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## Costs of Hedging Bad: The Global Threat Network and Impact on Financial Market Volatility

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The illicit world of crime and terrorism seems far removed from everyday activity and seems especially divorced from legitimate commercial endeavors. Increasingly, tragic attacks or fictitious-sounding jailbreaks perpetrated by criminals and terrorists make headlines, but their day-to-day activities are often thought of as shrouded in darkness and best left to professionals in law enforcement, intelligence, and elite military units. Isolating illicit activities like crime and terrorism from everyday activity fosters the illusion that illicit activities have, at most, a limited impact on governance, commerce, and economics. The barriers between the licit and illicit, as well as the impact of illicit on licit markets, may be more permeable than often acknowledged.

A central aspect of the “convergence” literature is that the combination, or more accurately synergy, of terrorism and criminality amplifies threats beyond conventional law enforcement to legitimate national security concerns. Many of the chapters in this volume, particularly Matt Levitt’s discussion of Hezbollah’s global network of criminals and entrepreneurs, focus on that very issue. Rather than build upon the well-established contention that convergence poses a serious national security threat, this chapter uses an original dataset and analysis to argue that the synergistic challenges posed by the combination of crime and terrorism generates real challenges in the economic and governance spheres. The convergence of crime and terrorism fosters distortions in markets, creating real financial costs that damage countries’ well-being and hinder their development.

This raises an important question. If this chapter focuses on the economic and financial implications of convergence, then why should the analysis appear in a volume on national security? Economics and markets may seem a step removed from national security concerns, but nothing could be further from the truth. Understanding how the connections between terrorist and criminal actors weigh on markets and economies is important for both policymakers and the military, as well as intelligence and civilian personnel, who address and counter the threats on the ground. Each is discussed briefly here in turn. Economic stability and prosperity is a critical foundation of national security; ignoring how convergence affects markets is, thus, to ignore one of the most insidious effects of this phenomenon on global stability.

The relationship between economic development and illicit activity is complicated. Terrorists and criminals rarely seek out economically broken or failed countries, but threats often manifest in countries facing economic challenges and struggling to achieve further development; some examples pertinent now include Iraq, Nigeria, and Pakistan. High unemployment and fewer legitimate employment opportunities, for example, may increase incentives to work in the illicit sectors, providing an ample pool of recruits for terrorists and criminals. Flow of investment capital to the public sector can also be a constraint by forcing an overreliance on government resources in the economy, increasing the chances of corruption and new political grievances among the disaffected. As policymakers consider different approaches to intervention, understanding the parts of illicit networks most likely to hurt investment should improve the efficacy of the financial statecraft toolkit.

Those operating against convergent threats around the world understand the importance of “working by, with, and through” host nations and local forces, which involves coalition building on the basis of mutual interests. Improving economic performance is almost always a priority for host nations, and this work potentially offers operators a guidepost for helping local security and economic officials think about the way certain threats may hinder investment and economic development. Enlisting support from local political, military, and law enforcement leadership can be challenging, but this shows that there may be concrete benefits to disrupting certain types of relationships. By finding common ground using the empirical backdrop laid here, operators and local forces may find prioritization, resourcing, and cooperation easier.

This chapter is based on a quantitative study of nearly 70 countries. Our findings contend that economic performance is meaningfully impacted by illicit activity and particular aspects of connectivity. The data driving this research, originally created to better understand crime-terror convergence from an empirical perspective, maps interpersonal connections in global illicit networks. The original analysis looked across 122 countries, but only 69 of those have equity markets (or “stock markets”) sufficiently mature to include in this study.

Using equity volatility in the 69 countries studied, there is strong statistical evidence that a link between illicit network convergence and economic volatility exists. In fact, countries with a one-unit standard deviation increase in the convergence variable generates as much as 2.5 more volatility; put another way, this phenomenon increases average volatility by 17 percent. The analysis below provides an interesting perspective on global illicit activity and how it can affect the global financial system.<sup>1</sup>

Volatility, or the movement of prices in the equity market, is one common method of measuring risk for businesses and investors by calculating asset price fluctuations over time. Volatility is influenced by investors’ expectations about future cash flows of companies. Riskier assets are usually more volatile, experiencing larger swings in price as investors struggle to assign value given the tradeoff between risk and return. Volatility can be calculated for individual assets like commodities or currencies, as well as entire markets. This chapter uses volatility measures of equity markets to see whether certain features of

the illicit network are more or less associated with larger price swings, as volatility can have a significant impact on the propensity to attract investment or business partnerships.

While a small population of speculators often profit from price volatility, most international investors are concerned with the cost of hedging risk. Hedging is a means of limiting risk by buying certain types of financial instruments that protect against large price swings. As volatility increases, the cost of hedging downside risk increases. Given the empirical results here, the costs of hedging against illicit activity probably reaches into the billions of dollars. Market volatility increases as the ratio of relationships linking criminals and terrorists increases, referred to as convergence. As these two groups grow increasingly intertwined, governments and commercial enterprises face an increasingly complex and uncertain set of risks.

The second element of the illicit network that seems to increase equity volatility is the prevalence of individuals that link disparate parts of the network, a concept referred to as “betweenness” in graph theory. People with high betweenness are the glue that hold a network together, and without these boundary spanners, networks fall apart. Given the interconnected and global nature of the illicit network, these people are well-positioned to control the flow of scarce resources across borders and groups, while also moving between the licit and illicit economies.

