

The arms trade, international alignments, and international conflict

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Abstract

Much of what policy makers, journalists, and scholars discuss under the heading of international politics concerns continuously changing patterns of friendliness and hostility between states. We lack, however, good ways to measure such *international alignments*. We employ data on arms trades to develop a new measure, coding a state's alignment according to which group of countries its main supplier belongs to – West, East, or “Other.” The measure more accurately maps known changes in foreign-policy orientation than commonly used measures in the literature, including formal alliances and similar UN voting records. Further, contiguous dyads whose countries transition from the same to different supplier groups see their militarized dispute rates increase by more than 25% on average, whereas dispute rates for non-contiguous dyads more than double. The pattern is even more pronounced when supplier combinations are disaggregated: Within-dyad transitions between West-West and East-West, for example, associate with a near-doubling of dispute rates in the contiguous sample and close to tripling in the non-contiguous sample. West-West dyads are generally far more peaceful than other combinations, even controlling for joint democracy.

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1 Introduction

Much of what we call international politics consists of year-to-year or even month-to-month shifts in friendliness or hostility among different pairs of states, as expressed by a large range of foreign policy actions. These shifts, or possible shifts, in *international alignments* are closely monitored by journalists, policy analysts, and policy makers. For instance, does something the Iranian leader said mean that Iran’s foreign policy will become less hostile to the US, or more so? What do we learn, if anything, about changes to US foreign policy alignments from Donald Trump’s decision to visit Saudi Arabia for his first foreign trip and gush over the regime, while being testy with NATO allies?

On occasion, shifts in alignment are marked by the making or breaking of a formal alliance between states. But such large changes are rare. In general, international relations scholars lack good measures of international alignments. We have data on formal alliances; annual correlations between voting patterns in the United Nations General Assembly; differences in regime type as measured by democracy scales such as Polity; shared IGO memberships, and trade between states. Each has value but also significant limitations. And, as we show below, none of these are particularly helpful for predicting changes in rates of militarized disputes between specific pairs of states over time.

In this paper we employ Stockholm International Peace Research Institute (SIPRI) data on arms transfers between states since 1950 to develop new measures of international alignment. The arms trade is highly concentrated, with a small number of major suppliers that we partition into three sets: West (the US and some NATO allies), East (mainly the Soviet Union/Russia), and “Other” (a diverse group of small suppliers which has accounted for about 15% of the total value of all arms trade on average since 1950). A country’s alignment in a given year is estimated from its major arms supplier group in that year or the most recent year in which it made any significant purchases.

We show that this measure has much more temporal variation within countries than most existing measures, and, upon closer comparison with two of the most popular variables, formal alliances

and UN voting behaviour, we find that the arms measure does a much better job at tracking known changes in foreign policy orientation. This is to a great extent because post-World War II alliances and UN voting patterns have tended to reflect formal regional frameworks that mask large within-region differences. We show that the arms-trade-based measure has markedly greater face validity for both cross-national and over-time variation during and after the Cold War.

Further, we find that contiguous dyads whose countries transition from having the same supplier group to having different supplier groups on average experience a 25% increase in within-dyad dispute rates, whereas the rates for non-contiguous dyads more than double. This is even more substantial when dyad supplier combinations are disaggregated. The within-dyad rate of militarized disputes is much lower between states that are jointly supplied by the West, versus all other pairings, though especially East-West. On average, transitions from West-West suppliers to East-West suppliers are associated with almost a doubling of the within-dyad dispute rate among contiguous dyads and almost a tripling among non-contiguous dyads.

By comparison, changes in formal alliances, trade dependency, or shared IGO memberships do not predict changes in dispute rates within dyads at all. Joint democracy status and similarity of UN voting patterns have some purchase for non-contiguous dyads, but both are marginal for explaining variation over time within contiguous pairs of states, where a large majority of militarized disputes have occurred (72% since 1950). Indeed, partially excepting joint democracy, none of the standard covariates used in quantitative models of militarized interstate dispute rates consistently predict variation within dyads over time, let alone associating with changes this large.

How should these results be interpreted? We are not claiming that arms supplier differences themselves have a direct causal effect on interstate military conflict. Rather, our argument is based on the dual premise that countries with different foreign and domestic policy preferences have a higher probability of having disputes, and that the identity of a country's arms supplier reflects its policy preferences. This is because, other things equal, exporters tend to prefer supplying, and importers prefer being supplied by, countries that have similar preferences to themselves.

The reason that arms deals tend to occur between states with similar foreign policy and domestic

political preferences is that arms deals entail major moral hazard problems on both buyer and seller sides. Weapons transactions tend to increase both the seller's and the buyer's ability to harm the other in the future. Unable to rely on the contracting solutions that are more available and reliable in domestic economic contexts, states try to limit moral hazard in arms transactions by dealing with states with more similar policy preferences.

As far as we know the SIPRI arms transfer data has not been used as a basis for measures of international alignment. There is a small literature that regresses measures of conflict on volumes of arms transfers for specific dyads (or arms transfer dependence), trying to draw inferences about a causal effect.¹ Akerman and Seim (2014) show that arms exchanges are more likely between states with more similar Polity (democracy) scores, although the relationship has weakened since the end of the Cold War (see also Perkins and Neumayer, 2010).

Moravcsik (1991) argues that historically, major powers face an “autarky-efficiency dilemma”: Although they might prefer to be self-sufficient in arms and not to sell to rivals, large fixed costs in the production of heavy weapons make for large economies of scale, so that a country cannot have a cutting-edge military industry unless it exports a lot. Moravcsik discusses how, before 1945, this dilemma could be so sharp as to lead major powers to sell weapons to peacetime adversaries and even wartime enemies. The heavy weapons export business has remained highly concentrated among the major powers since 1945. But perhaps because of the large increase in the number of small, low-income states, the big exporters have been able to exercise decided preferences and discrimination among arms buyers (as shown below).

The next section discusses the moral hazard problems associated with arms transfers, developing the theoretical argument for why these might be used to indicate international political alignment, at least for the period since 1945. We then introduce the SIPRI arms transfers data and some of its main features. The fourth section uses the examples of Egypt and Iran to illustrate how arms supplier identity does a better job of tracking these states' political alignments over time than do formal alliances or UN voting records. Section 5 operationalizes our measure, while section 6

¹See for examples and references Kinsella (1994, 1998). Since conflict and the expectation of it create demand for arms, the endogeneity problem here is formidable.

uses maps to show graphically how the measure captures cross-national variation in alignments as compared to formal alliances and UN voting behaviour. Finally, in Section 7 we show that changes in arms supplier identity associate with large changes in military dispute rates within interstate dyads over time.

2 Why would arms supply relationships indicate international political alignment?

The concept of alignment between two states in international relations is used so commonly – by academics, journalists, and policymakers – that authors rarely feel the need to provide a definition. We take it that two states are aligned to the extent that they have a self-conscious disposition to coordinate foreign policies on matters of mutual concern, particularly including supporting each other against third parties, and promoting interactions and exchange in various spheres (military, trade, culture). International alignment, as a disposition to coordinate foreign policies, will normally be in service of common foreign or domestic policy interests. Military alliances are a formalized type of alignment in one particular domain, but states can be aligned, even very closely, without having a formal alliance. The US and Israel are an often-used example. They have nearly perfectly coincident UN General Assembly voting records (for one thing) but no formal military alliance.

Two states might be aligned on one issue – meaning that they coordinate and support each other’s positions – while being at odds (not aligned) on other issues. The concept of alignment refers to a general disposition, either across multiple issues or intensely on one important issue, that goes beyond sharing common views on one minor issue.²

Why might arms sales be a serviceable proxy or indicator for interstate alignment in this sense?

A natural objection is that arms purchases take place in an arms market. Should we not expect buyers simply to look for the best price for the type of equipment they want? If so, why expect

²Walt (1987) and much prior literature did not distinguish between alliance and alignment. He wrote (p. 1) “I define *alliance* as a formal or informal relationship of security cooperation between two or more sovereign states,” and he is explicit about using “alliance” and “alignment” interchangeably (p. 12). Morrow (2000) drew attention to the question of why some alignments are formalized as military alliances. See also Dingman (1979).

that supplier source would indicate anything more than vagaries of demand and supply?

Arms have special properties as goods. They are not like tomatoes at a farmers' market. Arms deals are subject to major moral hazard problems on both the buyer and seller sides, in that a trade increases both sides' ability to act against the others' interests. This implies that both buyers and sellers will tend to prefer deals with a state that is expected to have similar foreign and domestic policy interests in the future, in order to reduce the risks from moral hazard.

A seller may fear that the buyer could use the weapons against itself, against other states that the seller likes, or against domestic opponents the seller likes or might prefer to see in power.³ Even if the buyer does not actually use the weapons in these ways, merely having them could hurt the seller's foreign policy interests via deterrence and coercive bargaining by a more highly armed buyer state. The seller may also worry that a buyer would resell to enemies, or spread information about weapon capabilities and manufacturing.⁴ In international anarchy, buyers and sellers cannot normally resolve these moral hazard problems with a contract governing use of the weapons, so sellers can have powerful reasons to prefer dealing with states with similar foreign policy preferences and similar preferences concerning domestic political opponents.

On the buyer side, the receiving state typically becomes at least somewhat dependent on the buyer for resupply and training in, or even operation of, sophisticated weapons systems. Interoperability is higher with different types of weapons from the same supplier, which increases a lock-in effect on buyers. Dependence on a particular supplier after purchase thus makes for a classic hold-up problem: What stops the supplier from exploiting buyer dependence in the

³For a more general discussion of moral hazard problems in the "outsourcing" of security policy, see Grinberg (2017). An example of seller fear that weapons might be used against an ally is US law H.R. 7177, passed in 2008, that requires that "Any certification relating to a proposed sale or export of defense articles or defense services under this section to any country in the Middle East other than Israel shall include a determination that the sale or export . . . will not adversely affect Israel's qualitative military edge over military threats to Israel" (22 US Code §2776h). Grinberg argues that one way the US has dealt with the moral hazard problem in this region is by deliberately making counterbalancing arms sales to Israel.

