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The illicit drug trade, counternarcotics strategies and terrorism

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Abstract Conventional wisdom indicates that international trade in illicit drugs helps to fuel terrorism. Since 2001, counter-narcotics policy increasingly has been used to fight terrorism. This study investigates empirically the relationship between the drug trade and terrorism and examines whether or not interdiction and eradication efforts reduce domestic and transnational terrorist activity. The study finds that illicit drug production and opiate and cocaine wholesale prices are significant positive predictors of transnational and domestic terrorist attacks, while drug crop eradication and drug interdiction are significant negative predictors of terrorism. The study concludes with the policy implications of the findings.

Keywords Terrorism · Illicit drug trade · Drug prices · Drug cultivation · Drug interdiction · Drug eradication

JEL Classification D74 · C23 · H56

"Drug money supports terror... If you buy drugs, you might too."

Office of National Drug Control Policy public service announcement
Aired Feb. 3, 2002 during Super Bowl XXXVI
Ad buy: $3.2 million for 30 seconds

1 Introduction

It is conventional wisdom, among policymakers, scholars and within the mainstream media that the international trade in illicit drugs is an important, and growing, driving force for terrorist activity (see, e.g., Cilluffo 2000; Cornell 2005; Gunaratna 2002; Hutchinson 2002;

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Perl 2001; Peters 2009; Rashid 1999). Experts assume that terrorist groups steadily have increased their involvement in the lucrative illegal drug trade and use drug revenues to expand their activities. Drug money allows groups to purchase weapons and equipment, recruit more cadres, bribe officials and establish networks of communications and safe houses. With these assets, terrorists can plan and execute more attacks. Experts also note that terrorist groups are well-suited to insert themselves into and benefit from the drug trade because they operate outside of legal and normative spheres. Furthermore, illicit drugs are an excellent resource for small, non-state actors like terrorists because they can be exploited with few investments in infrastructure and have a high value relative to transportation costs (Ballentine 2003; Cornell 2005). Drug revenues have become more important for terrorist groups because of declining state sponsorship in the post-Cold War era. Moreover, because there has been more monitoring of terrorists' traditional revenue sources after 9/11 (Dolar and Shughart 2007; Enders and Sandler 2000; Lipitz 2007; Ortiz 2002; Sanderson 2004), such groups have turned to revenues from illegal activities that are difficult to trace. Furthermore experts warn that because the illicit drug trade has compromised governments and security in countries like Afghanistan, it has helped to produce an environment that is highly conducive to terrorist movements (Kleiman 2004). As a result, terrorist groups thrive in countries politically destabilized by the drug trade.

A wide array of terrorist movements commonly are alleged to have engaged in the illicit drug trade: the Kurdish Workers Party (PKK); Hezbollah; the Filipino Abu Sayyaf movement; various Protestant paramilitaries and Real Irish Republican Army (RIRA) dissidents in Northern Ireland; the Indian separatist United Liberation Front of Assam; the Peruvian Sendero Luminoso; and of course the Taliban in Afghanistan and Pakistan and the Revolutionary Armed Forces of Colombia or FARC (Baruah 1994; Bibes 2001; Filler 2002; Makarenko 2004; Roth and Sever 2007; Silke 2000). One study estimates that the FARC movement derives approximately 50% of its operating revenue from coca production and cocaine trafficking (Rangel 1998). In some of these cases, local drug markets finance terrorist activity. However, scholars note that the illicit drugs and terrorism nexus has a prominent transnational dimension as well. Profits extracted from drug production and trafficking in one country helps to finance domestic terrorism in other countries far removed from the drug trade as well as transnational attacks (see Masciandaro 2004).