Given the sheer magnitude of many asset markets and the globalization of the financial system, it might seem reasonable to assume that the world economy is immune to the activities of illicit actors involved in black markets. Hundreds of billions of dollars of products are exchanged in the global economy and on financial exchanges daily. The global illicit economy, however, is not insignificant. It is estimated to be between 8 and 30 percent of the world economy, amounting to a staggering \$6 to \$22 trillion.<sup>2</sup> While many people associate activities like narcotics smuggling and arms dealing with the illicit economy, organized crime, counterfeiting, theft, and financial crime are also significant components, as Karl Lallerstedt’s contribution to this book illustrates. There seems ample reason, then, to revisit potential intersections of the licit and illicit economy in the midst of financial globalization.

There are many ways in which illicit activity might impact the basic economic forces of supply and demand. Countries with robust criminal networks are more likely to experience theft, smuggling, extortion, market manipulation, and other externalities frequently excluded from conventional economic modeling. All of these activities can impact the economy. While there are reasons to predict that the presence of a robust criminal network should impact an economy, there is much to learn about the particular mechanisms by which illicit networks impact licit financial activities. Unfortunately, there are only a few cross-sectional quantitative studies covering the subject.

Conventional wisdom suggests that policymakers should worry about less developed countries with weaker governance, poor rule of law, and economies built around natural resources or single commodities. This seems reasonable at first glance, but the relationship linking illicit and licit activities is nuanced. While governance certainly plays a role,

modest increases in the connectivity of criminal and terrorist elements or the structural placement of individuals within the network can increase estimated volatility across global markets, increasing risks to investors, and likely impacting capital flows to economies in need of further development.

Our unique empirical study of the relationship between illicit networks and one small feature of the global economy provides statistical evidence that markets are not isolated from the evolving threats of the 21<sup>st</sup> century. The next section looks at the impact that criminal organizations can have on economic conditions. This is followed by a discussion of equity market mechanics and variables that can impact asset price volatility and the potential relationship between the illicit global network and markets. Attention will then turn to our dataset, analytical methods, and the empirical results of the study.

### **Lessons from the Global Illicit Network: Beware Real Dark Pools**

In finance, a “dark pool” refers to large blocks of investment capital that can buy and sell assets outside of regular exchanges. Some argue that these pools increase risk by manipulating asset prices in an opaque fashion to benefit a handful of investors. Just as financial markets have resource pools that exist outside normal patterns of exchange, so do entire economies. There is a sector of the economy that operates in the dark, away from regulation, taxation, law enforcement, and official measurement.

Economists have long understood that illicit activity could adversely impact markets. Crime and violence were frequently treated as a local economic phenomenon. Al Capone’s bootlegging enterprise cast a shadow on the Chicago economy in the 1920s, just as the Cosa Nostra did in New York 40 years later. The Revolutionary Armed Forces of Colombia (FARC) had a significant influence on the Colombian economy, just like the Taliban regulation of heroin production did in Afghanistan during the 1990s. The impact was not limited to those localities, as drugs produced found their way into American cities like Miami, casting a shadow over distant economies. Despite this global phenomenon and its tangible impacts, until recently no comprehensive picture of the illicit network existed. As a result, it was perfectly reasonable to focus on local effects.

A study by the Combating Terrorism Center (CTC) conducted in 2014 offered a good reason to set aside siloed, local studies to consider the global implications of an expansive criminal and terrorist network that capitalizes on the opportunities of increased globalization and regional connectivity. Rather than a series of unconnected parallel criminal and terrorist networks that coexist in different regions around the world, the CTC analysis showed that 98 percent of the 2,700 individuals in the study were subsumed in a single, expansive, cross-national network.<sup>3</sup> This was somewhat unexpected as the study started with a list of 40 leading criminals across narcotics, arms, and human trafficking. Instead of finding locally focused criminal networks, this study demonstrated that individuals maintain relationships between a variety of criminal, terrorist, and antistate enterprises across continents and oceans. Critical to this process is the ability of criminals in one illicit sector to maintain relationships with

those involved in different criminal activities, as well as with individuals on global terrorist watch lists.

Focusing on a specific illicit actor or activity in a country or region can be helpful for local policy or law enforcement, but can be misleading in attempts to understand the broader socioeconomic ecosystem in which these individuals operate. Drug production in Colombia can impact crime and health care costs tied to addiction in Los Angeles. Arms made in Eastern Europe have found their way to Africa, Latin America, and Asia. In recent years, authorities have found money laundering and market manipulation crime syndicates operating at vast distances. Though this process seems relatively organized, there is no central command ordering interactions; there is no *Spectre*. The network is best described as a self-organizing complex system, or the outcome of self-interested opportunity-seeking social agents. The existence of an interconnected global network that leverages both licit and illicit marketplaces warrants an examination to better understand how the world's true pools of darkness impact legitimate economies and markets. This is meant to be a small step in legitimating that research.

### **How Do We Measure Economic Performance and What Moves Equity Markets?**

In order to demonstrate the impact of illicit networks on the economy, we must first address how we measure the robustness, well-being, and stability of the economy. Economic performance can be measured by using macroeconomic indicators; the two most common are gross domestic product (GDP) and gross national income (GNI), using real, nominal, or per capita values. To clarify, GDP tracks all expenditures on goods and services produced domestically, while GNI is GDP plus income earned by foreign residents (and less income earned by nonresidents in the country). These types of metrics, while helpful, are subject to different interpretations and revisions because of the difficulty associated with aggregating data over an entire economy. More problematic is that these numbers are published infrequently. Indeed, in the United States, initial GDP numbers come out once every quarter, but the final numbers are lagged by up to three months. In other countries, particularly in the developing world, data is released far less regularly and may be unreliable. Because of this, it is much more difficult to track the effect of the crime-terror network with infrequent, lagged, and oftentimes, inaccurate data. Identifying the impact of illicit activity across statistics that aggregate infrequently across an entire economy is difficult at best. Most relevant here, such indicators shed little light on the volatility that activities like crime and terrorism can create.

