Toward a Causal Explanation of Illicit Arms Supply

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Abstract

Previous research on the illicit arms trade, drawing on both qualitative and quantitative information, has revealed the prominent role played by certain actors and locales, especially those within the territories of the former Soviet bloc. Much of this research is descriptive, endeavoring to identify transferred weapons and the routes they take to conflict zones and lawless areas; the dealers, brokers, financiers, and transporters that facilitate these arms flows; and the consequences of these illicit flows for military conflict and criminal violence. But some of these studies have also suggested several reasons for the centrality of former Soviet-bloc countries in dark arms supply networks—for example, the abundance of Cold War weapons surpluses, corruption, and the political-economic legacies of socialist rule. The aim of this paper is to describe the illicit arms trade drawing on insights from social network theory, to further illuminate the contours of this arms trade using data I have collected for the 1998-2005 period, and to estimate some simple linear models to explain the prominence of countries as the origins and destinations of illegal weapons flows. My findings indicate that internal conflict, corruption, and arms embargoes correlate with the centrality of a state locale in the illicit arms network, but also that these factors are not sufficient to account for the importance of the former Soviet bloc.

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TOWARD A CAUSAL EXPLANATION OF ILLICIT ARMS SUPPLY

Despite the downward trend in the total dollar value of the arms trade since the end of the cold war, there is no such trend in the international transfer of small arms and light weapons (SALW). Comprehensive and reliable longitudinal data on the volume of the SALW trade are now becoming available and developments over the past two decades point to an increase in the flow of this type of weaponry. The proliferation of low-intensity warfare, conflicts in which SALW figure prominently, is a source of increased demand, while stocks of military surplus created by the dissolution of the Warsaw Pact and the collapse of the Soviet Union vastly increased supply. Light weaponry continues to be produced—by an expanding number of manufacturers, many of them driven to export in order to achieve economies of scale—and some of this is added to the second-hand equipment circulating in today's war zones.

Of this trade in SALW, the value of which has been estimated at roughly $4 billion per year, probably 10-20 percent occurs in the black and gray markets.[1] Information about the illicit

[1] On the SALW trade, see Michael Bourne, *Arming Conflict: The Proliferation of Small Arms* (New York: Palgrave Macmillan, 2007); Rachel Stohl, Matt Schroeder, and Dan Smith, *The Small Arms Trade* (Oxford: Oneworld, 2007); Indra de Soysa, Thomas Jackson, and Christin Ormhaug, "Does Globalization Profit the Small Arms Bazaar?," *International Interactions* 35 (2009), pp. 86-105; Mark Bromley, Lawrence Dermody, Hugh Griffiths, Paul Holtom, and Michael Jenks, "Transfers of Small Arms and Light Weapons to Fragile States: Strengthening Oversight and Control," SIPRI Insights on Peace and Security, no. 2013/1 (2013), available at books.sipri.org/product_info?c_product_id=453; Pablo Dreyfus, Nicholas Marsh, Matt Schroeder, Jasna Lazarevic, "Sifting the Sources Authorized Small Arms Transfers," in *Small Arms Survey 2009: Shadows of War. Cambridge* (Cambridge: Cambridge University Press, 2009). On the illicit trade in SALW, see Matt Schroeder and Benjamin King, "Surveying the Battlefield: Illicit Arms in Afghanistan, Iraq, and Somalia," in *Small Arms Survey 2012: Moving Targets* (Cambridge: Cambridge University Press, 2012); Stefano DellaVigna and Eliana La Ferrara, "Detecting Illegal Arms Trade," *American Economic Journal: Economic Policy* 2 (2010), pp. 26-57; Asif Efrat, "Toward Internationally Regulated Goods: Controlling the Trade in Small Arms and Light Weapons," *International Organization* 64 (2010), pp. 97-131. The estimate of the illicit portion of the overall SALW trade is reported in Nicholas Marsh, "Two Sides of the Same Coin? The Legal and Illegal Trade in Small Arms," *Brown Journal of World Affairs* 9 (2002), pp. 217-28. Although one might want to distinguish between illicit and illegal arms, I do not do so in this paper. But see, for example, Anne-Kathrin Glatz and Lora Lumpe, "Probing the Grey Area: Irresponsible Small Arms Transfers," in *Small Arms Survey 2007: Guns and the City* (Cambridge: Cambridge

arms trade abounds, particularly in the form of investigative journalism and reports on the field activities of intergovernmental and nongovernmental organizations involved in small arms control and disarmament. Although much of this information has been gathered, collated, and examined by researchers in the academic and activist communities, systematic data collection and analysis has yet to proceed very far. Data collection itself is a formidable task. Aside from the obvious difficulty deriving from the efforts of black marketeers to keep their activities out of view, the variety of actors, locales, equipment, and forms of transaction involved in the illicit arms trade presents a major challenge for any attempt to catalog them in a systematic way. Nevertheless, some progress is being made and it is not too early to begin mapping the structure of black market transfers of SALW.

I do three things in this paper. First, I discuss illicit arms transfers in the context of illegal markets and social networks. Scholars who have examined social networks as distinctive forms of organization offer insights that I find useful for understanding the illicit arms trade, the role of social capital in the functioning of these trafficking networks, and their resiliency despite the efforts of militaries and law enforcement to curtail this lethal trade. Second, I make use of some descriptive procedures, from among a set of quantitative and visual tools known as social network analysis (SNA), to illuminate some of the structural features of the illicit arms trade. For this purpose, I employ data from the 1998-2005 period, drawn from an evolving database I have been assembling on illicit arms transfers worldwide. Finally, I estimate some simple linear models to explain some of the variation in the prominence of state locales as either origins or

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University Press, 2007); Itty Abraham and Willem van Schendel, "The Making of Illicitness," in Willem van Schendel and Itty Abraham, eds., *Illicit Flow and Criminal Things: States, Borders, and the Other Side of Globalization* (Bloomington: Indiana University Press, 2005).

destination of illegal weapons flows. My findings indicate that internal conflict, corruption, and arms embargoes correlate with the centrality of a state locale in the illicit arms network, but also that these factors are not sufficient to account for the importance of the former Soviet bloc.

Supply of Illicit Arms

Virtually all illicit arms transfers are SALW, and in this category of armament researchers generally include pistols, rifles, assault rifles, carbines, machine guns, hand-held and mounted grenade launchers, portable anti-tank and anti-aircraft guns, portable missile launchers, and small caliber mortars. In any given geographic space, the stock of illicitly acquired weaponry may come from three basic sources: government stocks, local manufacture, and imports.[2]

Weapons may leak from government stocks because they are either stolen or sold. In the context of domestic unrest, armories and ammunition depots are often the target of raids by rebel fighters.[3] Government arms shipments are susceptible to interception in transit as well. Of course, the vulnerability of government stocks to theft is a function of the regime's capacity to guard weapons facilities and its legitimacy in the eyes of the guardians. Not all theft is the consequence of overwhelming force deployed by raiding parties. Military or security personnel may offer various levels of assistance, even by simply looking the other way, when their allegiances or sympathies begin to lean away from the sitting government. Soldiers, police, or

[2] This discussion follows Stefan Markowski, Stephanie Koorley, Peter Hall, and Jurgen Brauer, "Multi-Channel Supply Chains for Illicit Small Arms," *Defence and Peace Economics* 20 (2009), pp. 171-91.

[3] Thomas Jackson, "From Under Their Noses: Rebel Groups' Arms Acquisition and the Importance of Leakages from State Stockpiles," *International Studies Perspectives* 11 (2010), pp. 131-47; Nicholas Marsh, "Conflict Specific Capital: The Role of Weapons Acquisition in Civil War," *International Studies Perspectives* 8 (2007), pp. 54-72; Owen Greene and Ariel Macaspac Penetrante, "Arms, Private Militias and Fragile State Dynamics," in Owen Greene and Nicholas Marsh, eds., *Small Arms, Crime, and Conflict: Global Governance and the Threat of Armed Violence* (London: Routledge, 2011), pp. 138-60.

other officials may be similarly motivated to sell the arms at their disposal, but typically these illicit sales are driven by personal gain, or just necessity borne of dire economic circumstances. Lastly, because taking up arms against the government is illegal, weapons captured from government forces during the course of battle are also gotten illegally.

Most illicit weaponry was legally produced; it is only later that laws are broken by virtue of the manner in which possession has been transferred from one party to another. However, in areas of persistent conflict, illicit local production and refurbishment may emerge to help meet the high demand for small arms and explosives. Much of this takes place in private workshops or residences and is best characterized as craft production. As governments almost never sanction this sort of local manufacture, these arms add to a region's illicit stocks as soon as they leave the gunsmith's workbench.[4]

Illegally obtained weapons are often shipped across state borders. But not all illicit arms transfers start as leakages from the government arsenals. Governments themselves may covertly supply anti-government forces in other states. These transfers typically violate laws operating in the destination country, sometimes the laws of the supplying state, and, arguably, international law as well.[5] Clearer violations of international law are arms transfers undertaken, authorized, or

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[4] Eric G. Berman and Jonah Leff, "Light Weapons: Products, Producers, and Proliferation," *Small Arms Survey 2008: Risk and Resilience* (Cambridge: Cambridge University Press, 2008), pp. 7-41; Judit Kiss, "Craft Production of Small Arms." Background paper (Geneva: Small Arms Survey).