The assumption that illegal drugs help to drive terrorism is also reflected in counterterrorism policy. Increasingly, counter-narcotics policy decisions made in the United States, Western Europe and by international organizations like the newly formed and reorganized United Nations Office for Drugs and Crime (UNDOC) have come to be justified in the context of fighting terrorism (Felbab-Brown 2009). This is particularly true for terrorist hotspots in South and Southeast Asia, East Africa and Latin America. Eradication of poppy and coca crops and interdiction of heroin, opium and cocaine shipments have become key policy tools in fighting terrorism, even though these strategies remain controversial (see, e.g., Feickert 2005). Indeed, Kenney (2003) observes that contemporary counterterrorism operations in Afghanistan, Pakistan, Yemen and the Philippines are modeled after the "leadership interdiction" strategy used to neutralize Colombia's Medellin drug cartel during the 1980s. This further illustrates the degree of policy symbiosis that has developed between counter-narcotics and counterterrorism in policymaking.

However, despite copious qualitative documentation illustrated by the studies above, no systematic empirical research has been conducted on the relationship between the international trade in illicit drugs—specifically opiates and cocaine—and terrorism, or on the

effects of international drug interdiction and eradication campaigns on terrorism.[1] This study addresses these relationships by modeling the effects of worldwide illicit drug production and prices and drug interdiction and eradication outcomes on patterns of domestic and transnational terrorist attacks. The results of the analyses produce some preliminary empirical support for the hypotheses that drug prices and drug crop production are positive and substantive predictors of terrorism and that interdiction and eradication strategies may reduce terrorist activity. In the next sections I trace the theoretical dimensions of the relationship between drug markets and terrorist groups, conduct an empirical test of the relationship and conclude with a brief discussion of the implications of my findings for counterterrorism policymakers.

2 Drugs, counternarcotics policies and terrorism

How might the international drug trade fuel terrorist activity and how might counternarcotics policies like drug interdiction and eradication reduce terrorist activity? To address these questions, I borrow two theoretical arguments from Kleiman's (2004) depiction of the relationships linking drugs and terrorism and distill them into separate "cash" and "chaos" arguments about causal mechanisms.[2] The cash argument is straightforward. The illicit drug trade produces sizeable cash revenues[3] that terrorist groups extract—usually by taxing drug cultivators, storage agents, refiners and traffickers (see Felbab-Brown 2009; Goodhand 2000; Makarenko 2004)[4]—and then use them to expand their operations and launch more frequent attacks. The cash argument is the most commonly articulated focus of media and policymakers (Hutchinson 2002; Peters 2009), while reduction of terrorist group revenues, through efforts to destroy drug crops and production sites and to interdict drug products before they reach consumer markets, has become a key component of counterterrorism policy in many countries (Biersteker and Eckert 2007; Kleiman 2004; Steinitz 2002; Winer and Roule 2002). The chaos argument posits that illicit drug markets foster political instabilities within countries and undermine domestic security and the capacity of the state

[1] Empirical research has found opium production to be a positive predictor of the onset of civil wars (Regan and Aydin 2003; Regan and Norton 2003) and a factor prolonging domestic armed conflict. (Ross 2003, 2004a, 2004b). Overall, narcotics have not been studied extensively in the civil war literature.

[2] Kleiman (2004) actually distinguishes five different causal links between illicit drug markets and terrorism: (1) providing revenues for terrorist groups; (2) destabilizing and undermining security in drug-afflicted countries, creating space for terrorist activity; (3) corrupting and weakening government institutions thereby damaging legitimacy, fostering grievances against the ruling regime and impairing counterterrorism efforts; (4) creating ancillary black markets for weapons or forged documents that terrorists can use; and (5) taxing law enforcement by increasing crime overall. He identifies the first and second causal links, which he labels as "cash" and "chaos," as the most important for explaining how drugs boost terrorist activity (Kleiman 2004: 2). The other three causal mechanisms, I argue, are really adjuncts to the chaos causal mechanism.

[3] There is considerable controversy on the annual value of the global trade in illicit drugs. The United Nations Drug Control Program places the estimated value of the global trade in illicit drugs between $300 and $500 billion U.S. dollars annually, noting that this constitutes approximately 8% of world trade—a figure comparable to international trade in textile products (United Nations Drug Control Program 2000; United Nations Office on Drugs and Crime 2010). Scholars have disputed these figures, arguing that it is grossly inflated and estimating that the volume of transactions is between $20 and $25 billion annually (Reuter and Greenfield 2001).