Financial markets offer a different way of gauging the impact of illicit activity instead of the slow and opaque calculation that comes from relying on GDP indicators. Equity markets generally reflect investors' trust in business and the economic environment, specifically investors' willingness to risk capital in long-lived assets. Markets provide real-time price discovery, meaning there is regular feedback on the business environment and the probability of future cash flows. Another advantage is that equity values shift over time, and the price swings are one way to gauge investor uncertainty and risk. Larger price

swings, or increased volatility, generally reflect greater uncertainty and risk to future cash flows.

Other asset classes, like sovereign bonds, could have been used to examine the macroeconomic conditions, but equities arguably provide the best metric for real-time sentiment regarding the business environment. Sovereign bonds reflect investors' belief in the government's ability to not only pay the bills, but also to remain in power. Corporate credits would provide a better sense of the business environment than sovereign bonds, but they value a fixed payment stream, as opposed to equity holders who face an uncertain path of cash flows. Bondholders also usually have a claim on assets that could be sold, limiting the downside whereas equity holders typically have less protection against total loss.

Looking at equity markets (like the New York Stock Exchange, the NASDAQ, the Shanghai Composite, the London Stock Exchange, or any others across the globe) can be a way to assess the economic performance of a country while also factoring in risk and investor sentiment.<sup>4</sup> Using equity markets also allows for microanalysis, offering real-time data on not just the broader economic performance, but also future expectations for the business environment.<sup>5</sup>

International equity market returns are highly variable from year to year, as investors often find one year's underperforming market attractive the following year. Investors try to identify markets most likely to yield returns, sometimes in risky markets that have sold off in previous years. In other words, investors may be compensated for risk through low entry prices. Even a risky market, given the right price, can be an attractive value-investing opportunity. International equity market returns, therefore, are implicitly risk-adjusted. If risky assets are priced attractively, the return could still be substantial. Equity returns can be highly variable and risk is only one of many factors that investors may consider.

By focusing on swings in asset prices over time, volatility offers a more straightforward method of thinking about risk. More mature, stable, and transparent markets experience lower levels of volatility as investors have better information and confidence in the market. By contrast, markets in developing countries with poor governance, rule of law, and economic foundations are likely to be quite volatile. These factors are not easily changed, and volatility levels generally change slowly over time unless impacted by a major exogenous shock.

What types of things can affect equity markets? An equity index can be affected by economic issues, financial conditions, geopolitical concerns, or exogenous factors, like the weather. At the base level, equity prices are determined by estimates of the growth of future cash flows and the cost of capital. Economic measurements like GDP help investors get a sense of the growth environment, and stock market returns usually correlate with future growth.<sup>6</sup> Investors use the data releases to improve their understanding of future conditions, and so incorporating an economic indicator on the health of the economy is an important control variable. When investors believe that the pathway of future economic performance remains strong, market values are likely to increase and volatility should decrease. Growth scares and poor economic activity should lead to increased volatility as investors struggle to price an uncertain set of cash flows.

Inflation also has a strong and significant relationship to equity market volatility. Inflation is the cost difference between buying a good today versus sometime in the future. At first this might seem to have little impact on financial markets, but it actually serves as a critical building block to asset valuation. The rate of inflation helps establish the cost of borrowing money, or the cost of capital. As inflation increases, investors demand higher compensation for allocating their funds today, since those same funds will have lower purchasing power in future environments experiencing high inflation. Investors struggle to accurately set rates of return, and thereby determine the true value of future cash flows. Research suggests that countries experiencing higher inflation do face higher levels of asset price volatility, and our research incorporates inflation as an additional control variable.<sup>7</sup>

## Data and Methods

Our research relies on a number of data sources, but the most unique was a database developed by the Combating Terrorism Center at West Point based on open-source data compiled by Thomson Reuters' World-Check. Coders at World-Check relied extensively on court documentation, including indictments, from dozens of countries in over 60 languages as well as traditional open-source material. The initial database was compiled for commercial use as a due diligence tool. After the September 11 attacks, the United States adopted more stringent rules on money flows, raising the burden for financial services companies in particular. World-Check gathered information on individuals added to government watch lists along with their known associates, and the CTC used the data source to conduct an experiment on convergence in crime and terror across the global network of illicit actors and activities.

As noted above, the CTC study generated a list of the top 40 transnational criminals across narcotics, arms dealing, and human trafficking.<sup>8</sup> The project aimed at identifying the prevalence of linkages, or social distance, between the transnational criminals and terrorist actors based on known associates in the World-Check data. The researchers did not have to look very far. The initial 40 illicit actors linked directly to 754 known associates, and 86 were transnational terrorists on global watch lists. The frequency of terrorist elements in the network increased significantly when researchers moved out one degree.