⁴For example, Selcan Hacaoglu, "[Turkey Chooses Russia over NATO for Missile Defense](#)," *Bloomberg News*, July 13, 2017, reports that "Disagreements between [Turkey and the US] have also impacted business. No US companies bid for a Turkish attack helicopter contract in 2006 after Turkey insisted on full access to specific software codes, which the US refused to share, considering it a security risk." The lead of this article is a good example of our broader claim about arms suppliers being indicators of alignment: "Turkey has agreed to pay \$2.5 billion to acquire Russia's most advanced missile defense system, a senior Turkish official said, in a deal that signals a turn away from the NATO military alliance that has anchored Turkey to the West for more than six decades."

future? And the hold-up problem in this domain can be especially fearsome, since a state's demand for weapons and resupply will be high and critical precisely during interstate war or domestic rebellion. A state's leadership will prefer not to have to depend on resupply by a seller who might turn out to be indifferent or happy to see it overthrown, for example.

In addition, an arms supplier learns sensitive private information – intelligence – about a buyer's military and regime, all the more so the more sophisticated weapons systems are involved (because these require more hands-on training). This makes for yet more moral hazard on the part of the seller. And it will again be of greatest concern if the buying state's leadership expects that the seller may not always favor its rule, or might disclose military information to a local enemy. So again buyers have a strong incentive, in this contract-poor environment, to prefer sellers with similar foreign and domestic policy preferences, perhaps especially concerning domestic political ideology.

In principle, a buying state might try to limit the moral hazard problems associated with dependence on a single supplier by buying from multiple major suppliers – diversifying. This may still be problematic due to interoperability issues, especially for small forces, and the intelligence risks of buying from a supplier with different policy preferences. On the supplier side, the moral hazard issue of helping to arm a potential enemy is still there, though there could be benefits of having some influence rather than none.

In practice, consistent diversification appears not to be a common strategy for buyers. Using the SIPRI data discussed below, we find that the only countries that fairly consistently bought non-trivial amounts from both East and West bloc suppliers were India since 1960; Finland from 1960 to roughly the end of the Cold War; and to a lesser extent, Peru from the mid-1970s. Similarly, only a few countries have dealt with some frequency with both an East or West bloc supplier and a non-East-or-West supplier: Pakistan with both China and the West since 1965; Iran with China, North Korea, and Russia since the revolution; and Syria with Russia, North Korea since the 1990s, and, most recently, Iran. More generally, in most years countries buy entirely or almost entirely from either East, West, or “Other.” For example, in 87% of country years with an arms deal, the importing state gets at least 80% of the total value from suppliers

from only one of these three groups – and as we discuss next, usually from just one major supplier country.

What common foreign and domestic policy preferences are signaled if two states buy arms from the same supplier, or the same supplier group? In general, since the major powers (largest economies and militaries) are the main arms exporters and because they are also the states with the geographically broadest foreign policies, a regime that gets its arms from one or the other is typically indicating some degree of alignment with that major power’s regime ideology and foreign policy stance. This was certainly the case during the Cold War for states supplied by the US or the USSR. With the end of the Cold War, the heir to the Cold War ideological cleavage has been a dimension defined by proximity to “Washington consensus” economic policies and support for liberal democratic formalities.

But what does it mean, in terms of alignment, if a state gets its heavy weapons mainly from one of the smaller exporters that we group in Other? During the Cold War this may in some cases have indicated deliberate non-alignment with preferences and foreign policy objectives of both the US and the USSR. Since the end of the Cold War (and for many regimes during the Cold War as well), the meaning is less clear. It is less likely, as compared to getting arms from East or West, that being Other-supplied indicates ideological or foreign policy issue proximity with the supplier.

For one thing, the Other exporters are typically smaller countries that do not have expansive, global foreign policies and foreign policy preferences. As a result, both buyer and seller-side moral hazard problems are attenuated compared to arms relationships with a superpower like the US or the USSR. So if a state is principally supplied by an Other exporter, this probably tells us less on average about its alignment on global dimensions of conflict and ideology.

It may, however, tell us something about the buyer’s *local or regional* foreign policy positions and concerns: Other-supplied states may be more revisionist on average about some local or regional issues. As we discuss more below, the US and other Western suppliers have generally been supporters of both international and regional status quo’s. So they may be more disinclined to sell arms to states that have known revisionist preferences, and such states may be more wary

of being dependent on Western suppliers. The expectation would be that Other, and possible East, supplied states would tend to be more revisionist on average and so more dispute prone.

3 Arms trade data

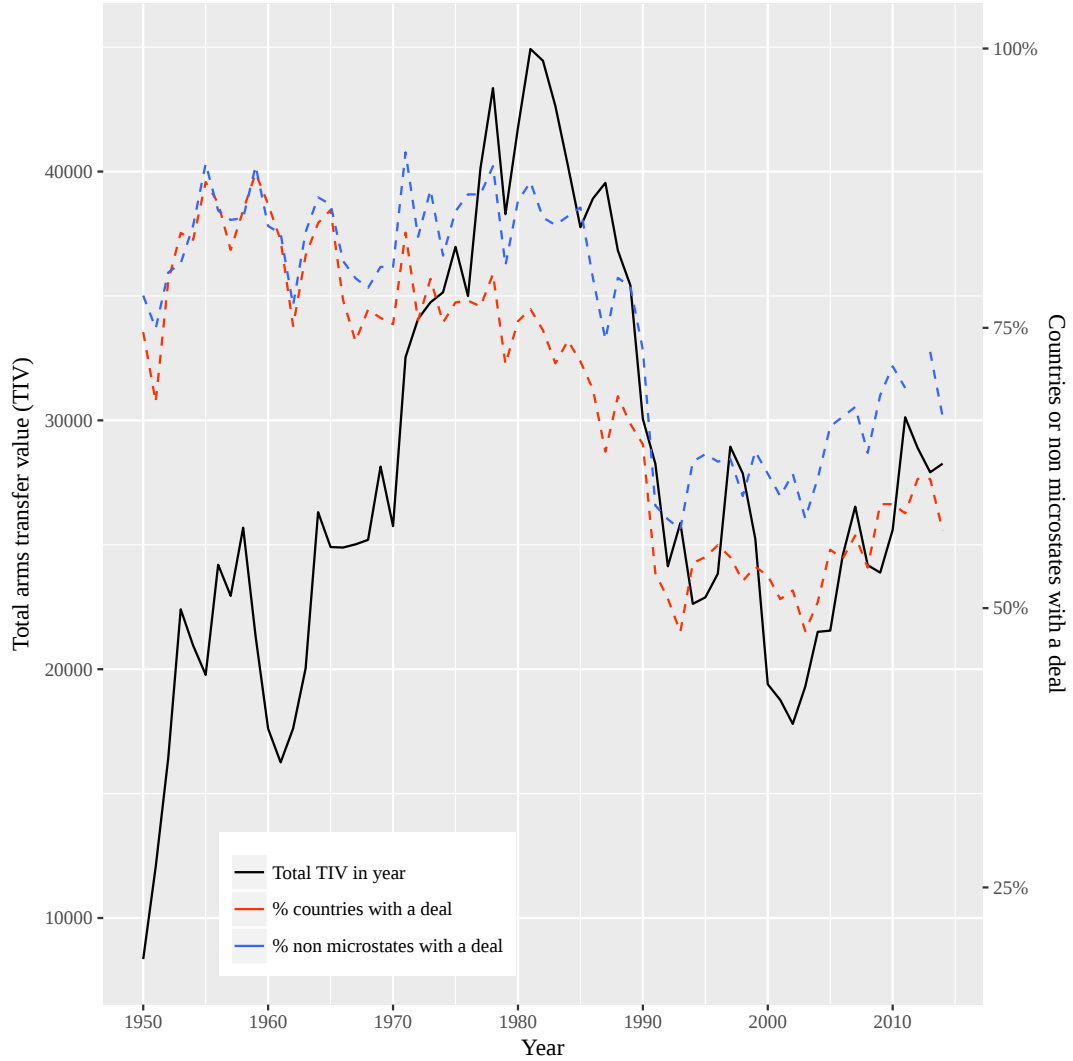
SIPRI’s arms transfer database contains information on all transfers of major conventional weapons since 1950 (SIPRI, 2016). For an arms transfer to enter the SIPRI database it has to (a) consist of “major” weapons, meaning that small arms and light weapons are excluded; (b) be mentioned in a publicly available source, meaning that no secret arms deals are included; and (c) be destined for military use, meaning that most police equipment is excluded.⁵

We would like a measure of the total value of trades for a country in a year. This is difficult even within weapons categories, as weapons of the same type can have different value and capabilities, and similar or indeed identical items are often sold at quite different prices. Moreover, the prices and terms of arms deals are generally not publicly available. As a result, SIPRI developed its own system of “trend-indicator values” (TIV). TIV values are calculated by multiplying the number of items in a transfer with the known production cost of a similar item in a fixed set of core weapons, thus arriving at an estimated value of transfers that is comparable over time and across countries. They should be seen as an estimate of the military resources being transferred, rather than a price paid. TIV flows form the basis of our analysis. Their evolution over time is displayed in Figure 1.⁶

⁵See <http://www.sipri.org/databases/armstransfers/armstransfers/background> for a detailed explanation.

⁶According to SIPRI, TIV values are not estimates of sales prices for arms transfers and have no direct relationship with US dollar values.