[5] The Iran-Contra affair involved the Reagan administration's covert and illegal sale of arms to Iran, which was subject to a U.S. arms embargo because the U.S. State Department had designated the country a state sponsor of terrorism. Relevant international law may include the Friendly Relations Declaration (UN General Assembly Resolution 2625, October 1970), which asserts that "no State shall organize, assist, foment, finance, incite or tolerate subversive, terrorist or armed activities directed towards the violent overthrow of the regime of another State, or interfere in civil strife in another State." The Arms Trade Treaty, adopted by the UN General Assembly in 2013, but not yet in force, sets the bar higher, prohibiting arms transfers if the supplying government has reason to believe that "the arms or items would be used in the commission of genocide, crimes against humanity, grave breaches of the Geneva Conventions of 1949, attacks directed against civilian objects or civilians protected as such, or other war crimes." Neither instrument singles out illicit arms transfers, though. The Illicit Firearms Protocol to the Convention against Transnational Organized Crime, adopted by the UN General Assembly in 2001, does not itself prohibit illicit

otherwise facilitated by governments that nevertheless contravene United Nations arms embargoes; they violate the UN Charter, which obligates states to accept and carry out the decisions of the Security Council. These transfers, along with sanctions-busting arms shipments by nonstate actors, whether motivated by political or economic considerations, add to the stock of illicit weaponry within a geographic locale.[6]

For an illicit international arms transfer to be completed, three types of actions must occur. First, the arms must become available for transfer through any of the sources mentioned above, namely government arsenals (whether by theft, leakage, or diversion) or illicit production. Second, they must be transported from one state locale to another. And third, they must be collected by a recipient (whether intended or unintended). An actual sequence of events may be, and typically is, complicated in various ways—for example, by the involvement of multiple brokers, transporters, and transshipment points—but these are the most basic components. The failure of any one of these components will thwart the transfer, and each is the target of those wanting to address the problem of illicit arms transfers from the supply side.

Against this seeming vulnerability is the fact that there are multiple sources and parallel transfer channels available to illicit arms traffickers, which makes supply-side approaches to arms control extraordinarily difficult. Illegal weapons may move through two or more state jurisdictions, as well as possibly ungoverned areas like the high seas or the territories of failed

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arms transfers, but directs state parties to adopt legislation criminalizing illicit arms manufacturing and trafficking. A fairly comprehensive (though now somewhat dated) treatment of international legal issues related to the small arms trade is Zeray Yihdego, *The Arms Trade and International Law* (Oxford: Hart Publishing, 2007).

[6] For an analysis of the relative importance of political over economic interests in exporters' violation of arms embargoes, see Matthew Moore, "Arming the Embargoed: A Supply-Side Understanding of Arms Embargo Violations," *Journal of Conflict Resolution* 45 (2010), pp. 593-615. See also Jennifer L. Erickson, "Stopping the Legal Flow of Weapons: Compliance with Arms Embargoes, 1981-2004," *Journal of Peace Research* 50 (2013), pp. 159-174.

and failing states. As Markowski et al. conclude, "The odds are clearly in favor of illicit arms users and suppliers who, given the scope for channel redundancy, can easily tie the sources of supplies to their illicit destination. [T]o be effective, governments would have to cut/disable a large number of active and dormant channels. To achieve this would require both superior intelligence and massive resources."[7]

Illicit Arms Trafficking

Arms sales, in general, are economic transactions, but these transactions are typically governed by more than market forces. State-sanctioned arms transfers, especially those involving major weapons systems (aircraft, armored vehicles, missile systems, etc.), are often elements in an ongoing political-military relationship between governments. They are undertaken for the purpose of enhancing the military capability of the receiving state, but they may also afford the supplier some degree of political influence over the recipient—although frequently less than expected—and signal to third parties that the supplier has some interest in the military security of the recipient. On average, the "political content" of small arms sales is probably lower than major weapons transfers. They do not entail the transfer of high levels of military capability and need not represent a significant measure of commitment by the supplier to the recipient's security. Other things equal, we can suppose therefore that small arms transfers more closely approximate economic transactions in a free market.

It is difficult to know whether illicit arms transfers, which are almost always small arms

[7] Markowski et al., "Multi-Channel Supply Chains," p. 188. On the control of illicit arms transfers, see Owen Greene, "International Responses to Illicit Arms Trafficking," *Crime, Law, and Social Change* 33 (2000), pp. 151-90; United Nations Institute for Disarmament Research, *Developing a Mechanism to Prevent Illicit Brokering in Small Arms and Light Weapons: Scope and Implications* (Geneva: United Nations, 2006).

transfers, have this same characteristic. Many of the actors involved in illicit arms supply are simply out to make a profit and have little interest in the security or political purposes of arms recipients. However, some suppliers (and brokers, transporters, and financiers) are very much committed to political and military aims of those on the receiving end of illicit arms shipments, something we would expect, for example, when diasporas are involved. In any case, whether driven on the supply side by economic or political considerations, or both, illicit transfers would seem to further require a degree of trust and shared commitment to an underground system of exchange. It is, of course, common to refer to the trade in illicit weapons as a black market, but the transnational flow of these goods is affected by a wider range of political, ideological, and/or ethnonational factors than other illicit flows, like illegal narcotics, stolen or counterfeit goods, or contraband minerals.

Illegal Markets

Some markets are illegal because the traded good or service itself is illegal (heroin, slave labor), while other markets are illegal because there are prohibitions on the commercial exchange of an otherwise legal good (like sex, in most jurisdictions). While both types of exchange are wholly illegal, other illicit markets coexist with legal counterparts. The exchange of stolen or counterfeit goods is illegal because legal goods have, in effect, become transformed into illegal ones by means of theft or forgery and may not be sold or bought. Other goods are exchanged illegally because the exchange itself has not conformed to the process stipulated by law—for example, absent the required licenses or tax payments. Exchanges in the illicit arms market involve one or both these latter types of illegality. Weapons are illegal because they are stolen or are otherwise

ill-gotten (corruption, battlefield recovery) and are therefore unlawful to possess, or they are illegal because their transfer to others subverts the law (unlicensed export, embargo violation).[8]

Illicit markets, for arms or anything else, form when supply and demand are sufficient to sustain profitable exchange among a collection of actors despite the risks. As in legal markets, exchange will occur when the cost of participating in the illegal market are offset by the net gains from the exchange. But the transaction costs associated with illegal market exchange are invariably higher than in legal markets. There is a premium on information about availability, price, quality, etc., when goods must be traded out of sight because their exchange is prohibited by law. Likewise, the costs of bargaining and sustaining agreements are higher because they are extralegal and therefore risky; the parties to the exchange cannot turn to state authorities for purposes of enforcing property rights and contract law. Add to this the risk of penalty for participating in prohibited exchange and (for some) the accompanying moral costs. Yet for many goods and services, in many places, illegal markets thrive.

The classic treatment of transaction costs is by Coase, who maintained that "the operation of a market costs something and that, by forming an organization and allowing some authority (the 'entrepreneur') to direct the resources, certain marketing costs are saved."[9] Transactions costs deriving from uncertainty—for example, about continued access to specialized inputs into

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[8] This discussion is based on the typology presented in Jens Beckert and Frank Wehinger, "In the Shadow: Illegal Markets and Economic Sociology," *Socio-Economic Review* 11 (2013), pp. 5-30. See also Massimo Nardo, "Economic Crime and Illegal Markets Integration: A Platform for Analysis," *Journal of Financial Crime* 18 (2011), pp. 47–62; Edgar L. Feige, *The Underground Economies* (Cambridge: Cambridge University Press, 1989); Pino Arlacchi, "Some Observations on Illegal Markets," in Vincenzo Ruggiero, Nigel South, and Ian Taylor, eds., *The New European Criminology: Crime and Social Order in Europe* (London: Routledge, 1998), pp. 203-15; Chris Paul and Al Wilhite, "Illegal Markets and the Social Costs of Rent-Seeking," *Public Choice* 79 (1994), pp. 105-15.

[9] R. H. Coase, "The Nature of the Firm," *Economica* 4 (1937), p. 392. See also Coase, "The Problem of Social Costs," *Journal of Law and Economics* 3 (1960), pp. 1-44; Oliver E. Williamson, "The Economics of Organization: The Transaction Cost Approach," *American Journal of Sociology* 87 (1981), pp. 548-77; Williamson, *Mechanisms of Governance* (Oxford: Oxford University Press, 1996).

the production process—can be mitigated by entering into contracts, as long as property rights are sufficiently well-defined and enforceable. But the continual negotiation and renegotiation of contracts is also costly. Such transaction costs, at least some of them, can be eliminated if the parties enter into an exchange relationship governed according to the bylaws of a hierarchical organization, like a vertically integrated firm. The mechanisms of governance available to firms overcome certain market inefficiencies, making production and exchange more profitable.

Although it is certainly the case that firms and governments—both hierarchical forms of organization—are sometimes counted among those participating in illegal market activities, this is most often attributable to rogue individuals or entities within the organizations. Such organizations are not very well suited to achieve the efficiencies necessary to offset the additional transaction costs associated with exchange in illicit markets. This is not necessarily because they are hierarchical, although that may be true in many instances. Rather, it is because these organizations come under the scrutiny of law, which by definition is anathema to the functioning of illegal markets.