As discussed, the most surprising conclusion in the CTC study was the interconnectedness of global illicit actors. This interconnectedness was not the work of any individual or group, but the outcome of a self-organizing complex system. The study then leveraged geographic data to identify potential drivers of crime-terror convergence. The cross-sectional analysis included a range of network variables across 120 countries. Rather than revisit the conclusions reached in that work, which focused on forces that may have influenced the formation of the network, the study conducted for this chapter leveraged the cross-sectional data to look at the way characteristics of the illicit network might impact the global financial system, using equity markets as a proxy. In other words, the CTC study used the network characteristics as a dependent variable, attempting to explain the patterns of illicit connectivity based on economic and political factors across countries.



Here, the network data serves as an independent variable to better understand whether illicit activities and networks impact licit economies and market functions.

The research conducted for this chapter leveraged three variables from the CTC data that summarize different aspects of the illicit network within each country. Networks can be characterized in a number of ways including number or density of connections, as well as structural features that help summarize an individual's role within the network. The three variables were chosen to reflect different ways that illicit behavior and the networks may weigh on governance and economic risks pertinent to financial markets. Each will be discussed here briefly. The main explanatory variables included factors for convergent relationships between criminals and terrorists, the average degree of illicit actors, and the average betweenness of those in the network. Each of these could impact the broader environment in which businesses and investors operate.

The convergence between criminal and terrorist elements was a critical aspect of the CTC study. Prior to building the network database, each individual in the network was assigned a role, or reason for inclusion. This was not a subjective decision by those that built the network graph, but a data field developed beforehand, which helped ensure that results were not driven by idiosyncratic or biased coding in the network study. Justification for the initial coding usually came from legal filings or watch list designations. As a result, some individuals were identified as terrorists while others were identified for their involvement in criminal activities such as narcotics or arms trafficking. In reality, the designations might not be mutually exclusive; consider individuals like Dawood Ibrahim. Though Ibrahim spans the worlds of terrorism and criminality, his primary interest is the D-Company criminal enterprise.

Convergence summarizes the density of ties crossing between individuals classified as criminals and terrorists in each country. The variable calculates the number of individuals that are criminals linked to terrorists, or terrorists linked with criminals, and divides that by the total number of illicit actors within the country. Higher levels of convergence reflect a greater propensity for terrorists and criminals to interact.

Degree centrality is perhaps the most basic metric within network science, and is generally thought of as a significant measure of importance in the network. The measure is simple and calculated by summing the total connections for each individual within the network. For example, if a network has nine people and one of the individuals has a social relationship with four other individuals, then the degree centrality equals four. The person who has two connections has a degree centrality of two, and is generally viewed as less connected than the individual with four. The more connections an individual has, or the higher the degree, the more influence that person could have in the network. Degree centrality does not incorporate unique structural aspects of the network or the placement of individuals within the infrastructure; it simply characterizes a network by the sum of connections of each individual. There are other measures of importance or influence within a network, as discussed below, but degree centrality is one commonly used metric, the easiest to calculate, and the most intuitive. In this study, degree centrality is converted into



a country-level measure by taking the average for each individual operating within the country. This summary degree variable is one method of reflecting the level of connectivity that illicit actors have, irrespective of their respective illicit activities, within each country.

The final network measure included is betweenness, one of the many metrics for influence in graph theory. While degree centrality measures influence by the aggregate number of connections, betweenness incorporates network structure and positioning of an individual within that structure. The measure specifically captures the importance of an individual in linking disparate parts of the network. Returning to the nine-person network above, imagine there are two groups of four people, each of which know one another. Each of the eight individuals in the two groups has a degree centrality of four. The ninth person in the network knows one person from each of the two groups. In the example above, the individual with the two connections might seem less influential, however, betweenness incorporates their structural position. In this instance, anytime the two groups want to interact, they must go through the person with degree centrality of two. Despite having fewer connections than those within the four-person networks, that ninth individual plays an important role as an intermediary.

Technically, betweenness is calculated by looking at the shortest pathway between any two nodes in the network and calculating how many of the paths go through a single individual. Those with the most through traffic have the highest betweenness. Individuals with high betweenness connect parts of the network that would otherwise be unconnected. Like the degree centrality measure, in this study it is first calculated for each individual and then converted into a country-level variable by calculating the average betweenness for individuals in each country. Literature on network analysis often refers to those with high betweenness as boundary spanners. These people are the network glue, or bottlenecks, when connections grow sparse. By connecting groups that might be otherwise unconnected, they play an important role as brokers and intermediaries. In some ways, betweenness is the most interesting of the three network measures, reflecting the ability of illicit actors within each country to facilitate high value transactions in goods, information, skills, or people within or outside of the country. These are illicit brokers that generally have international reach.

Our study also included a political control variable to ensure that any relationships among network measures were not capturing other country-specific governance factors that could impact volatility. The first alternative hypothesis is that higher measures among the network variables really reflect the functioning or failure of the government. In other words, countries with robust illicit networks are really just those one would consider failed or failing states. The CTC report dealt with this at length and found the two were distinct. To ensure that the network characteristics are not just measuring governance, the study included the Fragile States Index. This metric uses 12 indicators of state fragility and assigns a number to each state based upon perceived risks; the higher the number, the more risk factors there are in the country.<sup>9</sup>

Since our research is primarily about licit finance, incorporating variables that drive markets is critical. Therefore, the study included economic growth and inflation rates.

Generally, countries with higher real economic growth should expect higher returns and lower volatility. Since returns are partially driven by expected growth, and markets in growing economies are more likely to move higher, there are fewer price swings. The final control used in this study is inflation. Work on the “diversionary war hypothesis,” the idea that countries begin wars when internal turmoil rises, often uses inflation as a metric for internal turmoil.<sup>10</sup> From a market’s perspective, higher inflation complicates efforts to price financial assets. Investors may grow concerned about political will or capability to control prices. The true value of an asset becomes more difficult to discern, and this can increase volatility.