Figure 1: Evolution of TIV values over time

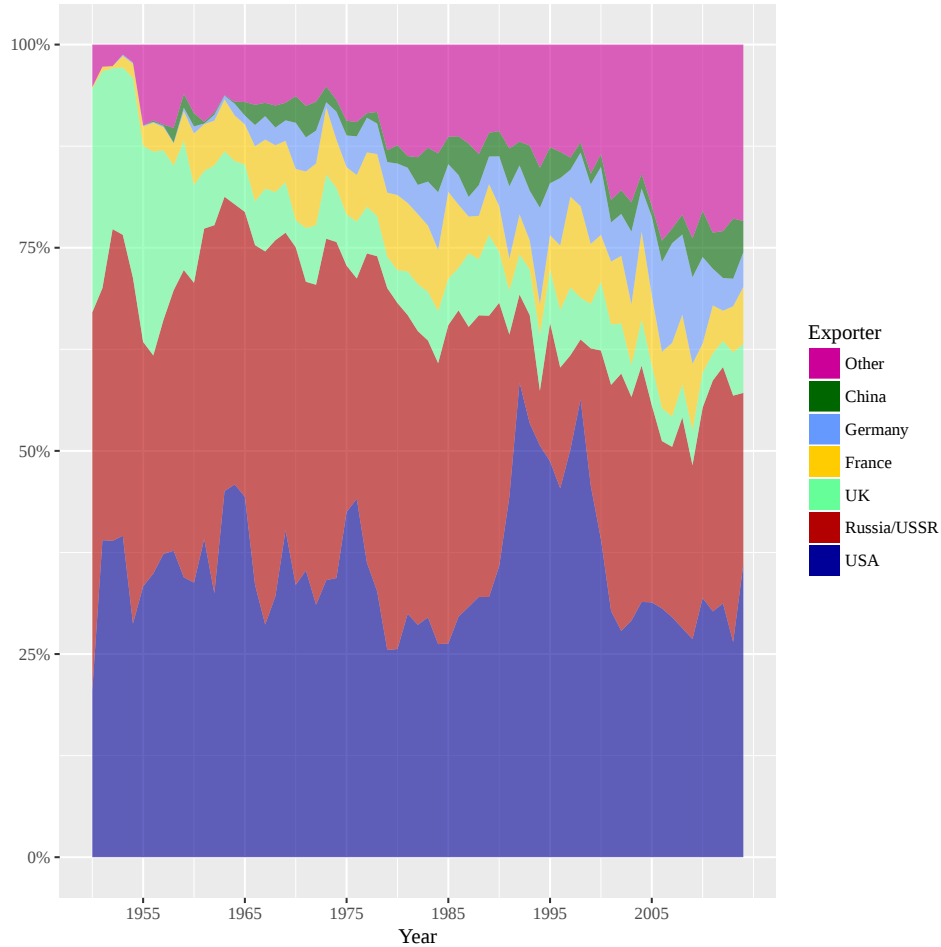


As is clear from the figure, the total volume of arms trades exhibits a strong Cold War trend, steadily increasing from their post-WWII low, peaking in the early eighties, and then falling rapidly up to 2002. More recent years show a marked increase from that local minimum. The dotted lines show that heavy weapons deals are frequent, with countries with populations greater than one million (“non microstates”) signing deals in more than four out of five years during the Cold War and in more than three out of five years on average since 1991.

While most countries contribute to these trade flows by importing arms, only a handful export

them at significant levels. Figure 2 displays the share of arms exports by exporter.

Figure 2: Share of world exports over time



The US and Russia/USSR are clearly the dominant players in the international arms trade. Except for a single year their combined exports at any one time make up more than 50% of the world's arms exports, and when Russian exports plummeted in the early nineties, the US picked up nearly all the slack. The second biggest group are the three largest European NATO countries, the United Kingdom, France, and Germany/West Germany. Together with the US, these three countries supply about 54% of the world's arms in an average year, and adding Russia these "big five" have almost always supplied more than 75% of TIV value each year. The sixth biggest supplier is China, which, despite its large economy, only takes up between 1 and 8% of exports. The "Other" group is on the rise, with Ukraine, Italy, Israel, the Netherlands, Spain,

Canada, Sweden, and Switzerland exporting the most.

4 Examples: Egypt and Iran

In this section we use the examples of Egypt and Iran to illustrate how a country’s major arms supplier can do a better job of tracking its international alignment than other commonly used indicators.

Following standard historical accounts, a brief summary of Egypt’s international alignments since 1945 would highlight three main phases, separated by shorter transitional periods.

Upto the 1952 Free Officers’ coup, King Faruk’s government was widely seen as aligned with, or even a puppet of, the West. Initially, Gamal Abdel Nasser was open to continued relations with the West, and the regime actively sought both economic and military assistance from the US (Alterman, 1998; Brands, 1986). However, by 1955, a combination of factors led him to orient Egyptian foreign policy away from the US and towards the Soviet Union. These included disputes with the British over their presence around the Suez; a contest for leadership among the Arab states in which Nasser staked out a more anti-colonial, anti-Western position popular with the “Arab street”; a perception of growing threat from Israel following several raids, including one on Gaza in February 1955; and his political uses of anti-Israel positions, which increased conflict with Israel and so increased the need for support from a great power not as aligned with “the Zionist entity.”

Nasser’s announcement of a major arms deal with the Soviets in September 1955 “electrified the region” (Barnett, 1998, 116) – it was widely understood at the time as indicating a fundamental shift in Egypt’s international alignment. In May 1956 Egypt recognized the People’s Republic of China, and a month later the US and the World Bank withdrew their funding of the Aswan Dam (Kissinger, 1994, 529). During the Suez Crisis, when the Egyptian Sinai was invaded by British, French, and Israeli forces, Khrushchev threatened to intervene with rockets against the Western side (Keesing’s, 1956, 15217). This, coupled with the newly formulated Eisenhower Doctrine, led Egypt to align even more closely with the East Bloc, an orientation that continued at least till

Nasser’s death in 1970.

Anwar Sadat initially maintained his predecessor’s foreign policies, culminating in the 1973 October War with Israel. He gradually drifted from East to West, however. In 1972 he expelled Soviet advisors from Egypt, and after the October War, began a more accommodating policy towards Israel (Shama, 2013, 153-154). In 1974 diplomatic relations between Egypt and the US were reestablished. In 1977 Sadat visited Jerusalem and a year later signed the Camp David Accords, which led to the Egypt-Israeli peace treaty in 1979. Meanwhile, the Egyptian-Soviet friendship treaty was abrogated in 1976, and in 1981 the Soviet ambassador and six other Soviet diplomats were expelled from Egypt (Farrel, 1981).

US-Egyptian relations continued to be good during Mubarak’s presidency. However, they began a slight decline after the Iraq war and the frequent calls for democratization of Egypt made by the Bush administration (Shama, 2013, 183). Shortly before his fall in early 2011, the Obama administration urged Mubarak to step down and to refrain from using violence against protesters (Mohammed and Spetalnick, 2011). Relations were further strained when the interim military council arrested prominent American NGO officers and charged them with obtaining funds illegally (BBC, 2012). Though the Muslim Brotherhood played a conciliatory role in this matter, the short-lived elected government of Mohamed Morsi generally seemed to be moving towards less strong alignment with the US and western states (at least on the surface, see e.g. Shama (2013, 233-235)), and the post-coup government of al-Sisi has continued policies that suggest leaning away from Mubarak’s close association with the US and other major western countries.⁷

These shifts over time are well reflected in Egypt’s arms purchases, but poorly or not at all by its formal alliances or UN voting patterns. Figure 3 plots Egypt’s arms imports from and UN ideal point similarity with its two largest suppliers over time, the US and Russia/USSR; vertical lines mark the re-establishment of diplomatic relations with the US in 1974 and the 2011 Egyptian Revolution. Egypt imported overwhelmingly from Britain until 1952 (not shown), and then we see the switch to Soviet weapons through and after 1955. France supplanted the USSR as the

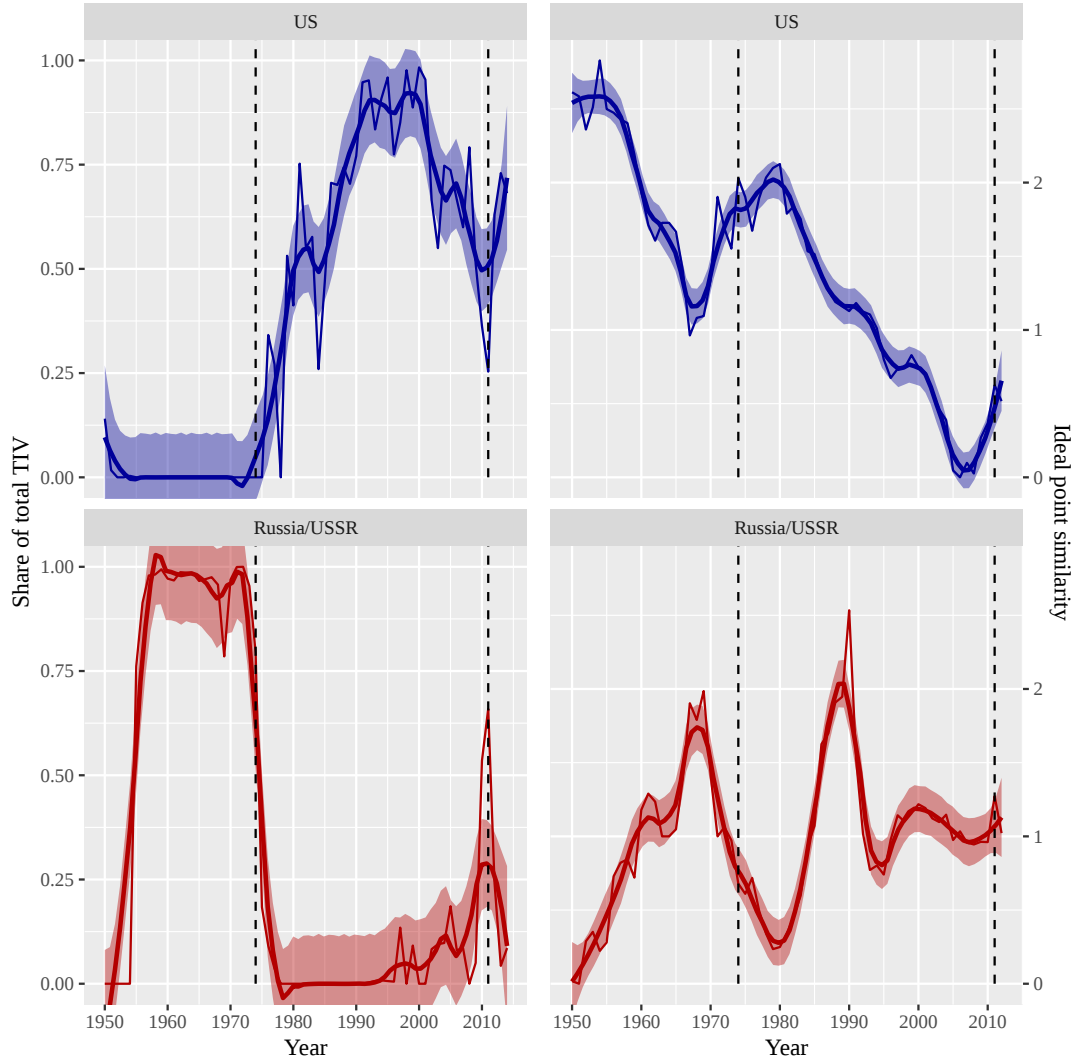
⁷See e.g. David Kirkpatrick, “In Snub to US, Russia and Egypt Move Toward Deal on Air Bases”, *The New York Times*, 30 November 2017.

largest supplier in 1975, and then from 1976 the US was almost always the largest single supplier until 2010 and 2011, when Mubarak and then the generals in the wake of Mubarak's fall turned to Russia. Following the Obama administration's temporary suspension of military aid to Egypt in 2013 after the regime massacred protesters (Labott, 2013), al-Sisi visited Moscow and has since announced several major arms agreements, including a \$3.5 billion deal in late 2014.⁸ The arms discussions have paralleled a range of other foreign policy moves that suggest a shift in alignment away from the US.⁹

⁸The arms deal does not yet appear in the SIPRI data, possibly because it was not finalized by end of 2014.