Social Networks and the Arms Trade

A market is a social entity that governs transactions between producers and consumers by means of a price mechanism, and economists typically locate pure markets at one end of a range of possible arrangements for the exchange of goods and services. This is the unorganized, anarchic end. No authority is exercised in a pure market; economic production and distribution is governed by prices, which result from individual decisions manifesting in the aggregate as supply and demand. At the hierarchical end are organized social entities like firms. Within a

firm, production and exchange are governed by an entrepreneur (à la Coase), whether an individual or a collective, who directs the allocation of resources within the organization.

Patterns of exchange governed by more than market forces but by less than authoritative direction have been of considerable interest to sociologists. Granovetter, for instance, has criticized the neoclassical economic approach to organization as offering a utilitarian and "undersocialized" conception of human action in which little allowance is made for the impact of social relations on exchange (except as a drag on the efficient allocation of resources). At the same time, early sociological correctives tended to propose "oversocialized" conceptions of behavior whereby individuals simply, and somewhat robotically, internalize societal norms, also leaving little room for the impact of ongoing social relations. For Granovetter and others, economic behavior is governed not only by institutional arrangements designed to discourage malfeasance and reduce transaction costs, or by a "generalized morality" instilled through the socialization process, but also by trust. Economic behavior is embedded in ongoing social interaction and more emphasis needs to be placed on "the role of concrete personal relations and structures (or 'networks') of such relations in generating trust and discouraging malfeasance."[10]

Much of the sociological research that has been done on interpersonal relations in economic life focuses on the creation and maintenance of networks as forms of social organization. Where price serves as the mechanism of governance in markets and formal authority serves that function within a vertically integrated firm, personal relationships, typically characterized by trust and a norm of reciprocity, facilitate the flow of resources within social

[10] Mark Granovetter, "Economic Action and Social Structure: The Problem of Embeddedness," *American Journal of Sociology* 91 (1985), p. 490. See also Dennis Wrong, "The Oversocialized Conception of Man in Modern Sociology," *American Sociological Review* 26 (1961), pp. 183-93.

networks.[11] Powell maintains that some forms of exchange are inherently more social than others. They depend not so much on formal authority, but on shared interests and ongoing relationships. In networks, "the entangling of obligation and reputation reaches a point that the actions of the parties are interdependent." The pattern of interaction "looks more like a marriage than a one-night stand, but there is no marriage license, no common household, no pooling of assets."[12] Whereas market transactions are often undertaken to maximize returns in the short term, networks sustain sequential exchange and contribute to an overall pattern of enduring interaction. When the exchange of goods or services requires trust or a sense of obligation, networks function well, especially when composed of homogenous groups of actors. The opportunism and guile contributing to high transaction costs in the impersonal market setting is less common among those sharing professional, ethnic, or ideological backgrounds, and thus formal hierarchical organizations less likely to emerge.

Social networks are the organizational forms most conducive to the generation and distribution of social capital, which I will define here as resources residing in the social relations of multiple actors that enable the production of either private or collective goods.[13] Indeed, social

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[11] Grahame F. Thompson, *Between Hierarchies and Markets: The Logic and Limits of Network Forms of Organization* (Oxford: Oxford University Press, 2003); Joel M. Podolny and Karen L. Page, "Network Forms of Organization," *Annual Review of Sociology* 24 (1998), pp. 57-76; P. R. Beije and J. Groenewegen, "A Network Analysis of Markets," *Journal of Economic Issues* 26 (1992), pp. 87-114; Jeffrey L. Bradach and Robert G. Eccles, "Price, Authority, and Trust: From Ideal Types to Plural Forms," *Annual Review of Sociology* 15 (1989), pp. 97-118.

[12] Walter W. Powell, "Neither Market nor Hierarchy: Network Forms of Organization," *Research in Organizational Behavior* 12 (1990), p. 301.

[13] The concept of social capital is the subject of a large and growing social scientific literature. See, for example, James S. Coleman, "Social Capital in the Creation of Human Capital," *American Journal of Sociology* 94 (1988, supplement), pp. S95-S120; Pierre Bourdieu, "The Forms of Capital," in John Richardson, ed., *Handbook of Theory and Research for the Sociology of Education* (Westport, Conn.: Greenwood, 1986); Alejandro Portes, "Social Capital: Its Origins and Applications in Modern Sociology, "*Annual Review of Sociology* 24 (1998), pp. 1-24; Robert Putnam, *Bowling Alone: The Collapse and Revival of American Community* (New York: Simon and Schuster, 2000); Michael Woolcock, "The Place of Social Capital in Understanding Social and Economic Outcomes," *Canadian Journal of Policy Research* 2 (2001), pp. 11-17.

networks would seem to be most important to those engaged in activities that must remain underground and are beyond the reach of legal contracts and other regulatory mechanisms that attach to open market exchange. Family ties, personal friendships, shared ethnicity and religious belief—these give rise to interpersonal loyalties and the trust that reduce transaction costs when the rule of law is unavailable. This sort of social capital is obviously not absent from commerce in open markets, but it becomes rather more essential to the movement of illicit goods and services.[14] If nothing else, suppliers, traffickers, and consumers must instill confidence amongst themselves that they share a commitment to keeping the joint enterprise hidden from scrutiny by the agencies of government. About the illicit arms trade, Naylor says that "discretion is a proverb, not only with respect to one's own business but with respect to everyone else's as well. By an unwritten code, gunrunners, however anxious to cut each other's commercial throats, rarely rat out each other."[15]

Illicit Trafficking Networks

Social network theory is proving useful in the analysis of "dark networks"—adversarial networks, like terrorists organizations or insurgencies, and criminal networks engaged in various forms of illicit trafficking and proliferation. Law enforcement and national security policymakers, in particular, have been interested in understanding the features of these dark

[14] Edward Kleemans and Henk G. van de Bunt, "The Social Embeddedness of Organized Crime," *Transnational Organized Crime* 5(1999), pp. 19-36; Klaus von Lampe and Per Ole Johansen, "Organized Crime and Trust: On the Conceptualization and Empirical Relevance of Trust in the Context of Criminal Networks," *Global Crime* 6 (2004), pp. 159-84. For a skeptical view, see Karim Murji, "Hierarchies, Markets and Networks: Ethnicity/Race and Drug Distribution." *Journal of Drug Issues* 37 (2007), pp. 781-804.

[15] R. T. Naylor, *Wages of Crime: Black Markets, Illegal Finance, and the Underworld Economy*, revised edition (Ithaca, N.Y.: Cornell University Press, 2004), p. 129.

networks that allow them to adapt to a changing environment, including efforts by police and military forces to defeat their activities and dismantle their organizations. Scholarship in sociology, economics, criminology, and political science is contributing to this understanding and providing a set of analytic tools to describe social networks, both their resiliencies and vulnerabilities.[16]

Dark networks typically face a trade-off between efficiency and security. As an organization, the network allows members to overcome barriers to collective action—the production and distribution of weapons, drugs, subversion, terror, etc.—thereby generating private and/or collective gains for participants. But these networks operate in risky environments and participants must be attentive to their exposure to external threats. Internally, trust and mutual commitment to a profitable covert enterprise may be enough to maintain the concealment necessary for network security. And when not, the threat of violence may suffice. A trade-off between efficiency and security exists because active networks are more likely to become exposed and fall victim to the disruptive efforts of military and law enforcement authorities.

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[16] See, for example, Jörg Raab and H. Brinton Milward, "Dark Networks as Problems." *Journal of Public Administration Research and Theory* 13 (2003), pp. 413-39; H. Brinton Milward and Jörg Raab, "Dark Networks as Organizational Problems: Elements of a Theory," *International Public Management Journal* 9 (2006), pp. 333-60; René M. Bakker, Jörg Raab, and H. Brinton Milward, "Preliminary Theory of Dark Network Resilience," *Journal of Policy Analysis and Management* 31 (2012), pp. 33-62; Peter Klerks, "The Network Paradigm Applied to Criminal Organisations: Theoretical Nitpicking or a Relevant Doctrine for Investigators? Recent Development in the Netherlands." *Connection*s 24 (2001), pp. 53-65; Marc Sageman, *Understanding Terror Networks* (Philadelphia: University of Pennsylvania Press, 2004), chap. 5; Arie Perliger and Ami Pedahzur, "Social Network Analysis in the Study of Terrorism and Political Violence," *PS: Political Science and Politics* 44 (2011), pp.45-50; Stuart Koschade, "A Social Network Analysis of Jemaah Islamiyah: The Applications to Counterterrorism and Intelligence," *Studies in Conflict and Terrorism* 29 (2006), pp. 559-75; Walter Enders and Xuejuan Su, "Rational Terrorists and Optimal Network Structure," *Journal of Conflict Resolution* 51 (2007), pp. 33-57; Alexander H. Montgomery, "Proliferation Networks in Theory and Practice," in James A. Russell and James J. Wirtz, eds., *Globalization and WMD Proliferation: Terrorism, Transnational Networks, and International Security* (London: Routledge, 2008); August Hämmerli, Regula Gattiker, and Reto Wayermann, "Conflict and Cooperation in an Actors' Network of Chechnya Based Events Data," *Journal of Conflict Resolution* 50 (2006), pp. 159-75; *The U.S. Army-Marine Corps Counterinsurgency Field Manual* (Chicago: University of Chicago Press, 2007), Appendix B: "Social Network Analysis and Other Analytic Tools."