We used two volatility measures over time to examine the potential relationship between illicit networks and licit markets. Equity market volatility generally refers to the standard deviation of closing prices for a given period of time. The analysis included volatility measures taken over 30-day and 260-day intervals in 2013 and 2014. Market data came from a commonly used financial database. The next section shows and discusses the results from the statistical test using the volatility measures as the dependent variables with the network characteristics and control variables as the independent variables.<sup>11</sup>

## Analysis

The empirical analysis of equity volatility across the 69 financial markets reveals that certain aspects of illicit networks have a significant impact on licit economic and market activity. At the same time that the econometric results suggest that market participants and policymakers should consider the impact of illicit networks, only certain structural factors proved to correlate strongly with equity market volatility. The factors we identified as the most significant were the levels of interaction between criminal and terrorist actors and the level of betweenness of actors within the network; increases in both these factors were positively correlated with market instability. This illustrates the tangible economic ramifications of convergence.

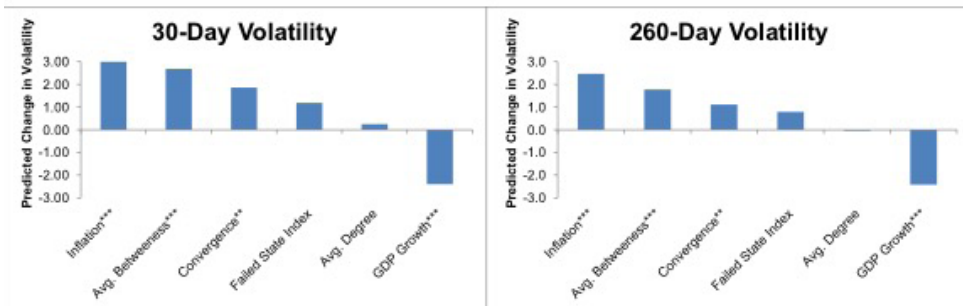
Our research demonstrates that the threat posed by crime-terror convergence carries over into the licit economy. Convergence displayed the strongest positive correlation among the network factors incorporated in the analysis; thus, equity markets in countries where criminal elements and terrorists have higher levels of interaction are, on average, more volatile than those where criminals and terrorists were reasonably isolated from each other. The tendency, and ability, for illicit actors to cross the crime-terror boundary increases risks to businesses and investors, thereby weighing on the private sector. In short, criminal networks can have tangible effects on economic health.

One thought that immediately comes to mind is that convergence, or the tendency for terrorists and criminals to interact, is largely a feature of failed states. This is, after all, conventional wisdom. The CTC report on crime-terror connectivity empirically refuted this long-held notion. Poor and failing states did not necessarily have the highest rates of crime-terror connectivity as convergence is a unique variable distinct from measures of governance or lack thereof. Convergence is prominent in two conditions. First, poor and

failed states, but only when the country is prone to initiating military conflict. Second, connectivity between terrorists and criminals is not isolated to poor and failed states, as rich countries can have high levels of convergence. Thus, assuming that convergence and failed states are synonymous is dangerous.

Our more recent research shows once again that convergence and failed state status are not equivalent concepts). While convergence is highly correlated with equity market volatility at statistically significant levels across time, the control variable for failed state status is relatively uncorrelated with equity volatility despite a small positive coefficient. The relationship between the failed states index control variable and volatility was not statistically significant. To ensure that the failed states index and convergence were not capturing the same phenomenon, correlation coefficients were run that showed a modest (below 0.20) relationship between the two variables.

**Figure 5.1. Estimated Impact of One Standard Deviation Increase on Volatility**



Note: Statistical significance marked by \* p-value<0.10, \*\* p-value<0.05, \*\*\* p-value<0.01.

Convergence in a country is clearly distinct from the failed state status in this sample as previous research suggested, and convergence is a much more powerful explanatory factor for equity market volatility. As the marginal analysis shows, a one standard deviation increase in the convergence variable generates an additional 1.1 to 1.9 more volatility, or put another way, increases average volatility by 7 to 10 percent. Using a theoretical options valuation model, that would increase the cost of hedging a 10 percent decline by 66 percent. That cost is built into the return calculations, meaning that expected returns have to increase enough to offset the higher hedging expense, which can have significant impact on allocation decisions, capital inflows, and private sector investment.

Convergence was not the only aspect of illicit connectivity that correlated with increased equity volatility. The average betweenness of the illicit actors within each country also seems to weigh on the markets. This was also consistent with the propositions offered earlier. Higher betweenness offers individuals unique standing and capabilities within a network. These are the individuals best capable of moving money and goods to parts of the network that might not otherwise have access. Just as in the case of licit economies, control of scarce resources is a source of power and wealth in the illicit world. By contrast, degree

centrality did not correlate with equity volatility. Countries with illicit actors that have high betweenness scores are transit points, at least in the network sense, for the raw materials that enable illicit activity. The boundary spanners or brokers probably yield significant influence while also having access to networks and cells both inside and outside their country. The connected and transnational nature of the network often translates into the realm of illicit finance, with these individuals moving money across the illicit network as well as between the licit and illicit economies.