[4] Though Peters (2009) makes the controversial argument that since 2001 Al Qaeda and the Taliban have moved beyond taxing and extorting money from apolitical participants in the narcotics trade into direct involvement in growing, trafficking and distribution.

to maintain civil order by projecting power internally. This angle is perhaps less frequently articulated by media and policymakers and is addressed more indirectly in counterterrorism policy, but empirical research on the relationship between weak and failed states and terrorism (for example Piazza 2007, 2008) and state internal policing capacity and terrorism (Lai 2007) helps to provide an empirical backdrop to the chaos argument.

3 Hypotheses

The cash and chaos arguments lead to three hypotheses to test the relationship between the international illicit drug trade and terrorist activity. The first of these links the wholesale prices of illicit drugs to terrorist activity, and is fully informed by the cash argument:

H_1: *Higher illicit drug prices yield higher rates of terrorism*

The bulk of the evidence seems to suggest that consumer demand for illicit drugs, particularly heroin and other opiates, is typically in the price inelastic range of demand, though this simple statement is qualified by some nuances and is affected by measurement challenges (Caulkins 1995; Erikson 1969; Koch and Grupp 1973; Weatherburn and Lind 1997). Illicit drug users exhibit less sensitivity to prices and rarely substitute other products or change consumption behaviors in response to price hikes. With demand in the relatively inelastic range for illicit drugs, higher drug prices yield larger revenues and profits (assuming no change in costs) for actors engaged in drug production, transportation and distribution, including terrorist groups (Godwin 1983; Wagstaff and Maynard 1988). These revenue increases stand to make terrorist movements associated with illicit drugs more active, permitting them to recruit more cadres, pay members higher wages, upgrade safe house networks and communication capacity, acquire more weapons, transport materiel and fighters, bribe officials and expand their operations. Higher prices therefore should trigger more frequent terrorist attacks. No previous empirical research has estimated the effects of drug revenues on terrorist groups, but work on analogous non-state actors—Mexican drug trafficking gangs—finds that a reduction in drug profits lowers their violent activity in the long term (Kilmer et al. 2010), thereby providing some confidence in Hypothesis 1.

The next hypothesis is informed by both the cash and chaos arguments:

H_2: *Higher rates of illicit drug crop production/cultivation will yield higher rates of terrorism*

The cash argument embedded in Hypothesis 2 turns on the difference between short and longer-term demand for illicit drug. In the short term, consumer demand for narcotics is stable. Therefore, when drug cultivation is higher and the supply of illicit drugs increases, the quantity demanded decreases. This reduces prices for illicit drugs and threatens to lower profits by reducing revenues and increasing costs for all actors engaged in the drug trade, ceteris paribus (see Bachman et al. 1990; Kleiman 1989; Weatherburn and Lind 1997). Decreases in drug revenue forces terrorist groups to scale back their activities as they find they have fewer resources to recruit for, plan and execute attacks. This dynamic is the key component of a common libertarian critique of existing counternarcotics policies that focus on supply-side solutions, such as drug crop eradication or subsidy of crop substitution (see, e.g., Carpenter 2005). Critics argue that such policies foster scarcities in narcotics markets, causing costs to fall and revenues to rise, thereby leading to more terrorism.

However, in the medium and long-run, increases in the number of potential customers and the development of new consumer markets has caused the demand curve for illicit drugs to

shift to the right. Caulkins and Reuter (2006) argue that drug markets have proven difficult for producers to satiate and that markets for cocaine and opiates in North America and Western Europe expanded through the 1950s to the 1990. Their depiction is consistent with other empirical evidence showing that global demand for illicit drugs grew from the mid 1980s to the late 1990s—through an increase in the number of new users in existing markets—and from the late 1990s to 2010—through the development of new markets. A 1999 report issued by the United Nations Office of Drug Control and Crime Prevention documents that between 1986 and 1997 the number of countries reporting an increase in cocaine and heroin usage among their populations increased (United Nations Office of Drug Control and Crime Prevention 1999: 91–96). In terms of absolute numbers of consumers worldwide, the 2011 *World Drug Report* issued by the UN Office on Drugs and Crime (UNODC) observes that since the late 1990s the numbers of illicit drug users has increased, though the number of chronic drug users has remained stable. More specifically, the UNODC estimates that in 1999 there were 180 million total users and around 25 million chronic, or "problem", users but by 2010 total users had increased to 272 million while chronic users had increased to 39 million (UNODC 2011). This suggests around a 10% increase per year in the potential consumer market for illicit drugs. The UNODC further documents the rapid development of new illicit drug consumer markets in Eastern Europe and the developing world. Heroin consumption dramatically increased in Central Asia and East Africa in the 2000s, while, during the same time, cocaine usage increased in West Africa and South America and synthetic drug consumption increased in the Middle East and South Asia. All of this occurred while traditional Western markets for cocaine, opiates and synthetics remained more or less steady (UNODC 2010).