Although it is often assumed that dark networks prioritize security over efficiency, Morselli et al. suggest that this is the case only for networks with particular types of objectives:

> When the objective involves a monetary outcome, action in the criminal enterprise context is more limited in terms of time because participants expect a pay-off for their involvement in the network, and as a result, action must be played out within a reasonably short time frame. When the objective is ideological, time is a more extensive resource and action may be prolonged—the ideological cause it prioritized over any episodic action and, as a result, a network may law low and wait for the right moment to act.[17]

Some illicit arms trafficking networks have long-term political or ideological goals, especially those connected to diasporas supporting armed groups operating in their homelands. However, most participants on the supply side of the illicit arms trade are out to turn a profit in a competitive black market. That is, following Morselli et al., arms trafficking networks are more likely to function in a ways that compromise their security, all else equal. Some suppliers, brokers, or transporters may operate in market niches, most likely attached to particular geographic locales, and therefore face little competition, but others must devote some of their energies to outmaneuvering others for clients. They also increase their take by squeezing those they must deal with up and down the supply and distribution chain. Such imperatives are not different in kind from the competitive forces operating in legal markets, but the temptation to defect and "rat out each other" is undoubtedly present and may threaten to undermine the mutual

[17] Carlo Morselli, Cynthia Giguère, Katia Petit, "The Efficiency-Security Trade-off in Criminal Networks," *Social Networks* 29 (2006), pp. 143-53. See also Valdis E. Krebs, "Mapping Networks of Terrorist Cells," *Connections* 24 (2002), pp. 43-52.

trust and reciprocity that seem essential for the functioning of dark networks.

Such competitive dynamics, along with generally high volume of arms trafficking activity, work against concealment and create vulnerabilities. Bruinsma and Bernasco have examined three criminal groups whose activities have two important features in common with illicit arms trafficking other than the need to operate underground. Heroin smuggling, human trafficking, and the transnational trade in stolen cars (i) serve a market and (ii) involve the movement of illegal goods and services across long distances. They find that activities characterized by higher levels of criminal and financial risk require collaboration grounded on substantial mutual trust, which is most likely to be a feature of cohesive social networks. In the case of heroin smuggling, the riskiest of the three criminal enterprises examined, that cohesion derives from ethnic and other demographic homogeneities. Turkish groups figure prominently in the heroin trade (at least destined for the Netherlands, a focus of the Bruinsma and Bernasco study) and those that work most closely together at the different stages of the process tend to be of similar age and social class, and hail from the same regions of the country.[18]

It is hard to say whether, in terms of criminal and financial risk, the illicit arms trade has more in common with heroin smuggling or purportedly less-risky trafficking in humans or stolen automobiles. And, as will become clear in a subsequent section, my data are not now sufficiently fine-grained to allow me to illuminate the degree of ethnic, religious, or ideological cohesion—and, by implication, trust—present in illicit arms trade networks. But, as a hypothesis, it is reasonable to posit that illicit arms networks that operate in higher risk environments—for example, in geographic locales with a robust police and/or military presence, or spanning long

[18] Gerben Bruinsma and Wim Bernasco, "Criminal Groups and Transnational Illegal Markets: A More Detailed Examination on the Basis of Social Network Theory," *Crime, Law, and Social Change* 41 (2004), pp. 79-94.

distances with multiple sites of potential vulnerability—are composed of more socially homogeneous groups. The social cohesion created by ethnic, religious, or ideological bonds reduces the likelihood of defection and thus the risks of exposure in an extralegal setting.[19]

Power and Influence in Illicit Arms Networks

Network forms of organization seem to offer distinct advantages to those engaged in illicit economic, political, and military activities. As Kenney explains, compared to the hierarchically organized and bureaucratic state agencies—intelligence, law enforcement, or military—that typically oppose them, illicit networks:

> contain relatively flat authority structures that facilitate rapid decision cycles and quick information flows. They compartment participants and information into separate, semiautonomous cells, often based on family, friendship, and geographic ties. They build redundancy into their operations by giving important functions to multiple groups, and they rely on brokers and other intermediaries to span "structural holes" between loosely connected nodes and networks.[20]

These organizational structures and practices foster secrecy and secure the distribution of information and other resources necessary to accomplish tasks. While state agencies enjoy a preponderance of coercive force and intelligence collection capacity, elaborate decision-making

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[19] Economic theories of rebellion posit similar social dynamics. See, for example, Paul Collier, "Rebellion as a Quasi-Criminal Activity," *Journal of Conflict Resolution* 44 (2000), pp. 839-53.

[20] Michael Kenney, *From Pablo to Osama: Trafficking and Terrorist Networks, Government Bureaucracies, and Competitive Adaptation* (University Park: Pennsylvania State University Press, 2007), p. 203. See also Kenney, "Turning to the 'Dark Side': Coordination, Exchange, and Learning in Criminal Networks," in Miles Kahler, ed., *Networked Politics: Agency, Power, and Governance* (Ithaca, N.Y.: Cornell University Press, 2009). For a discussion of the disadvantages these organizations face, see Mette Eilstrup-Sangiovanni and Calvert Jones, "Assessing the Dangers of Illicit Networks: Why al-Qaida May Be Less Threatening Than Many Think," *International Security* 33 (2008), pp. 7-44.

procedures, organizational checks, and other imperatives sometimes constrain their ability to employ this capacity to penetrate illicit networks and track their activities. And when state agencies are successful—for example, when they capture or kill a drug kingpin or terrorist mastermind and consequently are able to dismantle a portion of illicit enterprise—this often proves temporary as others regroup, reorganize, and recruit new members into even more diffuse network structures. Thus, networks may serve as force multipliers, providing organizational advantages that can be deployed against adversaries with superior resources but operating within the constraints of bureaucratic and hierarchical organizations.

In addition to the power of networks as organizational forms, social scientists are interested in actors' capacities relative to other actors within networks. Actors occupying particular positions have access to "social capital, information, coalitional opportunities, and other resources which can be exploited in order to pursue political purposes."[21] This conception is perfectly inconsistent with what Kenney and others identify as the power of networks vis-à-vis other organizational forms; the focus is simply on the individuals or collective entities that constitute nodes within a network, their relationships with other nodes, and the power and influence deriving from the nature and quantity of these linkages. That is, we can consider the power *of* illicit networks, or power *within* illicit networks. But coming from either a macro- or micro-perspective, what social network theorists and empirical researchers tend to emphasize as the bases of power and advantage are social ties, and not simply material capabilities possessed

[21] Deborah Avant and Oliver Westerwinter, "The New Power Politics: Networks and Global Security Governance," paper presented at the workshop on "The New Power Politics: Networks, Governance, and Global Security," Sié Chéou-Kang Center for International Security and Diplomacy, Josef Korbel School of International Studies, University of Denver, 1-2 March 2013, p. 9. See also Miles Kahler, "Networked Politics: Agency, Power, and Governance," in Kahler, ed., *Networked Politics*; Emilie M. Hafner-Burton, Miles Kahler, and Alexander H. Montgomery, "Network Analysis for International Relations," *International Organization* 63 (2009), pp. 559-92.

by actors or aggregated by organizations.

Of course, the resources that suppliers, middlemen, shippers, and anyone else involved in the illicit arms trade bring to bear in the competitive black-market environment are both material and social. Those who possess or can muster superior armament stocks, finance, transport, and other material resources are in a better position to exercise power within the network than those who do not. But one's connectedness is also a key source of influence and success. And compared to legal arms markets, where openly publicizing the availability of goods and distribution services is not a risky enterprise, the contribution of social connections to one's ability to survive and thrive in the black market takes on relatively greater importance. Larger numbers of relationships provide more opportunities for profitable transaction, but so do the right types of relationships. The pivotal activities of arms brokers, who bring together parties that would not otherwise come into contact in an underground environment, epitomize the role that social capital plays in black arms market.[22]

The differentiation of roles within the illicit arms trade means that some actors within the network exist in more symbiotic relationships, while other relationships are more competitive. Put simply, suppliers need buyers and vice versa, and both need brokers, financiers, and transporters to facilitate their deals and exchanges. But arms dealers may find themselves in competition with one another to meet the demand for weapons by particular groups or in particular regions, while brokers and other middlemen face competition from those who offer similar services. An actor's social capital, accumulated by virtue of the quantity and quality of

[22] See Brian Wood and Johan Peleman, *The Arms Fixers: Controlling the Brokers and Shipping Agents* (Oslo: International Peace Research Institute, 1999); Silvia Cattaneo, "Targeting the Middlemen: Controlling Brokering Activities," *Small Arms Survey 2004: Rights at Risk* (Cambridge: Cambridge University Press, 2004); Amnesty International, *Dead on Time: Arms Transportation, Brokering and the Threat to Human Rights*, ACT 30/008/2006 (May 2006), available at www.amnesty.org/en/library/info/ACT30/008/2006.

the actor's connections to others within the illicit arms network, is a resource for the exercise of power in both cooperative and competitive interaction.