The relationship between betweenness and equity market volatility is even stronger than convergence, which is not surprising since the measure incorporates structural position in characterizing importance. The impact of betweenness actually outweighs that of connectivity. While a one standard deviation increase in convergence is associated with a 30-day volatility increase of 1.9, the predicted impact of a similar increase in betweenness increases volatility by 2.7. The glue that holds together the global illicit network, particularly disparate parts of the network, is the greatest threat to licit commerce as gauged by equity market volatility based on this analysis. At first glance, the increased volatility seems small. The mean 260-day volatility across the sample is 15.7. The marginal impact of a one standard deviation in convergence and betweenness is 1.1 and 1.8, respectively.

An increase in volatility from 15.7 to 18.6 might seem small, but the financial implications can be significant. These seemingly abstract measures can actually be translated into monetary costs. The costs of hedging such risks can increase from 50 percent to 230 percent. To justify the investment, asset allocators would have to overcome a drag of at least 0.5 percent on expected return, which could be sufficient to drive investment towards another market. For example, if an emerging market had a total market of \$40 billion, the costs of hedging could increase from \$400 million to \$600 million on the low end of the estimate.

## Policy Implications

In the last decade, the growing convergence between criminal and terrorist enterprises has gained attention in the foreign policy and military arenas, but as we showcase here, there is also a sufficient rationale to consider the economic impact as well.

Just like any of today's multinational companies operating with globalized supply chains, these illicit networks will continue to converge and work together, whether their missions overlap or not, in order to move resources, share knowledge, and raise funds to operate. The links between these groups will be stronger and the networks will naturally grow increasingly dense, as is the case with many naturally occurring complex systems. More convergence likely translates to greater economic effects locally as well as globally.

With higher volatility, there is an expectation that equity market returns will be affected as well. Businesses and investors frequently consider the costs of security and illicit activity, but rarely do they explicitly price this illicit network component into their calculations. This risk premium for businesses to operate in a country with stronger convergence remains higher than in countries with lower convergence rates, raising the

costs of doing business in these countries. For countries looking to access foreign capital for commercial and infrastructure development, the costs to hedge risks from convergence can weigh heavily and limit capital inflow, which hurts development. Investor perception of convergent risk in developing markets may partially explain the predilection for foreign capital to flow to developed economies despite lower long-term economic growth rates.

Developed countries, however, also grapple with convergence threats. Less-developed countries do not necessarily have higher rates of convergence than developed countries. Development does not actually serve as a strong indicator of criminal or convergent activity (though this does not mean it is not an indicator). This is a global challenge, and undermines the conventional wisdom that poorly governed countries are hotbeds for illicit activity. The prominent nature of this misperception may be rooted in the vastly different capabilities that exist between developed and developing countries. Developed countries have highly institutionalized elements ready to deal with many of the problems, but there is no shortage of work for law enforcement and intelligence personnel. In some cases, developing nations have lower levels of convergence than developed countries, but they also have to do less with less.

Building on the CTC data that argued interaction in the global network was more common than previously expected, these relations seemingly affect a country's economic ecosystem. The rise of groups like the Islamic State of Iraq and the Levant (ISIL) that bridge gaps across the criminal-terrorism spectrum is a primary example of this. ISIL is selling oil on the black market and that can impact licit markets. This type of activity happened in the mid-2000s, with nearly 20 percent of Iraqi oil production (or up to 300,000 barrels per day) marked as unaccounted, which is industry parlance for likely stolen and smuggled.<sup>12</sup>

Following the September 11 terrorist attacks, then President George W. Bush created the Office of Terrorism and Financial Intelligence in the Department of Treasury and repurposed other departments and officials to work on criminal and terrorism financing. This included safeguarding the financial system against illegal use (i.e., money laundering) while also combating illicit actors, including rogue nations, terrorist cells, and drug traffickers. Even with these resources, the effect that illicit networks have on broader economic issues is not well-documented. By better understanding this relationship and seeing the extent to which illicit networks are a drag on a country's economy by producing increased volatility, policymakers can better assess the most economically damaging elements.

The crime-terror convergence is a growing, but still young, field of inquiry. Criminal enterprises from all facets of the illicit spectrum, from terrorism to financial criminals, often work together in some manner over time. The effects can be drastic and destabilizing. Criminal and terrorist groups aim for negative political control in that they benefit from denying or minimizing government and law enforcement operating capacity. Criminals want to pursue profit without fear of law enforcement, but criminal profits come at a cost in legitimate economies. When crime is rife, relying on contracts and other business conventions becomes tenuous. Criminal groups can also seek gain from levying illegitimate

taxes on local businesses. Even in instances where criminals do not seek to directly profit, illicit activity redirects funds out of the licit economy. Moreover, terrorists often seek to overturn the political status quo and frequently rely in part on attacking the legitimacy of the ruling regime. Stifling economic growth and commercial activity is one method by which terrorists might look to cast doubt on the capability of current political leadership. The tactics employed, violence aimed at civilians, create a drag through damaged property, loss of life, and dampening of commercial sentiment. There are also direct costs associated with countering both criminal and terrorist elements, and those tend to increase as the problems grow more acute.

The impact of criminal and terrorist activity could be bleeding into and impacting the larger and more general (and licit) marketplaces. Criminal networks can interfere with trade routes or cause supply shortages. As Jessica Stern writes in this volume and others have noted elsewhere, ISIL lines its coffers with the sale of stolen oil (measured by the U.S. Treasury as over \$1 million per day), impacting local and regional economies.<sup>13</sup> ISIL's success in raising illicit funds, working with criminal elements, controlling territory, and building an international strike capacity shows how dangerous and destabilizing the intersection of crime and terrorism can be.