⁹See e.g. Patrick Markey and Maria Tsvetkova, "Putin, Egypt's Sisi discuss restart of flights, sign nuclear deal", *Reuters*, 11 December 2017.

Figure 3: Egypt's arms imports and UN ideal point similarity



Despite the substantial changes in Egypt's international alignments during this period, it has not at any point been formally allied to the US and has only had an entente – arguably the weakest type of formal alliance – with the USSR from 1971 to 1976 (Gibler, 2009). In these six years, Egypt went from being strongly aligned with the USSR to hardly at all, and yet this is when the entente occurred.¹⁰

¹⁰The ATOP data codes this Treaty of Friendship and Cooperation as a non-aggression pact, which Leeds (2005, 5) is disinclined to count as a military alliance at all. In their analysis of the treaty, Barnett and Levy (1991, 387) note that it was prompted by Soviet worry that Sadat might move *away* from Nasser's close, but not formalized, alignment.

Neither does ideal point similarity based on General Assembly votes map well onto changes in Egypt's alignment, as indicated in the right panel of Figure 3. The overall trend of a long-run decline in correlation with US positions almost completely misses Egypt's western orientation under Sadat and Mubarak. And while the increased correlation with Soviet voting up to about 1967 is consistent with Nasser's stance, the fluctuations after this are difficult to interpret and hard to map to the main developments outlined above. In general, it is clear from Figure 3 that ideal point similarity adjusts much more slowly than arms trades to changes in events, to the extent that it does at all.

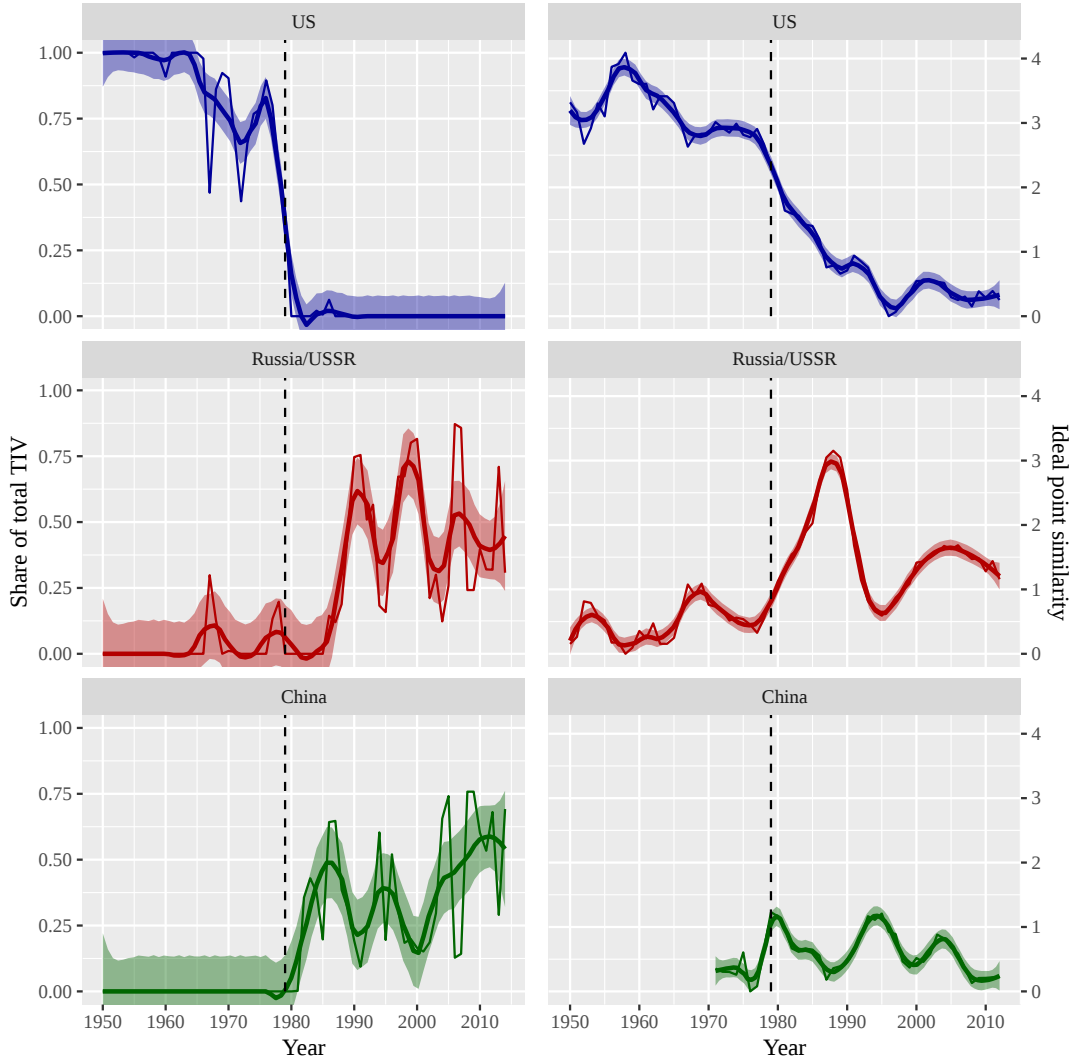
The case of Iran further underscores the advantages of the arms measure. During the entirety of Mohammad Reza Shah's reign from 1941 to the 1979 revolution, Iran maintained a close alignment with the US (Murray, 2009, 1-9). This is clearly reflected in its arms imports (Figure 4), which until the late seventies were almost exclusively from the US. After the revolution, the new regime sought to break off all ties to the US, but also pursued a non-aligned foreign policy, hostile towards the communist world as well as towards the West (Takeyh, 2009, 146-150). This is again reflected in its choice of arms supplier. Since 1979, Iran has not relied on a single, dominant supplier, but has instead oscillated between China and Russia/USSR.

Ideal point similarity based on UN voting tracks some of this narrative, but changes only slowly in response to political changes. Similarity with the US, in particular, exhibits a strong downwards trend throughout the whole period and this barely accelerates with the extremely sharp shift in alignment caused by the Iranian revolution.

Formal alliances do only slightly better, as the US and Iran signed a defense agreement in 1959 that was abrogated in 1979. Russia/USSR had no agreements with Iran before or after 1979, however, and China got a non-aggression pact only in 2002.

Having provided some prima facie evidence for arms imports capturing international alignment, we now construct an operational measure.

Figure 4: Arms exports to Iran



5 An arms-trade-based measure of international alignment

For each country-year we compute the share of total arms imports (measured by TIV) coming from each of three groups, West, East, and Other. In the *narrow* version of our main measure, the groups are based on the “big five” suppliers, with the US, UK, France, and West Germany/Germany assigned to West, the USSR/Russia assigned to East, and all other suppli-

ers assigned to Other.¹¹ We also consider a “broad” version in which any supplier in Western Europe or one of the “British offshoots” is assigned to West, any supplier in Eastern Europe to East, and the rest to Other. In both versions the big five are assumed to be their own principal suppliers. We then code the alignment of a country in a year as the group from which it received the largest TIV share in that year.

While there are several ways that one could use the vector of a country-year’s TIV shares to make an alignment measure, this procedure has a number of advantages. First, TIV values fluctuate idiosyncratically as a state receives more or fewer arms, so year-to-year variation in any more continuous statistic of the vector will largely be random with respect to alignment.¹² Using the group with maximum TIV share eliminates much of this spurious (vis-a-vis alignment) variation. Second, as noted above there are few countries that consistently get significant amounts from different supplier groups. So even if the alignment of a country that is consistently 60-40 West-East is meaningfully different from one that is consistently 100-0 West-East, cases like the former are extremely rare. In about 80% of country years with a deal, at least 90% of TIV value is coming from a single group. And in the remaining 20%, a more even (e.g., 60-40) distribution across supplier groups tends to be occasional (not persistent).

The level of arms imports – particularly for smaller countries with smaller budgets – can be volatile, and many countries do not make substantial purchases every year. About 34% of our 9,802 country years have no SIPRI-recorded arms deal (27% for country years with population greater than one million). To deal with this and to avoid having single years with insignificant import levels drive changes in major supplier, we disregard all import values in a country year that are below 10% of a country’s median maximum purchase from a single supplier over the last 20 years. If no values remain for a year, we assume that the country has not switched main supplier since the last purchase above this threshold. The second procedure reduces the number of country years with no maximum TIV group estimate to 739, or 7.8% of our frame.¹³

¹¹Recall that these five big suppliers dominate the “market,” accounting for at least 70% of all TIV export value in all years, and on average 86%.

¹²For example, if a country gets most of its arms from the Soviet Union in all years, but more in some than others, it is not likely that the high import years are any different in terms of the country’s political alignment.

¹³Results reported below change very little if we limit the number of years carried forward, change the number of years used to calculate the threshold value, or use a range of nearby threshold percentages (see Appendix).