However, there is also a downside: better connected actors have higher profiles, which can become a vulnerability in the illicit arms trade. High-profile individuals in dark networks, especially those who seem to be thumbing their noses at state security and law enforcement agencies—think of Pablo Escobar (Medellin drug cartel), Osama bin Laden (al Qaeda), or the arms trafficker Viktor Bout—provoke redoubled efforts to bring them to justice. Even among co-conspirators within the network, high-profile actors may come to be viewed as rogues that invite unwanted outside attention and scrutiny. Their connectedness and influence within the network thus becomes a source of resentment and even enmity, setting into motion a reversal of the social process that led to their power and influence. Other network actors will seek to minimize their contacts or sever their relationships altogether, to the extent that they can. In extreme cases, more than relationships may be severed.

Mapping the Illicit Arms Trade

More theoretical work needs to be done in order to fully conceptualize the illicit arms trade as a social network, or as a multitude of intersecting networks. However, while it may be somewhat premature to proceed with empirical analysis, I believe that the network characteristics of the illicit arms trade are sufficiently compelling that it is appropriate to simultaneously explore its structural features using some of the quantitative methods developed for social network analysis.

The focus of social network analysis (SNA) is less on the attributes or behavior of actors than on the structural dimensions of their social environment, which are distilled from the overall

pattern of relationships or exchanges among the actors. The social network itself is defined as the group of actors and the relationships or interactions that link them, and SNA methods are applied once it is assumed (or demonstrated) that a group of actors constitutes a network. That is, SNA is not a means of distinguishing networks from other forms of social organization, like anarchical or hierarchical forms, nor does it provide a way to assess the degree of "networkness" characterizing a given social grouping. The premise of SNA is that the organization of a set of interrelated actors bears some resemblance to a social network and that it is therefore useful to examine its structural dimensions.[23]

The Illicit Arms Transfers Database (IATD) is an evolving dataset consisting of information gleaned from news and other reports of illegal arms shipments crossing interstate borders. The goal is to systematize the large amount of information that exists about the international black market in armaments so that some of these data might be subjected to social scientific analysis. At this time, the IATD's content derives solely from materials collected by the Norwegian Initiative on Small Arms Transfers (NISAT), affiliated with the International Peace Research Institute in Oslo. Although the primary focus of NISAT's quantitative data collection efforts is the legal trade in small arms and light weapons, it also maintains a "Black Market File Archive," a collection of news stories and investigative reports on the illicit arms trade. These accounts, which range widely in content and format, are collated into country folders based on the locale of the events described therein. NISAT obtains reports from multiple

[23] The most authoritative and comprehensive guide to the methods of social network analysis is probably Stanley Wasserman and Katherine Faust, *Social Network Analysis: Methods and Applications* (Cambridge: Cambridge University Press, 1994). For a briefer treatment, see John Scott, *Social Network Analysis: A Handbook*, second edition (Thousand Oaks, Calif.: Sage, 2000). For an introduction to the network analytical literature in multiple disciplines, including the physical and biological sciences, see Mark Newman, Albert- László Barabási, and Duncan J. Watts, eds., *The Structure and Dynamics of Networks* (Princeton, N.J.: Princeton University Press, 2006).

news organizations, as well as other organizations providing information on the black market arms trade. These reports provide the raw information upon which the IATD is built.

The unit of observation in the IATD is an illicit arms transfer "event," defined as coterminous with a particular arms shipment's journey from source to recipient, possibly intercepted along the way. Each record in the database consists of data describing that event, including the actors and locations involved in the shipment's journey from originator to recipient (or interceptor), as well as the information source. Most variables in the database are event descriptors and can be grouped as they pertain to (a) the *source* of the arms shipment, (b) those involved in the arms *deal*, (c) the *characteristics* of the arms shipped, (d) the *journey* that the shipment took after leaving the source, and (e) the shipment's *destination*. At present, there are over 60 variables in the database used to describe characteristics of different types of illicit transfers, although most records contain missing data for many of these variables simply due to the paucity of information on black market transactions.[24]

[Table 1 about here]

The stories and reports collected by NISAT vary widely in the amount of useful information they contain. Some articles include detailed accounts of arms shipments from manufacturer to purchaser, including any number of participating intermediate dealers, brokers, and shipping agents.[25] Other reports include no codable event information at all. Some reports

[24] For a full description of IATD coding procedures, including a complete list of variables and definitions, see David Kinsella, "Illicit Arms Transfers Database: Coding Manual," November 2008; available at web.pdx.edu/~kinsella/iatcode.pdf. The database itself is not yet available to the wider research community. See also Jason E. Strakes, "Illicit Arms Transfers: Linking Weapons Characteristics and Strategic Applications," *Defense and Security Analysis* 24 (2008), pp. 61-64.

[25] Dealers are those middlemen who buy and sell the arms, in effect taking temporary ownership of the weapons along the way. Brokers are those who facilitate the arms deals. They bring parties together, perhaps helping with financing, and they usually profit from their brokerage, but they do not take possession or ownership of the arms shipment in route. Shipping agents are those who help arrange transportation of the arms, but who do not do the

provide a wealth of background information, like previous events in ongoing arms-supply relationships. Others pick up a particular shipment's journey midstream, as when one military organization supplies another organization, without any indication of where the first group acquired the weaponry. Even when reports contain complete information, the events themselves exhibit a wide range of forms. There is substantial variation in the number and type of intermediaries engaged in illicit transfers, the nature of the illegalities involved (forged end-user certificates, arsenal theft, etc.), and whether transfers were intercepted by state authorities or someone else other than the intended recipient.

Ideally, because I am conceptualizing the illicit arms trade as a social network, the nodes in the network would represent actors (individuals or collectivities) involved in the arms transfers. The IATD includes actor-level information, but these data are not at present sufficiently developed and cross-checked to warrant the application of either descriptive or inferential SNA methods. Instead, nodes are operationalized here as *locales*: state-administered territories wherein these actors operate and where illicit weapons shipments have originated, terminated, or transited. "State locales" does not mean "state actors"; although political and military officials are sometimes implicated in illicit arms transfers, this is generally not state-sanctioned activity and most states attempt to curb it.

Figure 1 maps state locales involved in illicit arms transfers during the 1998–2005 period, the time span for which articles in NISAT's Black Market Archives have been most thoroughly coded to date. The nodeset displayed in the figure consists of 172 state locales involved in either the legal SALW trade or the illicit arms trade, each labeled with three-letter country codes.

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actual shipping. See Wood and Peleman, *The Arms Fixers*.

Nodes linked by (faintly drawn) arrows are illicit arms-trade locales (there are 141). The remaining nonlinked nodes (or "isolates") are those locales involved in the legal SALW trade, but for which there are no reports of illegal transfers. The nodes in Figure 1 are arranged according to the longitudinal and latitudinal coordinates of their capital cities and color-coded by geographic region. SNA visualization methods include various algorithms for arranging network nodes in two- or three-dimensional space, but using geographical coordinates is most appropriate for my purposes. (Refined data would allow more precision in the placement of nodes, including multiple nodes within the borders of states.) The lines connecting the nodes in Figure 1 indicate that illicit weapons flowed from one locale to the other at least once during the 1998-2005 period. The lines are thicker and darker if there are more illicit arms-transfer events ascertained from the reports in the NISAT archives; they do not indicate the volume of the arms flow, either in quantity or value, which is not sufficiently documented.

[Figure 1 about here]

Another indicator displayed in Figure 1 relates to the prominence or "centrality" of the locale in the illicit arms trade. There are several alternative ways to operationalize centrality, but the most straightforward measure uses the number of other nodes to which a particular node is linked: the node's "outdegree" (transfers *to* other locales) or "indegree" (transfers *from* other locales). A locale's centrality, then, is its outdegree or indegree as a proportion of all possible directed links. The larger nodes in Figure 1 represent state locales with higher indegree centralities. Not surprisingly, the most prominent destinations for illicit arms transfers are locales in Sub-Saharan Africa, as well as other high-conflict areas in the Middle East and South Asia.

[Figure 2 about here]

Figure 2 replicates Figure 1, except that here the larger nodes are state locales with higher outdegree centralities. The prominence of former Soviet-bloc countries in the illicit arms trade is noteworthy. The three locales with the highest outdegree centralities are Russia, Czech Republic and Bulgaria, while the former Soviet bloc constitutes half of the twenty most central nodes worldwide. Figure 3 further highlights the links between and among the former Soviet-bloc countries and locales in Sub-Saharan Africa, which constitute over one-third of the 650 links shown in Figures 1 and 2. Of these, over 40 percent represent outflow links from the former Soviet bloc to Sub-Saharan Africa, while just under 40 percent are links within Sub-Saharan Africa. Figure 3 also shows the substantial number of links between former Soviet-bloc locales.

[Figure 3 about here]

Toward a Causal Explanation of Illicit Arms Supply

In this final section, I consider a few factors that can help explain some of the variation in the prominence of different states as locales for either dispatch or receipt of illicit weaponry. Some explanations would seem fairly obvious and generally applicable, such as lax law enforcement within arms-supply locales or the persistence of violent armed conflict within destination locales. Others may pertain to factors particular to certain countries or regions. In regard to the latter, and given the descriptive results presented in the previous section, I begin with some conjectures about the prominence of former Soviet bloc countries. I then present two very simple linear models: one to explain states' outdegree centrality in the illicit arms network, and one to explain indegree centrality.