The dynamics between illicit networks and national economic performance are not entirely new ground, but the data analyzed is somewhat novel. Extant scholarship suggests a number of things about criminal-terrorism convergence. Some have argued that the process of convergence has hastened in recent years, and the growing interconnection is a unique problem for and threat to U.S. national security.<sup>14</sup> Others have argued that convergence is overstated as a national security threat.<sup>15</sup> However, in a previous phase of this project, network analysis found that the illicit network is highly connected. Looking at more than 2,700 individuals operating in 3,600 locations and linked by 15,000 relationships that span 122 countries, the analysis showed that 98 percent of the individuals in the dataset were separated by a maximum of two degrees of association. In total, the CTC analysis found more than 1,000 country-to-country relationships.<sup>16</sup>

Questions about the types of interactions in the crime-terror network remain. These links can be to get money, but are primarily transactional in nature, based on partnerships of convenience and complementary business ties.<sup>17</sup> Some scholars have correctly identified that groups or individuals might work together for certain periods of time and then terminate their relations.<sup>18</sup> Some groups converge on an activity, when terrorists use criminal activities or criminals use terrorist tactics in pursuit of their respective political and economic ends, while others converge when a terror group works with a criminal enterprise. We have seen that with the Haqqani network's relationship with al-Qaeda and D-Company's relationship with Lashkar-e-Taiba. Related, groups may also transition along an apparent crime-terrorism continuum, transitioning from ideologically motivated groups that avoided involvement with criminal activities that now perpetuate crimes because of the attraction of the lucrative nature of criminal activities.<sup>19</sup>

Turning to the economic side of illicit networks, the debate is far less developed.

Many questions arise when trying to assess the global economic footprint of illicit networks. Some have come up with estimates; however, not only do these estimates vary widely, but it is also difficult to determine their accuracy, with estimates ranging from 8 percent to as large as 30 percent of world GDP, or \$6 trillion to \$22 trillion. Even if these estimates are not fully accurate, the scope of these networks is jarring.

A handful of papers have studied the economic impacts of singular aspects of the illicit network. In the wake of the September 11 attacks, terrorism received most of the attention and research. It is clear that terrorism has a negative economic effect. Looking at the September 11 terrorist attacks, the direct costs were estimated at \$27.2 billion, which represented about 0.25 percent of the U.S. GDP.<sup>20</sup> Looking more holistically, terrorist attacks have a stock price reaction of -0.83 percent, which corresponds to an average loss per firm per attack of \$401 million in market capitalization, or the value of a company calculated by multiplying the current share price and the total number of outstanding stocks.<sup>21</sup> The correlations between regime type and development level with illicit networks are interesting and complex. The general consensus is that developing countries and nondemocratic regimes are more conducive to illicit networks that also damage the country's economy. However, transnational crime is strongest in the richest countries, but often obfuscated by the sheer size of the legitimate economy.<sup>22</sup>

## Conclusion

Illicit networks leave a broad wave of destruction in their path. This clearly touches the community (and the broader region and globe), but these networks are also a headwind for national economies.

There are certainly limitations, as with any type of study delving into the clandestine. Now that we know these groups are well-connected and have a draining effect on the financial system, more effort needs to be paid to how these groups interact, and ultimately, how these groups first become connected. Lack of data (particularly in the 51 countries that lack an equity market that were included in the original study) limits this study, but additional attention needs to be focused on the aggregate effect over the long run. Our analysis lays out how the illicit and the licit economy bleed together. For illicit networks, destabilization is critical, and that is borne out in the numbers.



## Appendix. Full Regression Results

	Ordinary Least Squares		Random Effects	
	30 Day Volatility	260 Day Volatility	30 Day Volatility	260 Day Volatility
Convergence	3.36 **	2.01 **	3.37 *	2.28 *
<i>Std. Error</i>	1.84	1.02	1.96	1.33
Average Between	1.65 ***	1.10 ***	1.66 **	1.20 **
<i>Std. Error</i>	0.75	0.41	0.80	0.54
Average Degree	0.05	-0.01	0.05	-0.03
<i>Std. Error</i>	0.25	0.14	0.26	0.18
Failed State Index	0.05	0.03	0.05	0.02
<i>Std. Error</i>	0.05	0.03	0.05	0.03
Inflation	0.49 ***	0.40 ***	0.48 ***	0.36 ***
<i>Std. Error</i>	0.17	0.09	0.18	0.11
GDP Growth	-0.88 ***	-0.89 ***	-0.85 *	-0.52 **
<i>Std. Error</i>	0.42	0.23	0.44	0.24
Constant	12.16 ***	12.86 ***	12.14 ***	12.65 ***
<i>Std. Error</i>	3.15	1.73	3.34	2.28

Note: Statistical significance marked by \* p-value<0.10, \*\* p-value<0.05, \*\*\* p-value<0.01.

## Notes

<sup>1</sup> For greater information on equity markets or volatility, please consult, among other resources, Frederic S. Mishkin and Stanley Eakins, *Financial Markets and Institutions* (New York, NY: Prentice Hall, 2014).

<sup>2</sup> Stephen Easton, "The Size of the Underground Economy: A Review of the Estimates," *Simon Fraser Working Paper* (2001), available at <<http://www.sfu.ca/~easton/Econ448W/TheUndergroundEconomy.pdf>>.

<sup>3</sup> Scott Helfstein and John Solomon, *Risky Business: The Global Threat Network and the Politics of Contraband* (West Point, NY: Combating Terrorism Center at West Point, May 2014).