Table 1 gives the distribution of alignments so coded, for both the narrow and broad versions and for the Cold War and after. In 58% (narrow) or 66% (broad) of country years the largest arms supplier was from West during the Cold War. This dropped to 35% (narrow) or 50% (broad) after 1991. In both periods, about one in five (more or less) country years are coded as aligned with East. Other suppliers see a large increase after 1991, with either the narrow or broad measures.¹⁴ The Other suppliers are a diverse group – not concentrated on one or two states – and since 1991 the concentration of TIV from Other suppliers has actually decreased relative to the Cold War period. The top Other suppliers post-Cold War have been China (16% of total TIV from Other), Netherlands (10%), Italy (9.4%), Ukraine (8.7%), and Sweden (7.4%).

Table 1: Country-year alignment codings

supplier	Narrow measure		Broad measure	
	Cold War	post Cold War	Cold War	post Cold War
West	0.58	0.35	0.66	0.5
	3159	1396	3582	2018
East	0.2	0.17	0.21	0.22
	1104	666	1122	866
Other	0.15	0.42	0.07	0.21
	814	1666	373	844
missing	0.07	0.07	0.07	0.07
	381	272	381	272

Note: Cells have column shares and N .

Table 2 shows bivariate correlations of dummies for West, East, and Other alignment with several alternative alignment measures. The correlations are all in the expected directions, which is as it should be if we believe these things have validity as the basis for measures of alignment. However the correlations are not especially large, indicating that countries' major arms suppliers do not track closely with their East-West alliance status, regime type, degree of agreement with the US or Russia/USSR in UN General Assembly voting, trade dependency with the US or Russia/USSR, or overlap in IGO memberships with the US or Russia/USSR. It is also interesting that states armed primarily by Other suppliers tend to vote more often with Russia and against the US in the UN, even while they are not much allied to Russia or the US and they tend to be more

¹⁴Although this is the result of a gradual increase over the whole period, as indicated in Figure 2.

democratic by regime type than are states armed by East.¹⁵

Table 2: Correlations with other alignment measures

	West	East	Other
Democracy	0.20	-0.23	-0.02
Marxist-Leninist	-0.29	0.52	-0.13
US UN agree %	0.41	-0.25	-0.23
Rus/USSR UN agree %	-0.38	0.27	0.18
US ally	0.36	-0.29	-0.14
Rus/USSR ally	-0.26	0.43	-0.10
US trade depend.	0.10	-0.14	0.02
Rus/USSR trade depend.	-0.18	0.19	0.03
US joint IGO's	0.22	-0.22	-0.06
Rus/USSR joint IGO's	-0.02	0.00	0.02

A good measure of alignment should pick up in changes within countries over time – for instance, Egypt shifting towards the West after 1974 – in addition to getting a country’s average alignment. A measure that varies little over time obviously cannot do this. Table 3 presents three different ways of comparing the within-country variation of the arms-based alignment measure against alternatives. The first column shows the share of variation in dummies for West, East, and Other after removing variation associated with fixed effects for country and year. Notice that within-country variation of the arms supplier-based measures is much greater than for all the other measures except general trade dependence. The second column shows residual variance after removing regional and year “effects”. Note that a remarkable 52 to 67% of the variation in the UN voting measures and also US formal allies is “explained” just by knowing the year and the country’s region. For the arms-trade measures the corresponding amounts are about 20% or less.¹⁶

¹⁵Democracy here is an indicator for whether the Polity score in the country year was six or greater. Alliances are from COW. The UN variables are percentage of votes that agree with the vote of the US or Russia in the General Assembly that year (using Bailey, Strezhnev and Voeten, 2017). Marxist-Leninist is an indicator for whether the country’s constitution declared it a socialist state (which was a good indicator for avowed Marxist-Leninism), coded by Fearon using mainly Wikipedia’s list. The trade dependency variables are total trade between country i and the US or Russia/USSR divided by i ’s aggregate GDP (Oneal and Russett, 1997), and the IGO variables simply count the number of IGO memberships shared between country i and the US or Russia/USSR (Russett, Oneal and Davis, 1998).

¹⁶In the appendix we show this table for the Cold War and post Cold War periods separately. Not surprisingly a great deal of within-country variation for USSR/Russia alliance, and for democracy, is due to the collapse of communism around 1991. By contrast, within-country variation for the arms trade measure does not fall nearly as much.

The third column in Table 3 shows the frequency of year-to-year changes for the categorical measures. Principal arms supplier group changes within countries in 13% of years, whereas formal alliances almost never change, and democracy begins or ends by this measure in less than 2% of years.

Table 3: Variation in alignment measures
NOT “explained” by country, region, year

	Var country, year	Var region, year	Pr($y_t \neq y_{t-1}$)
West	0.466	0.781	0.130
East	0.394	0.848	
Other	0.572	0.821	
US alliance	0.068	0.378	0.003
Rus/USSR alliance	0.234	0.623	0.003
Democracy	0.337	0.653	0.019
US UN agree %	0.178	0.328	
Rus/USSR UN agree %	0.303	0.480	
US trade depend.	0.366	0.771	
Rus/USSR trade depend.	0.427	0.736	
US joint IGO’s	0.062	0.544	
Rus/USSR joint IGO’s	0.069	0.383	

Notes: “Var” columns are $1 - R^2$ from the regression of row variable on dummies for countries (col. 1) or regions (col. 2) and years. Narrow group definition.

6 Alignments during the Cold War and after

We now turn to a closer comparison of the arms measure and the two most popular existing alignment proxies, formal alliances and UN voting behaviour. To depict cross-national and over-time variation, Figures 5 and 6 display maps that indicate alignment using colors and color intensities that correspond to the average value of a given measure over the years in a period (Cold War and post-Cold War). For example, for the arms trade measure we create a 0-to-1 variable,

$$color_i^{arms} = \frac{West_i}{West_i + East_i},$$

where $West_i$ and $East_i$ are the number of years country i ’s major arms supplier was West or East, respectively, over the whole period (if both are zero $color \equiv .5$). Thus pure blue ($color = 1$)

is a country supplied only by West and pure red ($color = 0$) is a country supplied only by East (Soviet Union/Russia). The percentage of Other years is indicated by the color intensity, with fading towards white indicating a higher share from Other suppliers. Numerically,

$$intensity_i^{arms} = 1 - \frac{Other_i}{\text{total } i \text{ years in period}},$$

where $Other_i$ is the number of years in the period that i 's major supplier was Other. For instance, in the post-Cold War period, Tanzania and Paraguay got all of their arms from Other suppliers (mainly China for Tanzania, and Taiwan and Israel for Paraguay); so they are both completely white in Figure 6.

For alliances, we similarly use $color_i^{ally} = West_i / (West_i + East_i)$, where $West_i$ and $East_i$ are now the number of years that i had any kind of Correlates-of-War-coded alliance with the US or USSR/Russia in the period. Intensity is given by the percentage of years that the country (in the period) was allied with either the US or Russia. Thus the white states are those with no alliance to either the US or USSR/Russia.

The UN voting data does not lend itself to construction of a parallel set of two-dimensional measures. This is because it is essentially one-dimensional, mostly reflecting the East-West cleavage during the Cold War, and a similar liberal-non liberal divide after 1991 (Voeten, 2000, Forthcoming).¹⁷ Instead, we rely on Bailey, Strezhnev and Voeten's (2017) estimates of annual state ideal points in a single dimension, which they produce using an item-response model applied to the UN roll call vote data. In an attempt to maximize comparability to our arms-based measure, we set $color_i^{un}$ to be the share of years in which the country's ideal point was on the US side of the mean of ideal points in that year.¹⁸ For all three measures, countries with all missing values are colored grey.

¹⁷Consider the two country-year variables that are the annual correlations of state i 's UN votes with those of the US and the USSR during the Cold War. The first principal component of these two variables captures 97% of the variation, and the remaining 3% (the orthogonal second dimension) is hard or impossible to interpret.

¹⁸We compute the mean by year after having set the small number of ideal points outside of the Russia-US interval to whichever's ideal point is closer. An alternative approach is to set $color_i^{un}$ to the average of a state's ideal points in a period (normalized to the $[0, 1]$ interval with Russia and the US at the extremes). But then almost all countries look approximately the same shade of magenta, as the ideal points cluster at about .4 during the Cold War and at .1 since 1991. The procedure we use produces a distribution of colors that is bimodal on the extremes, as is the case for the arms measure.

Inspection of the graphs shows some correlation across the measures, but it is clear that the arms-trade-based measure picks up far more variation within regions than either the alliance or UN-based measures. In both periods these scarcely vary at all within Africa and the Middle East, and in the post-Cold War period Latin America and Asia also exhibit little variation – particularly on the UN measure.¹⁹

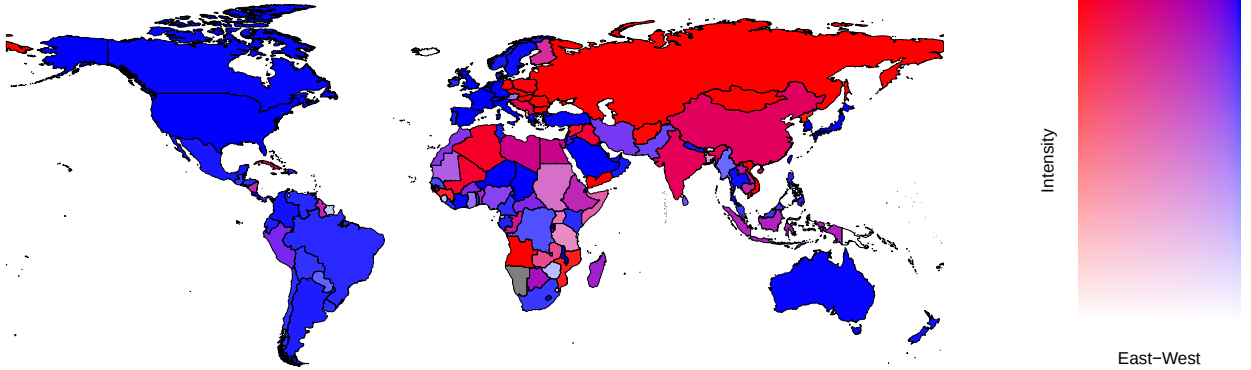
Face validity also appears strong, especially in contrast to the UN measure post-Cold War, and alliances in both periods. To give some examples, the arms-based measure codes Sweden to West, as opposed to neutral (ally); Finland appears mixed during the Cold War, versus East (ally) or West (UN votes); Cuba is very red, versus west-leaning or neutral (ally, due to the OAS); Nicaragua is red post-Cold War, rather than blue (ally); Saudi Arabia and the Gulf states are coded as West-aligned rather than neutral (ally) or East-aligned (UN votes); Angola, Mozambique, Algeria, Iraq, Syria, and Vietnam are coded to East or East-neutral throughout the periods, which is not the case for any of these if one goes by alliances. And notice that the arms-based measure correctly identifies quite a few countries that switched or had mixed alignments during the Cold War, such as China, Iran, Pakistan, India, Madagascar, Ethiopia, Egypt, Laos, and Indonesia. After the Cold War, the measure picks up a shift by Pakistan away from the West towards Other (here, China); moves away from the US and towards East or Other by Venezuela, Bolivia, and Ecuador; as well as the general move (and some subtle variations) in the orientations of former East bloc states in Eastern Europe and the former Soviet Union.

