overall, there seems no clear evidence that the US and European countries perceive the threat from terrorism very differently.

Concerns terrorism via immigration	Germany	USA
Agree	64.5	41.3
Hard to say	8.7	38.7
Disagree	24.8	18.3

Table 4. Source: World Values Survey. Data for 2017-20 wave from question Q147. When answers do not add to 100%, rest is due to answer categories “don’t know” or “no answer”. Wording of survey question: “From your point of view, what have been the effects of immigrants on the development of [your country]?: Increase the risks of terrorism”

Concerns extremism in name of Islam	Germany	France	UK	USA
Very	47	46	43	42
Somewhat	35	33	36	30
Not too	13	16	15	16
Not at all	4	5	5	11

Table 5. Source: Pew Research Center, “Majorities in Europe, North America worried about Islamic extremism”, May 24, 2017 (<https://www.pewresearch.org/fact-tank/2017/05/24/majorities->

¹⁰Disagreement was somewhat larger in Germany than in US (24.8% vs. 18.3%), which is explained by a much larger fraction of “hard to say” answers in the US.

in-europe-north-america-worried-about-islamic-extremism/); Survey question: “How concerned are you about extremism in the name of Islam in our country these days?”

Taken together, the three parts of evidence suggest that the first two components are the key aspects to explaining the emergence and abandoning of US extraterritorial sanctions against Iran. The fracking boom in the US has reduced the US benefits of trade with Iran substantially, while the EUs dependence was rather stable. JCPOA was formed under President Obama, who valued a multilateral approach, as his reputational cost of violating the traditional economic order would likely to have been large. Trump’s little interest in his international reputation led to the abandoning of the multilateral approach and the imposition of extraterritorial sanctions.

6 Conclusion

In this paper, I identify conditions under which extraterritorial trade sanctions emerge as outcome of a non-cooperative game between three countries. While several assumptions are built on the specific case of the US-Iran-EU case, where such sanctions have played a prominent role, the insights may go well beyond the specific case. Extraterritorial sanctions may be individually rational when conventional sanctions are not enough to induce good behavior by the sanctioned countries, such sanctions restrict resources by the sanctioned country, and the sanctioning countries differ in at least one of three dimensions concerning the bilateral benefits from trade, the losses from non-economic activity, and the cost of violating the international order.

Future research should consider other concrete cases of extraterritorial sanctions in the hope of building a more general theoretical model of extraterritorial sanctions. Going beyond the positive analysis pursued in this paper, normative conclusions should be explored as well. In the present model, extraterritorial sanctions are harmful from a normative standpoint because they violate the international order. Conventional sanctions by all countries would be superior but may not be an equilibrium outcome.

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Appendix

I sketch a simple Ricardian model of international trade to illustrate that spending on Y may increase or decrease when moving from autarky to free trade. I consider a small open economy, and drop subscript 3 (“Iran”) as all variables refer to that country.

Let the utility function of the representative consumer in the country be $V(c^1, c^2, B(Ly))$, where c^1 and c^2 are the consumption levels of goods 1 and 2, and B is the benefit from activity Y . All goods and the benefit of Y are produced by using the only factor of production labor. The amount of labor devoted to Y is a measure of spending. Let the production functions be of linear types

$$x^1 = \frac{L^1}{a^1}, \quad x^2 = \frac{L^2}{a^2}, \quad B = \frac{L^Y}{a^Y},$$

where the denominators represent the input output coefficients. Labor is in fixed supply L so that $L^1 + L^2 + L^Y = L$.

Autarky: The optimal allocation of resources is governed by the first order conditions $\frac{V_1}{a^1} = \frac{V_2}{a^2}$ and $\frac{V_1}{a^1} = \frac{V_B}{a^Y}$, indicating that the marginal rates of substitution are equated to the marginal rate of transformation.

Free trade: The country take prices of traded goods 1 and 2, p^1 and p^2 , as given. The wage rate is w and thus labor income is wL . The optimal allocation is implicitly defined by the first order conditions $\frac{V_1}{p^1} = \frac{V_2}{p^2}$ and $\frac{V_1}{a^1} = \frac{V_B}{a^Y}$, where $w = p^1/a^1$ was used.

To compare the level of L^Y in the two situations assume that $V = \ln c^1 + k c^2 + \ln B$, where $k > 0$ is a parameter. Under autarky $B = a^2/(k a^Y)$, while under free trade $B = (a^1 p^2)/(k p^1 a^Y)$. The latter is larger than the former if $a^1/a^2 > p^1/p^2$, that is, if the country has a comparative advantage in good 2. In that case, opening up for trade increases the consumption of good 1 because through imports the provision has become cheaper, and that in turn makes more resources devoted to Y attractive to equalize the marginal benefits of goods 1 and Y . If, however, comparative advantage is in good 1, L^Y and thus B goes down.