<sup>4</sup> Brad Comincioli, "The Stock Market As A Leading Indicator: An Application Of Granger Causality," *The University Avenue Undergraduate Journal of Economics* 1, no. 1 (1996); Holger Sandte, "Stock Markets vs GDP Growth: A Complicated Mixture," *BNY Mellon Viewpoint*, 2012.

<sup>5</sup> Tracking volatility in equity markets can be relatively straightforward, but numerous studies reflect on methods of constructing and analyzing equity volatility. One common method of tracking volatility uses exchange indices like the Chicago Board Options Exchange Volatility Index (VIX). These index measures usually use derivative or hedging markets to assign a value to volatility, but most commonly the measure refers to the standard deviation of asset prices.

<sup>6</sup> Eugene F. Fama, "Stock Returns, Real Activity, Inflation, and Money," *The American Economic Review* 71, no. 4 (1981).

<sup>7</sup> Claude B. Erb, Campbell R. Harvey, and Tadas E. Viskanta, "Inflation and World Equity Selection," *Financial Analysts Journal* 51, no. 6 (1995); John H. Boyd, Ross Levin, and Bruce D. Smith, "The Impact of Inflation on Financial Sector Performance," *Journal of Monetary Economics* 47, no. 2 (2001).

<sup>8</sup> World-Check identified the primary activity for which illicit individuals were listed or indicted, and as result the Combating Terrorism Center team did not have to make coding judgments about the illicit activities with which individuals were involved. This helped avoid biased coding or results, creating a double blind experiment of sorts.

<sup>9</sup> The Fund for Peace, "Fragile States Index," 2015, available at <<http://fsi.fundforpeace.org/>>.

<sup>10</sup> Sara McLaughlin Mitchell and Brandon C. Prins, "Rivalry and Diversionary Uses of Force," *Journal of Conflict Resolution* 48, no. 6 (2004).

<sup>11</sup> Empirical assessment of the relationship between illicit networks and equity market volatility was relatively straightforward. Volatility is a continuous measure with definable mean and standard deviation. Under

these conditions, the most straightforward and simplest measure of estimation is the basic multivariate linear regression model or ordinary least squares. A number of other models and specifications were used to ensure the robust nature of the results. While the section below reports results from ordinary least squares, the Appendix with the regression results also includes a random effects model common in panel data.

<sup>12</sup> James Glanz, "Billions in Oil Missing in Iraq, U.S. Study Says," *New York Times*, May 12, 2007, available at <[http://www.nytimes.com/2007/05/12/world/middleeast/12oil.html?\\_r=0](http://www.nytimes.com/2007/05/12/world/middleeast/12oil.html?_r=0)>.

<sup>13</sup> David McCabe and Laura Barron-Lopez, "Treasury: ISIS makes \$1M a day from oil sales," *The Hill*, October 23, 2014, available at <<http://thehill.com/policy/defense/221644-treasury-isis-makes-1m-a-day-from-oil-sales>>.

<sup>14</sup> Thomas M. Sanderson, "Transnational Terror and Organized Crime: Blurring the Lines," *SAIS Review* 24, no. 1 (2004); Bob Killebrew and Jennifer Bernal, "Crime Wars: Gangs, Cartels, and U.S. National Security," *Washington, DC: Center for a New American Security*, 2010.

<sup>15</sup> Chris Dishman, "Terrorism, Crime, and Transformation," *Studies in Conflict and Terrorism* 24, no. 1 (2001).

<sup>16</sup> Helfstein and Solomon, *Risky Business*.

<sup>17</sup> Vanda Felbab-Brown and James J.F. Forest, "Political Violence and the Illicit Economies of West Africa," *Terrorism and Political Violence* 24, no. 5 (2012); Michael Kenney, *From Pablo to Osama: Trafficking and Terrorist Networks, Government Bureaucracies and Competitive Adaptation* (University Park, PA: Pennsylvania State University Press, 2007); Peter Lowe, "Counterfeiting: Links to Organised Crime and Terrorist Funding," *Journal of Financial Crime* 13, no. 2 (2006); Louise Shelley and John Picarelli, "Methods Not Motives: Implications of the Convergence of International Organized Crime and Terrorism," *Police Practice and Research* 3, no. 4 (2002); John Picarelli, "Osama bin Corleone? Vito the Jackal? Framing Threat Convergence Through an Examination of Transnational Organized Crime and International Terrorism," *Terrorism and Political Violence* 24, no. 2 (2012).

<sup>18</sup> Shelley and Picarelli, "Methods Not Motives."

<sup>19</sup> Tamara Makarenko, "The Crime-Terror Continuum: Tracing the Interplay between Transnational Organized Crime and Terrorism," *Global Crime* 6, no. 1 (2004).

<sup>20</sup> Tilman Bruck and Bengt-Arne Wickstrom, *The Economic Consequences of Terror: A Brief Survey*, HiCN Working Paper No. 3 (Brighton: School of Social Sciences and Cultural Studies University of Sussex, 2004).

<sup>21</sup> Andrew Karolyi and Rodolfo Martell, "Terrorism and the Stock Market," *International Review of Applied Financial Issues and Economics* 2, no. 2 (2010).

<sup>22</sup> Patrick Radden Keefe, "The Geography of Badness: Mapping the Hubs of the Illicit Global Economy," in *Convergence: Illicit Networks and National Security in the Age of Globalization*, ed. Michael Miklaucic and Jacqueline Brewer (Washington, DC: National Defense