Substantively, the arms-measure maps reveal a broad, average move in the direction of more states getting arms from Other suppliers, especially in Latin America and Africa; this is seen in the more faded colors in these regions post-Cold War. By contrast, the alliance measure picks up little pre/post-1991 change except in Eastern Europe, while post-Cold War the UN voting measure displays virtually no meaningful variation at all, outside of Europe.

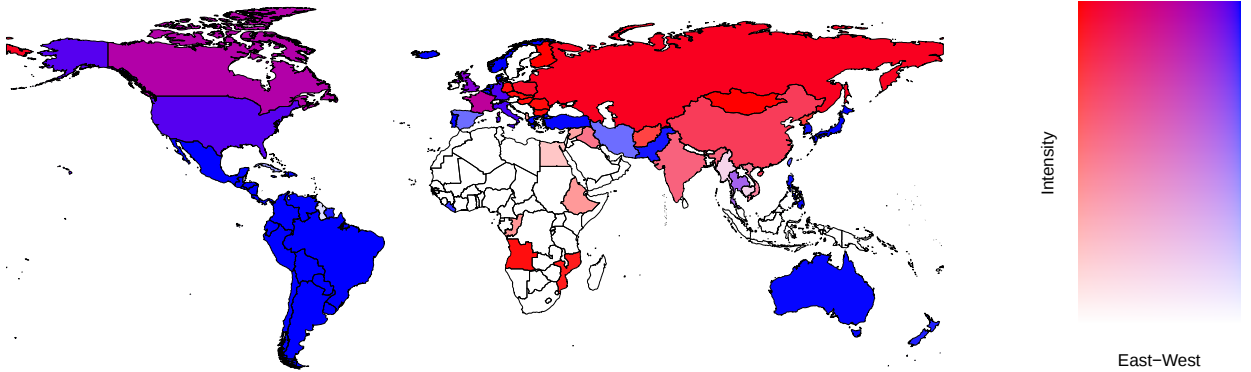
¹⁹For the UN measure one gets the same result if we set $color_i^{un}$ to be i 's average ideal point in the period; then, these regions appears as a fairly uniform shade of reddish purple.

Figure 5

arms measure (narrow), Cold War



ally measure (narrow), Cold War



un measure (narrow), Cold War

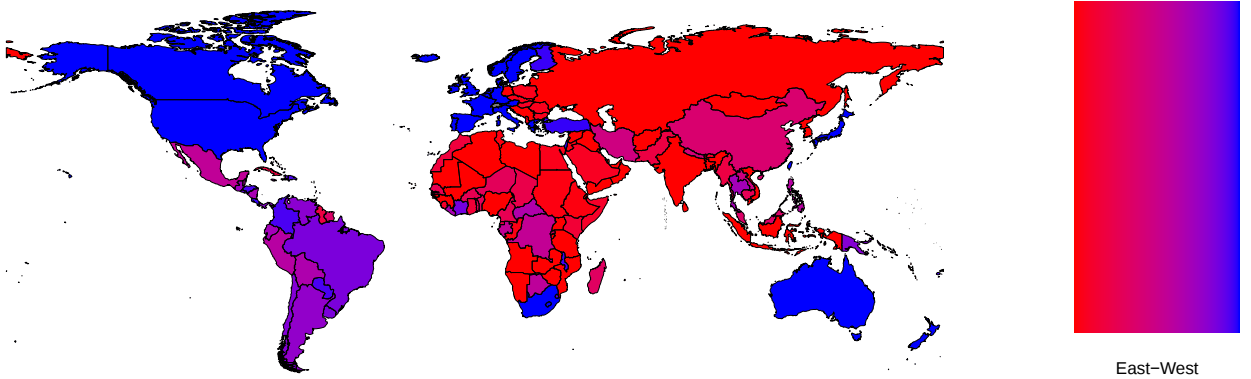
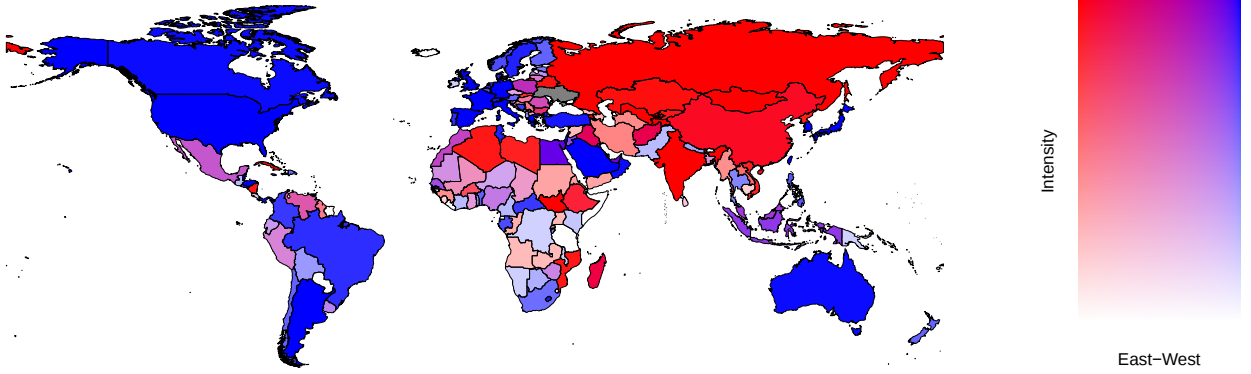
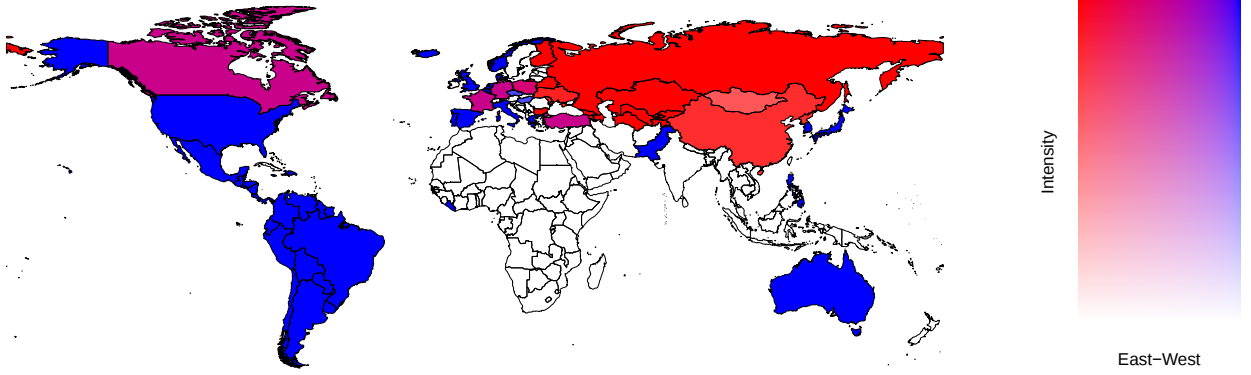


Figure 6

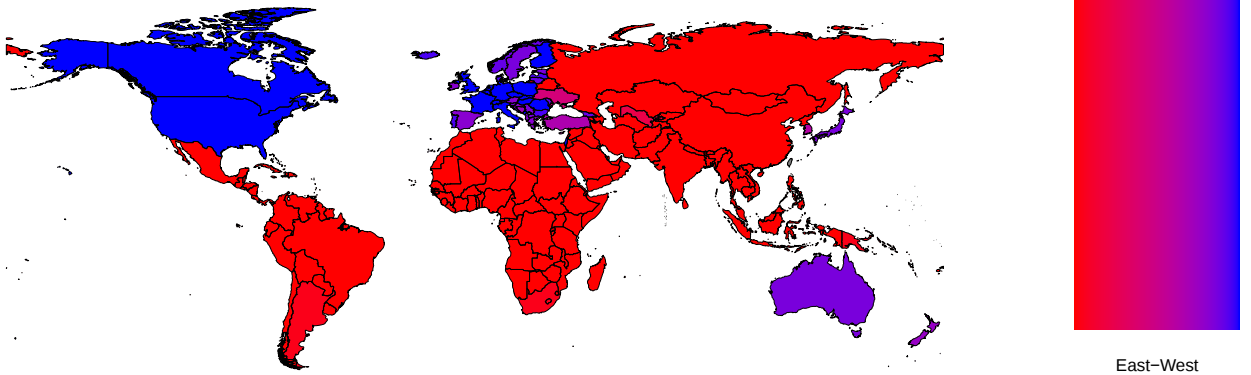
arms measure (narrow), post Cold War



ally measure (narrow), post Cold War



un measure (narrow), post Cold War



7 International conflict and international political alignments

In this section we examine how militarized interstate dispute (MID) rates vary with alignment status, as measured by a state’s principal arms supplier group. We show that when dyads transition from having the same alignment to having different alignments, their dispute rates generally increase. These increases are much more pronounced for some supplier combinations than for others.