Why the Prominence of the Former Soviet Bloc?

Several factors have conspired to make individuals and organizations in Russia and other former Soviet bloc locales active participants in illicit arms transfer networks. The most common explanations focus on the role of Russian military and security forces, especially the incentives and opportunities associated with the political-economic transition that accompanied the end of the cold war. The dismantling of the formidable Soviet-era military-industrial complex was remarkable, and attendant dislocations have been documented by both insiders and outside observers.[26] Among the outcomes were decommissioned weapons stocks, mothballed or underutilized military production facilities, and an uncertain future for many military and security personnel. Whether motivated by economic desperation or opportunism, many of the latter had access to post-cold war arms surpluses. They also had access to military transport facilities or found common cause with others who had logistical expertise and experience moving cargo surreptitiously. As Turbiville observed, "crime and corruption in the wake of Soviet dissolution quickly began to shape and influence every dimension of state and private life. Military establishments in the region—shrinking, impoverished, and demoralized—were far from immune to these pressures, and in the case of the Russian armed forces in particular, have become major participants in the illegal diversion of weapons as well as being profoundly affected by crime in other ways." Illicit arms trafficking and other crime had become institutionalized within the Russian military, argued Turbiville, which was, in essence, a "mafia

[26] For example, David Holloway and Michael McFaul, "Demilitarization and Defense Conversion," in Gail W. Lapidus (ed.), *The New Russia: Troubled Transformation* (Boulder, Colo.: Westview, 1995); Mikhail I. Gerasev and Viktor M. Surikov, "The Crisis in the Russian Defense Industry: Implications for Arms Exports," in Andrew J. Pierre and Dmitri V. Trenin (eds.), *Russia in the World Arms Trade* (Washington, D.C.: Carnegie Endowment for International Peace, 1997).

in uniform."[27]

The former-Soviet arsenal was also hemorrhaging in the periphery. The phased withdrawal of Soviet armed forces from central and eastern Europe and the Baltic states in the early 1990s was, given the immense scale and logistical challenges, generally well managed, but huge volumes of weapons were moved rather quickly and inevitable leakages probably left large numbers of SALW in the wake.[28] The eruption of ethnic conflicts in the Caucuses—both inside Russia (namely, Chechnya) and in the post-Soviet states of Georgia, Armenia, and Azerbaijan—increased the demand for arms and presented Russian soldiers, whether deployed to put down rebellions or as peacekeepers, with opportunities to acquire much-needed cash. Violent conflicts elsewhere, like Moldova and Tajikistan, witnessed similar patterns.[29]

Although research on the illicit arms trade has devoted more attention to Russia than to other former Soviet bloc countries, the figures in the previous section also highlight the prominence of eastern Europe. Phythian suggests that the similar factors were at work: "Post-communist eastern Europe remains the prime source for black market small arms. Controls

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[27] Graham H. Turbiville, Jr., "Weapons Proliferation and Organized Crime: The Russian Military Dimensions," *Airpower Journal* 10, special edition (1996), p. 18; Turbiville, *Mafia in Uniform: The "Criminalization" of the Russian Armed Forces* (Fort Leavenworth, Kan.: Foreign Military Studies Office, 1995). Viktor Bout is a good example, although certainly not representative in terms of business acumen and success. Bout served as an officer in the Soviet Armed Forces—different sources place him in the Air Forces, military intelligence (the GRU), and the KGB (unlikely)—and, after being discharged at the end of the cold war, got his start in arms trafficking by acquiring transport planes. Douglas Farah and Stephen Braun, *Merchant of Death: Money, Guns, Planes, and the Man Who Makes War Possible* (Hoboken, N.J.: John Wiley and Sons, 2007). On the role played by post-cold war privatization of the transport industry in the former Soviet bloc, see especially Amnesty International, *Dead on Time*.

[28] This did not, of course, start with post-cold war deployments; Soviet military personnel returning from Afghanistan in the 1980s also sold arms and ammunition to make ends meet. See, for example, Ian Anthony, "Illicit Arms Transfers," in Ian Anthony (ed.), *Russia and the Arms Trade* (Oxford: Oxford University Press, 1998).

[29] For a comprehensive overview of Russia's role in illicit arms transfers throughout the 1990s, see John Berryman, "Russia and the Illicit Arms Trade," *Crime, Law and Social Change* 33 (2000), pp. 85-104. In addition to the Russian military, Berryman also considers the role of Russian arms manufacturers, but this is considerably less documented. See also Anthony, "Illicit Arms Transfers."

are weak and easily evaded, corruption is rife, and financial rewards are far in excess of the meagre salaries of most east European munitions workers or officials."[30] In the case of the Balkans, however, where the Yugoslav wars were fed by both the import and internal trafficking of illicit weapons, Arsovska and Kostakos suggest that the outflow of arms, even with the end of the conflicts, has been less pronounced than we might expect given the volume of illicit stocks circulating in the Balkans. They attribute this in part to the very high internal demand for arms driven by cultural factors and a historical distrust of state institutions; these social forces seem to trump an economic logic that would otherwise point to a substantial post-conflict expansion of arms exports in the face of excess supply.[31]

In addition to the factors associated the post-cold war dislocations experienced by defense-industrial institutions in former Soviet-bloc countries, part of the explanation for their role in the illicit arms trade probably relates to their communist legacy. The inadequacies of central planning to direct resources so as to meet consumer demand were apparent long before the end of the cold war. Thus, "economies of favors" developed whereby needs were satisfied by way of personal connections and informal networks of exchange.[32] Such transactions were not at all rare and were not limited to party functionaries or other members of the political elite, nor were they regarded as illegal or illicit by the many rank and file who participated in them.

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[30] Mark Phythian, "The Illicit Arms Trade: Cold War and Post-Cold War," *Crime, Law and Social Change* 33 (2000), p. 30.

[31] Jana Arsovska and Panos A. Kostakos, "Illicit Arms Trafficking and the Limits of Rational Choice Theory: The Case of the Balkans," *Trends in Organized Crime* 11 (2008), pp. 352-78. Such observations notwithstanding, the descriptive findings above suggests that former Yugoslav states are not as prominent as Russia and other Eastern European locales like the Czech Republic, Bulgaria, and the Ukraine (at least when measured in terms of outflow links).

[32] See, for example, Alena V. Ledeneva, *Russia's Economy of Favours:* Blat*, Networking and Informal Exchange* (Cambridge: Cambridge University Press, 1998).

Starting with this description of behavior under communism, we might hypothesize that post-communist illicit arms trade was able to draw participants from a population not unaccustomed to satisfying demand through social networks operating in the shadows of officially sanctioned practice. The argument has been put forth by Cheloukhine about Russian organized crime generally: "The growth of the shadow economy was the main catalyst forming organized crime. Racketeering, robbery, and other crimes were dangerous but predominantly secondary [during the Soviet era]. The roots of the Russian mafia lie in the innermost depths of the Russian shadow economy."[33] This is not to suggest that everyone who participated in the shadow economy is a potential arms trafficker, only that command economies nurtured individuals and networks that were well-positioned to take advantage of the forces of arms supply and demand unleashed by the end of the cold war and the collapse of communism.

Some Linear Regression Results

Although the previous discussion suggests that some of the explanation for the centrality of certain illicit arms-supply locales may be grounded in the post-cold war particulars of Soviet and East European political-economy, a more general proposition is that outdegree centrality is positively related to the level of corruption in society. To test this, I estimate a linear model of centrality using the corruption perceptions index (CPI) compiled annually by Transparency International. The index is a composite measure combining indicators from various

[33] Serguei Cheloukhine, "The Roots of Russian Organized Crime: From Old-fashioned Professionals to the Organized Criminal Groups of Today," *Crime, Law and Social Change* 50 (2008), p. 363. The "Soviet inheritance" has also been used to explain organized crime in former Soviet republics. See Lada L. Roslycky, "Organized Transnational Crime in the Black Sea Region: A Geopolitical Dilemma?," *Trends in Organized Crime* 12 (2009), pp. 21-29; Louise I. Shelley, "Russia and Ukraine: Transition or Tragedy?," in Roy Godson (ed.), *Menace to Society: Political-Criminal Collaboration Around the World* (London: Transaction, 2003).

sources—Freedom House (Nations in Transit), the World Bank (Country Policy and Institutional Assessment), the World Economic Forum (Executive Opinion Survey), the African Development Bank (Governance Ratings), and others—and ranges from 0 for the most corrupt to 100 for the least corrupt.[34] To determine whether former Soviet-bloc locales have higher outdegree centralities even after accounting for corruption levels, I also include a dummy variable for just those 24 nodes.