Before presenting the analysis, we briefly extend the theoretical discussion of Section 2 to the case of dyadic conflict propensities. We argued that due to two-sided moral hazard, arms sellers and buyers would tend to prefer to transact with states with similar foreign and domestic policy preferences. If so, then on average two West-supplied states would be expected to have more similar preferences than a pair of states where one is mainly supplied by West and the other by East. Likewise, two East-supplied states would be expected to have more similar preferences than a mixed West-East pair.

We might have similar expectations for two Other-supplied states, though perhaps less definite since it is not clear that Other measures alignment in the same way as West and East. Buying arms from an Other supplier might indicate a commitment to a non-aligned foreign policy during the Cold War. But it might also indicate that the regime prefers not to depend on the US or USSR/Russia, perhaps because it has local revisionist foreign policy preferences that neither big power would be sympathetic to. Or perhaps some of these states are just more price sensitive and can get better deals from Other suppliers. Perhaps they can get better deals from Other suppliers in part *because* the big suppliers have concerns about what they might use the weapons for.

We construct a full, undirected dyadic dataset of all the country-years between 1950 and 2012 and add data on Militarized Interstates Disputes (MIDs) to it. This results in 762,118 dyad-years, 3,090 of which have one or more MIDs ongoing.²⁰

²⁰In the analyses below, we exclude microstates from the sample and only look at dyads where both members had a population of over 500,000 people in 2006. Results are very similar when theses dyads are included.

For the main part of the analysis, our outcome variable, *Onset*, is a dummy that is one in dyad-years where the two countries enter into a MID with each other and zero otherwise. We follow the literature in not counting *joiners*, meaning that for MIDs with multiple participants, we count only onsets in dyad-years where both countries are marked as “originators” by COW (Bennett and Stam, 2000). 1,755 country years (.25%) have at least one MID onset in this sense.²¹

To predict this outcome, we either use a single dummy marking whether a pair of states share supplier group, or six dummies marking the six possible combinations of main arms supplier groups: West-West, West-East, West-Other, East-East, East-Other, and Other-Other. We estimate the following equation,

$$Onset_{ij,t+1} = \alpha_0 + \beta \mathbf{ArmsSuppliers}_{ijt} + \gamma \mathbf{X}_{ijt} + a_{ij} + u_t + v_{ijt}, \quad (1)$$

where i and j index country, t indexes year, α_0 is a constant, ***ArmsSuppliers*** is either the dummy for any supplier difference or a vector of the arms supplier combination dummies with the first, West-West, left out as the reference category, β is either a single coefficient or a vector of coefficients, $\mathbf{X}$ is a vector of controls, and γ is another vector of coefficients. The three remaining terms represent unobserved determinants of *Onset*. a_{ij} is the time-invariant set of dyad fixed effects; u_t is the unit-invariant set of year-fixed effects; and v_{ijt} contains unobserved determinants that vary across both dyad and time. The controls in $\mathbf{X}$ are standard variables in the MID literature: The log of the highest aggregate GDP in the dyad-year, the log of the lowest aggregate GDP in the dyad-year, a dummy marking whether the countries share a defensive alliance, and a dummy marking joint democracy (both states with Polity scores greater than five). As the indices in Equation 1 show, we use the lead of *Onset*, so that all predictor variables are from the previous year.²²

²¹Results are very similar, if slightly stronger, when joiners are counted. They are also slightly stronger if we use the number of MID onsets in a dyad year as the dependent variable (rather than zero versus 1 for at least one onset). See Appendix.

²²In the Appendix we also show results when we include dummies for mixed democratic-autocratic dyads along with joint democracy (joint autocracy as the reference category). Results are similar, revealing in addition that most of the joint democracy effect is from the comparison to periods of democracy-autocracy, which have tended to be more conflictual. Concerning lagged versus contemporaneous covariates, results are markedly stronger if we use the arms supplier measures in the same period as *Onset*.

We report the results for the linear probability model (LPM), clustering the standard errors by dyad.²³ Similar results obtained with conditional logit are shown in the Appendix. We also break the sample into contiguous and non-contiguous dyads. Because MID onset rates for contiguous dyads are almost two orders of magnitude greater, it does not make sense to assume that the marginal impact of any covariate is the same for contiguous and non-contiguous dyads. Finally, we focus on models that include both dyad and year fixed effects, so that we are asking whether temporal change in a covariate predicts (on average) a change in militarized dispute rates within a pair of countries.

7.1 The arms supplier measure and interstate disputes

Our main empirical question is whether within-dyad changes between common and different principal arms suppliers predict changes in militarized dispute rates. To reiterate, while it is possible that a state’s arms source has a causal effect on its dispute propensity with specific other states, we see this as a proxy, or indirect measure, of a state’s domestic and foreign policy preferences. These might change within a country for a variety of reasons – change of regime, leader, or more subtle changes in a leadership’s domestic or foreign policy preferences and strategies. We expect such factors to have causal effects on dispute propensities, and to be measured to some extent by the shifts in arms suppliers, by the arguments given in Section 2.

Table 4 presents empirical results for the nonspecific supplier differences – that is, dyad years with different supplier groups versus dyad years with common suppliers. This is the test implied by our theoretical argument as we had it prior to looking at the data (see section 2). Table 5 presents the main results when we disaggregate types of supplier combinations. This is a natural extension, but the explanations suggested below for the empirical patterns observed are post hoc.

²³For a recent treatment of LPM’s with fixed effects see Beck (2015). Current work in political methodology points out that statistical inference from dyadic data is likely still overconfident if standard errors do not account for *cross*- as well as *within*-dyad dependency (the former usually arising from the same country being part of multiple dyads at the same time, see e.g. Aronow, Samii and Assenova (2015) and Erikson, Pinto and Rader (2014). To check whether cross-dyad dependency biases our inference, we implement the randomization correction proposed by Erikson, Pinto and Rader (2014) and find only negligible differences to the results presented below.

Table 4: Arms supplier similarity and militarized interstate disputes, 1950-2010

	<i>Dependent variable:</i>					
	100*Onset _{t+1}					
	contiguous			not contiguous		
Diff. alignment	1.12*		1.18*	0.07***		0.07***
	(0.48)		(0.48)	(0.01)		(0.02)
log(GDP) _{hi}		−1.34	−1.59		−0.03	−0.04
		(1.03)	(1.09)		(0.02)	(0.02)
log(GDP) _{lo}		−1.02	−0.94		−0.04*	−0.05*
		(0.94)	(1.00)		(0.02)	(0.02)
Democ-Democ		−1.63	−1.75		−0.09***	−0.09***
		(0.88)	(0.92)		(0.02)	(0.02)
Ally		0.35	0.68		0.07	0.11
		(0.80)	(0.83)		(0.08)	(0.08)
100*Pr(Onset) Same align.	4.22		4.19	0.06		0.06
Dyad & Year FEs	Y	Y	Y	Y	Y	Y
Observations	19,885	20,426	19,493	473,816	493,327	461,286

Note:

*p<0.05; **p<0.01; ***p<0.001
se's clustered by dyad

Table 4 shows that when a pair of states go from being supplied by the same group to being supplied by different groups, their dispute rates tend to increase. For the contiguous sample, the estimated increase is a little more than one percentage point, or about 27% of the baseline rate of about 4.2%. In the non-contiguous sample, average dispute rates more than double with a shift from common to different suppliers (though of course the absolute rates are much lower).

Including controls for joint democracy, aggregate GDP, and alliances results in very little change in the estimate on supplier difference. Nor do the estimates for these factors change much when one introduces the supplier difference dummy. This reflects that the within-dyad correlations between these covariates and the arms supplier measure are quite small.

Disaggregating the supplier combinations reveals interesting variation that is masked when supplier differences are treated as one. We find that all other dyad-year types have higher average dispute rates than West-West, with quite large differences – nearly double in the contiguous sample and more than double in the non-contiguous sample – seen for East-West, East-Other, and

Table 5: Disaggregating arms supplier combinations

<i>Dependent variable:</i>						
	100*Onset _{t+1}					
	contiguous			not contiguous		
East-West	3.14*** (0.90)		3.18*** (0.89)	0.12*** (0.03)		0.12*** (0.03)
East-East	1.96 (1.38)		1.49 (1.41)	0.09* (0.04)		0.06 (0.04)
East-Other	3.05** (1.09)		2.65* (1.06)	0.13*** (0.03)		0.11*** (0.03)
Other-Other	3.09** (0.95)		2.66** (0.93)	0.10*** (0.02)		0.08*** (0.02)
West-Other	1.20 (0.62)		1.09 (0.62)	0.09*** (0.02)		0.09*** (0.02)
log(GDP) _{hi}		-1.34 (1.03)	-1.44 (1.09)		-0.03 (0.02)	-0.04 (0.02)
log(GDP) _{lo}		-1.02 (0.94)	-0.77 (1.00)		-0.04* (0.02)	-0.04 (0.02)
Democ-Democ		-1.63 (0.88)	-1.54 (0.93)		-0.09*** (0.02)	-0.09*** (0.02)
Ally		0.35 (0.80)	0.53 (0.83)		0.07 (0.08)	0.11 (0.08)
100*Pr(Onset) WW	3.49		3.49	0.07		0.07
Dyad & Year FEs	Y	Y	Y	Y	Y	Y
Observations	19,885	20,426	19,493	473,816	493,327	461,286

*Note:**p<0.05; **p<0.01; ***p<0.001
se's clustered by dyad

Other-Other. To repeat, this is *not* due to some unmeasured, time-invariant feature of country pairs that tended to be West-West; the estimates come from comparisons within dyads that had changes in supplier groups. Again, including the controls have negligible impact on this pattern.

Under the hypothesis that common suppliers indicate more similar domestic and foreign policy preferences, the expectation is that transitions from West-West, East-East, and Other-Other to unmatched supplier pairs should associate with higher dispute rates. To get a clearer picture of this, Table 6 uses the first and fourth models in Table 5 to display the dispute rates for dyad types ij , $i, j \in \{\text{West, East, Other}\}$, and associated p values for the null hypothesis that $rate_{ij} = rate_{ii}$ (the first index is the row, the second the column).²⁴ We see that West-West dyad years are significantly more peaceful than West-East and West-Other. East-East dyad years are on average more peaceful than East-West and East-Other, though the (two-sided) p values on the null are both about .37.²⁵ The pattern is least in evidence in the case of Other-Other, where we see that in contiguous dyads Other-West tends to be less conflictual than Other-Other.