The level of corruption should also explain a locale's centrality as a destination for illicit arms flows. Not all illegal arms shipments arrive on desolate beaches or abandoned airstrips; law enforcement officials, including port and customs authorities, are frequently bribed or coerced to allow contraband to pass through various checkpoints. Therefore, I also use CPI to estimate a linear model of indegree centrality. The most obvious factor accounting for SALW inflows, both legal and illegal, is the presence of armed violence within a territory, so I include in the model a variable for internal conflict, measured as the radius of the conflict zone, or the sum of radii if there are multiple conflict zones within the state's territory. Such zones include areas of armed encounters, rebel bases, and rebel-occupied territories in countries where the government confronts a rebellion. The data come the Peace Research Institute Oslo (PRIO).[35] A third independent variable in the model is a dummy variable indicating whether the country is the target of either a multilateral arms embargo or bilateral arms embargoes by five or more states. I

[34] Transparency International (Global Coalition Against Corruption), "Research: Corruption Perceptions Index," 2014; available at www.transparency.org/research/cpi/. Sources and methods are described in the "CPI information package," available at files.transparency.org/content/download/702/3015/file/CPI2013_DataBundle.zip.

[35] See Johan Dittrich Hallberg, "PRIO Conflict Site 1989-2008: A Geo-Referenced Dataset on Armed Conflict," *Conflict Management and Peace Science* 29 (2012), pp. 219-232. The data and codebook are available at www.prio.no/Data/Armed-Conflict/Conflict-Site/. PRIO's measure does not include zones outside the country whose government is being challenged, but where rebels or dislocated populations are taking refuge. Because these are also locales into which illicit arms flow, the measure is imperfect for my purposes.

create this variable from data compiled by Erickson for her study of arms embargo compliance.[36]

Both of these models are, admittedly, thinly specified.[37] But as a proxy for the various other factors affecting the outflow or inflow of weaponry, I include as a control variable the node's outdegree or indegree centrality computed using data on the *legal* transfers of SALW. That is, such things as population, size of armed forces, economic output, manufacturing capacity, etc., probably help to explain arms flows generally, so including a variable for centrality in the legal SALW trade should allow me to better isolate the relationship between illicit arms-trade centrality and the other explanatory factors discussed above. SALW centralities are computed using quantitative data collected by NISAT.[38] Means and standard deviations of the variables used in the models are reported in Table 1.

[Table 1 about here]

Table 2 shows the estimated effects of corruption and former Soviet-bloc membership on a locale's outdegree centrality in the illicit arms trade. Even this simple model (including the SALW control variable) explains 44 percent of the variance in centrality, with centrality increasing as corruption increases (recall that the value of the variable increases with *non*-corruption). The table reports standardized coefficient estimates, so we see that a standard

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[36] Erickson, "Stopping the Legal Flow of Weapons; data available at www.prio.no/Journals/Journal/?x=2&content=replicationData.

[37] On the other hand, my illicit arms-transfer data are still fairly "noisy" and the purpose of these models is not only to test some propositions about what accounts for centrality in the illicit arms trade network, but also to reflect on the plausibility of explanations teased from these data. There are other, more general pitfalls associated with overly specified models. See especially Christopher H. Achen, "Let's Put Garbage-Can Regression and Garbage-Can Probits Where They Belong," *Conflict Management and Peace Science* 22 (2005), pp. 327-339; Phlip A. Schrodt, "Seven Deadly Sins of Contemporary Quantitative Political Analysis," *Journal of Peace Research* 51 (March 2014), pp. 287-300.

[38] Norwegian Initiative on Small Arms Transfers, "NISAT Database of Small Arms Transfers," February 2014; available at nisat.prio.org/Trade-Database/Researchers-Database/. Nodes are considered linked only if the value of SALW transfers totaled more than $1 million from 1998 to 2005. Other than the centrality scores and dummy variables, all other variables used in the regressions are annual averages from 1998 through 2004 or 2005.

deviation increase in corruption is associated with a 0.21 standard deviation increase in outdegree centrality. The direction of this relationship is as we expect. The locale's membership in the former Soviet bloc also explains a significant amount variance in outdegree centrality, over and above what is explained by corruption. These countries outdegree centralities are, on average, 0.36 standard deviations higher than all countries taken together. Subsequent modeling should attempt to better specify just what it is about the former Soviet bloc that makes them more central in the illicit arms network.

[Table 2 about here]

Table 3 shows the estimated effects of internal conflict, corruption, and arms embargo, which, along with the control variable, explain half of the variance in indegree centrality. The size of the conflict area in the country is positively related to its indegree centrality, as we expect; a standard deviation increase in conflict zone radius is associated with a 0.38 standard deviation increase in centrality. As is the case with outdegree centrality, increased corruption is also associated with a higher indegree centrality, although the relationship is somewhat weaker. Finally, we see that the imposition of arms embargoes does not diminish the centrality of state locales in the illicit arms trade; quite the contrary—the indegree centralities of embargoed states are 0.41 standard deviations higher than all states together, on average.

[Table 3 about here]

Although the expected effect of internal conflict on demand for weaponry is positive whether those arms are transferred legally or illegally, both corruption and embargoes are likely to have opposite effects on legal versus illicit transfers. Indeed, while Table 3 indicates that indegree centrality in the illicit arms trade is higher for states with higher levels of corruption and

those subject to multilateral arms embargoes, Table 4 suggests that higher corruption *diminishes* the country's prominence as a destination for legal SALW transfers, as does the imposition of embargoes. The good news is that state-sanctioned SALW exports are not insensitive to poor governance and transparency by importers, or to multilateral sanctions. The bad news is that the illicit arms trade is there to supply the unmet demand.

[Table 4 about here]

Conclusion

The illicit arms trade shares some important properties with networked forms of organization studied by sociologists. The complex and convoluted nature of black market arms transfers suits this realm of the arms trade especially well to investigation as a social network. Like any underground activity involving the exchange and transport of contraband (drugs, counterfeit currency, humans), the illicit arms trade operates within an informal organizational environment. The forces of supply and demand are mediated by the forces of trust, loyalty, and mutual commitment that govern the flow of information and material within a social network.

Even descriptive methods and visualizations from social network analysis reveal interesting structural features of the global illicit arms trade. The locales occupying central position in the network readily stand out. Among the countries where illicit arms shipments originate, former members of the Soviet bloc appear central, whether as weapons sources or as conduits linking other locales in the network. One explanation for their prominence in the illicit arms trade might be found in the availability of cold war surplus and a black market infrastructure nurtured originally by their communist economic systems. This, at least, is a

reasonable working hypothesis for subsequent empirical research. The centrality of countries in Sub-Saharan Africa as destinations for illicit arm transfers is also clearly revealed, but surely comes as no surprise given the persistence of violent armed conflict there.

The utility of quantitative methods for illuminating the illicit arms trade obviously hinges on the quality of data that can be collected. Mapping the structure of the black market is hampered by the secrecy with which deals are concluded and the duplicity of the actors involved. What we do know about it is due mainly to the perseverance of enterprising activists and investigative reporters and, as with any data source, this information is subject to measurement error and selection bias. The analysis of network dynamics often requires fairly complete information about nodes and links, particularly if the aim is to model network vulnerabilities. If the lack of information makes it necessary to restrict analysis to sampled data, important elements of the network structure may be missed. However, this danger should be less pronounced when examining scale-free networks because even incomplete information is likely to identify the most prominent nodes.[39]

The results of some fairly simple linear regressions seem to affirm a few basic elements of a causal explanation of illicit arms supply. The prominence of locales serving as either the origin or the destination of illegal arms transfers is associated with higher levels of corruption. The most central destinations for illicit transfers are those with larger conflict zones and those subject to arms embargoes. These statistical findings are not exactly earth-shattering, but if nothing else it is reassuring that some of our intuitions are supported by an initial analysis of data

[39] On scale-free networks, see Albert-László Barabási and Eric Bonabeau, "Scale-Free Networks," *Scientific American* 288 (2003), pp. 60-69; Barabási and Reka Albert, "Emergence of Scaling in Random Networks," *Science* 286 (1999), pp. 509-512. For an alternative and innovative approach to identifying illegal arms-transfer activity, one that focuses on movement in the stock prices of weapons manufacturers, see Stefano DellaVigna and Eliana La Ferrara, "Detecting Illegal Arms Trade."

that are noisy and incomplete, and are likely to retain certain limitations even with further effort to clean and expand the database. The data do tell a believable story.

More sophisticated SNA methods will become useful as our data collections improve. Rather than simply identifying actors and locales in the illicit arms trade, it will become possible to model the linkages among them as a function of factors on both the supply and demand side. The role of ongoing conflict, social and economic deprivation, weapons surpluses, criminal networks, and other conditions conducive to proliferation have been highlighted by small arms researchers and activists. The cause of arms control will be advanced to the extent that we can identify the most important forces driving proliferation, especially those that are most subject to policy intervention and manipulation, and the actors and locales that figure most prominently in the arms supply network. When resources are scarce and attentions divided, efforts must be focused where they will do the most good.