Table 6: Dispute rates by dyad type, after dyad and year fixed effects.
 p values (two-sided) against $H_0 : ii = ij$.

	Contiguous dyads				Non-contiguous dyads		
	W	E	O		W	E	O
W	3.49	6.63	4.69	W	0.067	0.190	0.160
p value		0.00	0.05	p value		0.000	0.000
E	6.63	5.44	6.54	E	0.190	0.153	0.194
p value	0.37		0.37	p value	0.213		0.208
O	4.69	6.54	6.57	O	0.160	0.194	0.167
p value	0.02	0.97		p value	0.622	0.102	

A second interesting pattern is that West-West dyad years are the most pacific compared to *all* other combinations, including East-East and Other-Other (with statistical significance for all except the contrast with contiguous East-East and contiguous West-Other dyad years; see Table 5). This is clearly not a function of West-West tending to coincide with periods of joint democracy.

²⁴Note that dyad and year fixed effects have been removed, so these are averages over within-dyad comparisons.

²⁵The hypothesis is strongly directional, so from a classical perspective one might argue that it is appropriate to divide these by two. Our own preference would be to think in terms of Bayesian posteriors (or credibility intervals) in any event.

A possible explanation (our conjecture) is that for the entire post-1945 period, West suppliers and West-supplied states have tended to be supporters of local and regional status quo's, while East and Other-supplied regimes more often have had revisionist foreign policy objectives. It might also be that East- and Other-supplied regimes are on average less stable and more threatened domestically, leading to more diversionary interstate conflicts or internal-conflict-related frictions with neighbors (Gleditsch, Salehyan and Schultz, 2008; Schultz, 2010).

7.2 Other measures of alignment and interstate disputes

In Table 7 we include common alternative measures of alignment in models 3 and 6 of Tables 4 and 5. The alternatives include UN ideal point distance between states i and j in year t ; the number of IGO memberships shared between i and j in t (Russett, Oneal and Davis, 1998); and the lower of the country pair's two bilateral trade dependencies (total trade/GDP) (Oneal and Russett, 1997).²⁶ For each measure we report both the estimated coefficient with only the alternative measure (plus dyad and year fixed effects and standard controls), and then coefficients when either the unspecific supplier difference dummy or the supplier combinations are included alongside the alternative measure. We find that neither shared IGO memberships nor lower trade dependency correlate consistently with onset. UN ideal point difference is significant in the non-contiguous sample, but its inclusion does not substantially alter the estimates on the arms supplier measures.

²⁶In the appendix we show results with alternative operationalizations of trade and IGO memberships found in the liberal peace literature.

Table 7: Including alternative alignment measures

	<i>Dependent variable:</i>					
	100*Onset _{t+1}					
	contiguous		not contiguous			
<i>Panel A: W/o arms supplier measures</i>						
Depend _{lo}	51.42 (31.42)			−5.18 (12.05)		
Shared IGO's		−0.10 (0.07)			−0.01 (0.003)	
UN ideal diff.			0.67 (0.70)			0.06* (0.03)
Observations	19,979	18,495	18,639	457,422	441,052	446,347
<i>Panel B: Any arms supplier diff.</i>						
Diff. alignment	1.06* (0.46)	1.26* (0.53)	1.09* (0.49)	0.07*** (0.02)	0.07*** (0.02)	0.05*** (0.01)
Depend _{lo}	57.50 (31.62)			−4.24 (12.18)		
Shared IGO's		−0.08 (0.07)			−0.01 (0.004)	
UN ideal diff.			0.56 (0.74)			0.06* (0.03)
100*Pr(Onset) Same align.	4.06	4.26	3.88	0.06	0.06	0.06
Observations	19,161	17,696	17,844	432,586	413,142	419,056
<i>Panel C: All combinations</i>						
Depend _{lo}	62.72* (31.47)			−3.47 (12.18)		
Shared IGO's		−0.07 (0.07)			−0.01 (0.004)	
UN ideal diff.			0.36 (0.76)			0.06* (0.03)
East-West	2.97*** (0.87)	3.17*** (0.94)	2.94** (1.00)	0.12*** (0.03)	0.11*** (0.03)	0.08*** (0.02)
East-East	2.33* (1.16)	0.91 (1.62)	2.34 (1.26)	0.07 (0.04)	0.05 (0.04)	0.05 (0.04)
East-Other	2.79** (1.06)	2.29* (1.12)	2.67* (1.13)	0.11*** (0.03)	0.11*** (0.03)	0.09*** (0.02)
Other-Other	2.68** (0.93)	2.95** (1.13)	2.51** (0.91)	0.09*** (0.03)	0.08** (0.03)	0.09*** (0.02)
West-Other	1.18 (0.62)	1.10 (0.66)	1.28* (0.63)	0.09*** (0.02)	0.09*** (0.02)	0.08*** (0.02)
100*Pr(Onset) WW	3.32	3.48	3.34	0.07	0.07	0.07
Dyad & Year FEs	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
Observations	19,161	17,696	17,844	432,586	413,142	419,056

Note:

*p<0.05; **p<0.01; ***p<0.001
se's clustered on dyad

7.3 Robustness and variations

The Appendix presents parallel results for an array of alternative variable and model specifications, including the broad version of the arms supplier measure; “wars” and “uses of force” rather than any MID; pooled time-series cross-sections; conditional logits; Cold War versus post Cold War; and alternative operationalizations of the arms supplier, trade, and IGO measures. None challenge the overall findings. We summarize results for all but the minor operationalization variations here.

Using the broad version of the arms measure generally decreases estimated coefficients on the dummies slightly, but preserves their signs. When we restrict attention to war-level MIDs (COW hostility level = 5), the number of positive outcomes falls from 1232 to 19 for the contiguous dyads and from 495 to just 4 for the non-contiguous dyads. Remarkably, both the unspecific supplier difference dummy and the East-West dummy retain positive signs and significance. Letting the dependent variable score a 1 for wars and also uses of force (COW hostility level ≥ 4) brings the number of conflicts back up to 423 and 101, respectively, and yields results similar to those obtained using all MIDs. Pooling all dyads (that is, excluding dyad fixed effects) results in large increases in the estimates for the arms supplier dummies, and preservation of the overall pattern.²⁷ Moving back to within-dyad models, the conditional logit models show give nearly identical results to the LPM’s, even though they discard all dyads without variation on the outcome variable.

To check how results vary across the Cold War divide, we interact the arms supplier measures with a post-1991 dummy. For the coefficient on the dummy marking unspecific differences in supplier group, the within-dyad association goes to zero after the end of the Cold War. This is not the case for the supplier combinations, however, where we find that all combinations except West-Other are more dispute-prone than West-West after the end of the Cold War, albeit with typically smaller differences that are more marginally significant. The result changes for unspecific supplier differences mainly because, after 1991, East-East dyads became much more

²⁷For the contiguous sample, this also recovers some of the usual findings from the IR literature regarding aggregate GDP, joint democracy, and alliances.

conflict prone, whereas during the Cold War their rates were similar to West-West. Looking at East-East MIDs, it is clear that a significant part of this change stems from disputes between new states created by the break ups of the communist federations of Yugoslavia and the Soviet Union (e.g., Serbia and Croatia (3); Serbia and Hungary (2); Tajikistan, Kyrgyzstan, and Uzbekistan (9)).

Since the post-Cold War time series are short (about 20 years) relative to dispute frequencies, there is not much within-dyad dispute variation with which to estimate these interactions. So we also checked pooled models, finding the same pattern but greater statistical significance for the differences between West-West and the other combinations post Cold War (except West-Other). In the pooled model, unspecific supplier differences go back to being significantly related to conflict after 1991.

8 Conclusion

“Science is measurement” was a late 19th and early 20th century dictum expressed on occasion by physicists. As a general matter the dictum is overstated. But nonetheless, and almost regardless of how one feels about the term “science” in “social science,” there is a good case that the field of International Relations pays too little attention to measurement of key concepts.

Our results suggest that a country’s major arms supplier provides a better basis for measuring its international political alignment than does its formal alliances, regime type, UN voting record, international trade patterns, or IGO memberships. Since 1945, governments have changed their major arms suppliers more frequently than most of these other indicators, and as we have shown, the changes plausibly correlate with significant policy changes and with rates of participation in militarized interstate disputes (MIDs).

Regarding MIDs, the canonical empirical approach in the quantitative IR literature is to report the results of cross-dyad comparisons and not to consider whether within-dyad changes in time-varying variables of interest predict subsequent changes in dispute rates.²⁸ If one believes in, or

²⁸The issue was raised by Green, Kim and Yoon (2001), in a critique that nonetheless did not lead the quantitative IR conflict literature to routinely show results with dyad and year fixed effects. For significant exceptions, see

wants to update about, causal propositions concerning these variables, then at least naively one should expect to see the predicted relationship obtain for within-dyad changes. For instance, if you think that joint democracy causes a lower likelihood of violent conflict, then you should expect that dyads that transition into joint democracy should see their dispute rates fall on average.

A striking feature of the arms supplier-based measures of alignment is that they robustly predict changes in dispute rates within dyads over time. Contiguous country pairs that transition from (to) West-West supplier status see their militarized dispute rates roughly double (halve), on average. This suggests that the measure is picking up significant changes in a regime's foreign policy preferences or goals, or foreign policy events related to changes in domestic policy preferences. The results hold independent of whether one controls for degree of democracy, suggesting that they tap changes in foreign policy preferences that are not simply a function of regime type (as measured by Polity, in any event).

We have argued that these patterns make sense once we recognize that the market for heavy weapons is not a "textbook" market in which the only important considerations are price and quality. A set of moral hazard problems associated with arms can make state leaders care about the political preferences and agendas of buyers and sellers, with one result being that transaction patterns tend to correlate with international alignments.

Schultz (2001) and Oneal and Russett (2001).

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