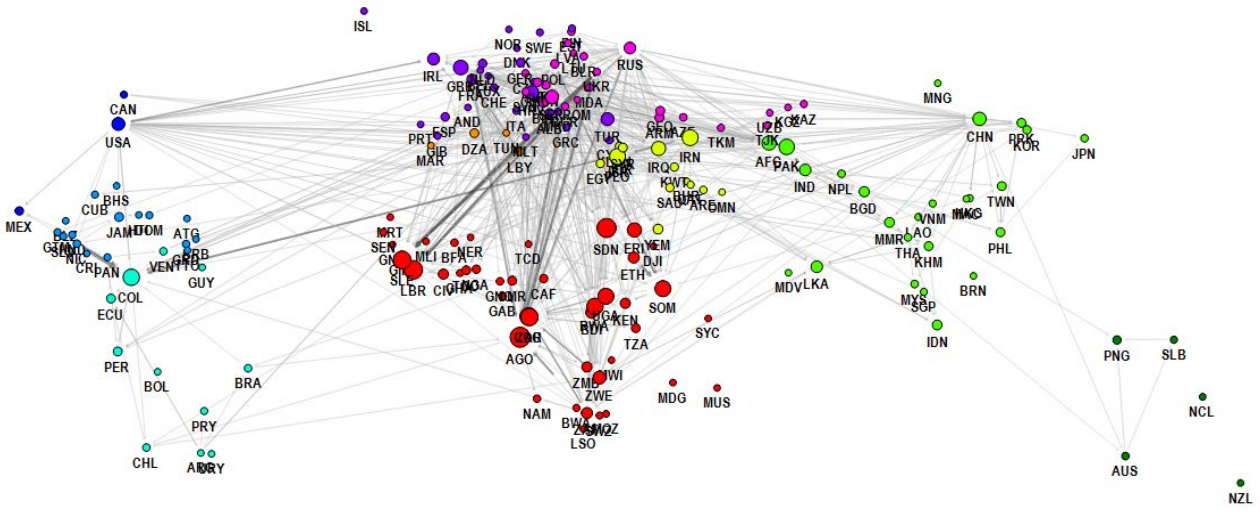

Figure 1 Illicit Arms Trade, 1998-2005: Nodesize as Indegree Centrality

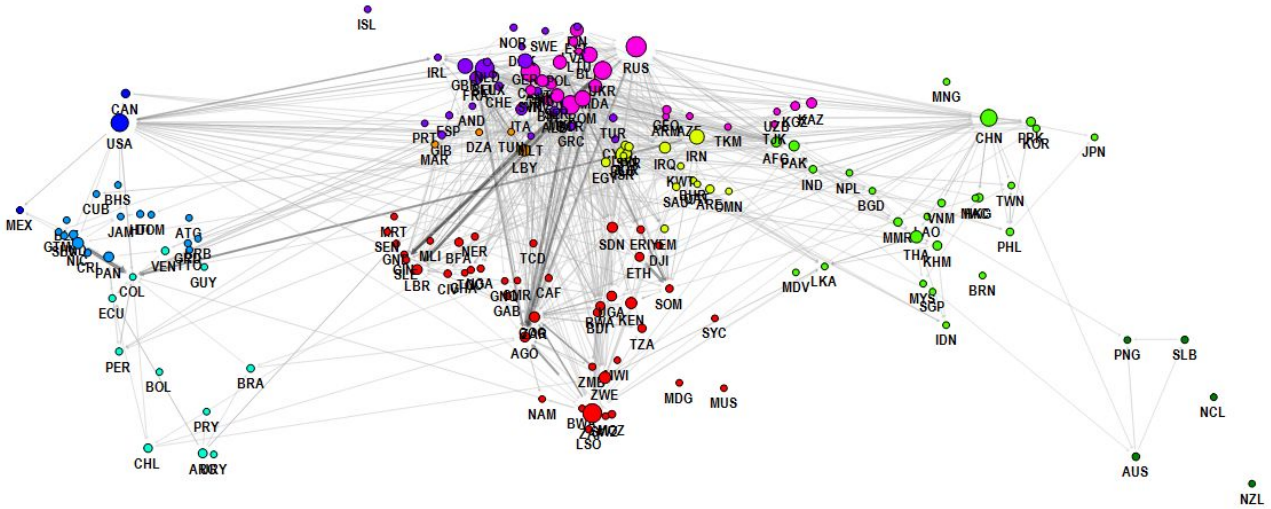

Figure 2 Illicit Arms Trade, 1998-2005: Nodesize as Outdegree Centrality

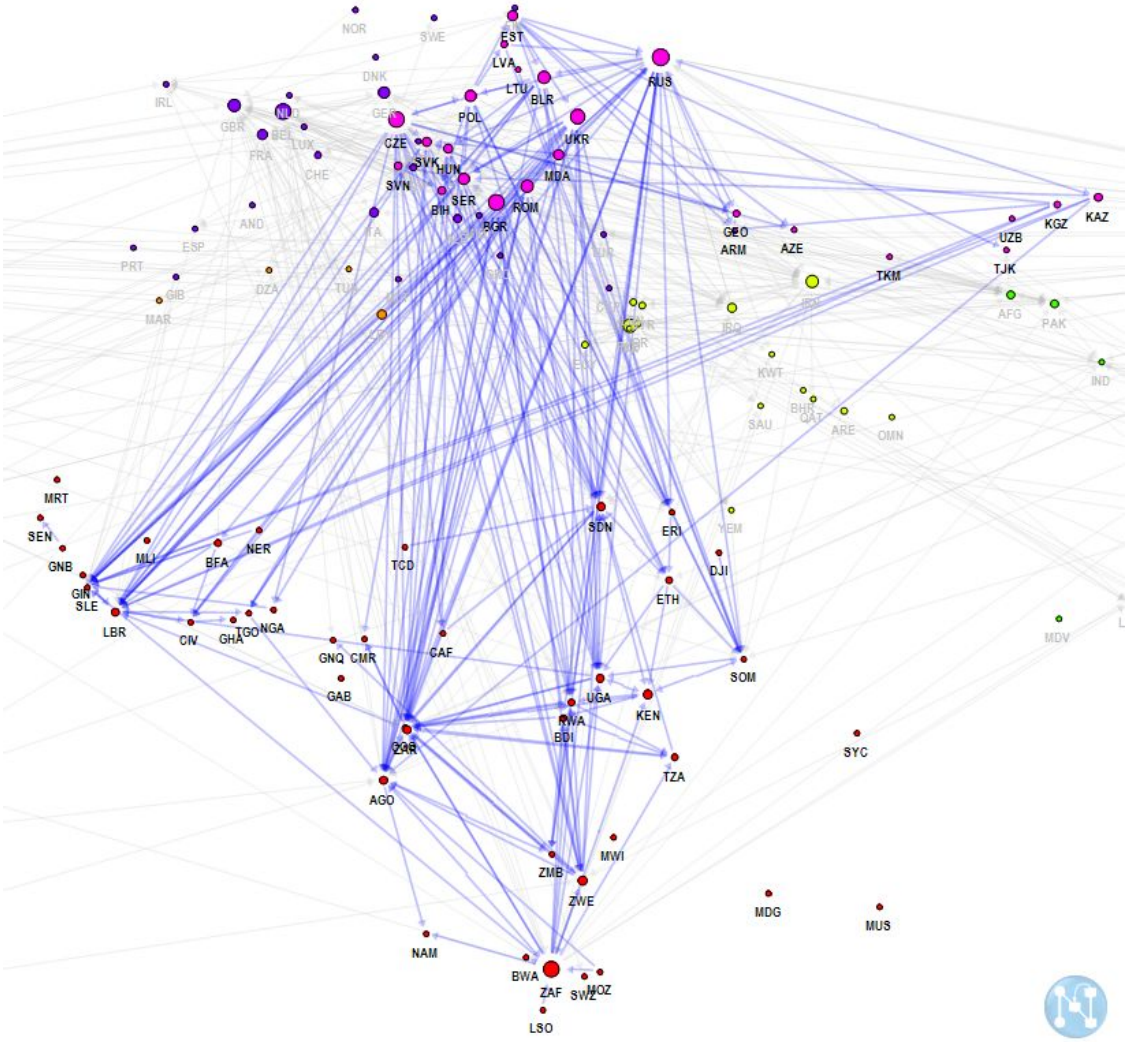

Figure 3 Illicit Arms Trade, 1998-2005: Former Soviet Bloc and Sub-Saharan Africa

Table 1 Descriptive Statistics

	mean	*st. dev.*
IAT Outdegree Centrality	0.023	0.040
IAT Indegree Centrality	0.023	0.031
SALW Outdegree Centrality	0.049	0.099
SALW Indegree Centrality	0.049	0.054
Corruption index	4.047	2.145
Conflict area (radius)	73.626	159.468
Former Soviet bloc country	0.149	0.028
Arms embargo (multilateral)	0.155	0.029

Table 2 Model of IAT Outdegree Centrality

	Coeff. Est. (stand.)	*t ratio*	*signif.*
SALW centrality	0.59	8.73	0.000
(Non)Corruption	-0.21	-3.00	0.003
Former Soviet	0.36	5.93	0.000
R^2	0.44		
N	161		

Table 3 Model of IAT Indegree Centrality

	Coeff. Est. (stand.)	*t ratio*	*signif.*
SALW centrality	0.22	3.10	0.002
(Non)Corruption	-0.14	-1.88	0.062
Conflict area	0.38	5.83	0.000
Arms embargo	0.41	6.39	0.000
R^2	0.49		
N	161		

Table 4 Model of SALW Indegree Centrality

	Coeff. Est. (stand.)	*t ratio*	*signif.*
(Non)Corruption	0.57	8.03	0.000
Conflict area	0.18	2.46	0.015
Arms embargo	-0.12	-1.70	0.090
R^2	0.33		
N	161		