Increased demand in the longer term buoys illicit drug prices and maintains higher revenue streams for all actors engaged in the drug trade, including terrorist movements. This stands to provide terrorist movements with the resources necessary to continue activities and to increase attacks, provided that the increase in costs is less than the increase in revenue from the increased cultivation. Perhaps more importantly, increased drug production boosts attacks as a byproduct of the locations where terrorist groups engage in the illicit drug industry. Recall that most terrorist groups insert themselves into the drug trade in geographic areas home to crop cultivation, storage and points of origin for shipments, where they serve as agents affording protection in return for "taxes" imposed on participants in the early stages of the supply chain, rather than at the point of distribution and sales. Higher levels of drug crop production, and higher rates of subsequent drug trafficking, afford greater opportunities for terrorist groups to engage in and extract revenues from the illicit narcotics trade, making them more active.

Hypothesis 2 also derives support from the chaos argument. Higher rates of cultivation indicate a reduced capacity of states to police their internal territories and suggest that the local drug economy has compromised state ability to enforce rule of law. Countries, where large quantities of illicit drugs are cultivated, are states with weak capacities to police their internal territories and where local drug production has compromised counterterrorism capacities. Overall crime rates rise and local law enforcement becomes overstretched and often corrupted while ancillary markets for weapons, illegal documents and illegal movement of persons across borders flourish (Kleiman 2004). Moreover, illicit drug markets in countries degrade governmental and civil institutions and add to popular anti-government grievances (Ross 2004b), which lead to a loss of legitimacy by afflicted governments. All of these developments are a boon to terrorist movements. Previous empirical research has found the growth of stateless or un-policed territory to be an essential element for the formation and development of terrorist groups because it affords terrorist groups training grounds and space to develop communication and other

fund raising capacities (see Piazza 2007, 2008; Takeyh and Gvosdev 2002). Similarly, countries with degraded rule of law, weak democratic institutions and aggrieved social groups have been found to experience higher rates of terrorism (Choi 2010; Li 2005; Piazza 2011). Terrorist groups find it easier to recruit cadres and to generate sympathy for their activities in countries with alienated and disaffected populations.

Reuter's (2009) discussion of cultivation practices of cannabis, opiate poppy and coca producers further undergirds the chaos component of Hypothesis 2. All three crops can in principle be grown anywhere, particularly with the perfection of indoor hydroponic growing techniques. The geographically location of drug cultivation is due mostly to local law enforcement capacity, which affects the costs of doing business, including modest increases in local wages (Reuter 2009). Poppy and coca, which are high-priority substances for law enforcement, are grown only in the few countries, characterized by severe state failures and poor policing capacity, like Afghanistan and Colombia.[5] Participants in this supply chain risk severe criminal penalties.

The final hypothesis is informed by the cash and chaos arguments:

H_3: *Higher rates of drug crop eradication and drug product interdiction will yield lower rates of terrorism*

As counternarcotics strategies, the goal of eradication and interdiction is to reduce terrorism by cutting off terrorist groups' access to narcotics trade revenues. The cash component of this argument anticipates that increased eradication and interdiction will do just that, and terrorist activity will correspondingly decline. But like Hypothesis 2 above, the effects of eradication and interdiction are different for short-term and longer-term demand. In the short term, eradication and drug seizure efforts, if successful, decrease the quantity supplied (demanded) (Bachman et al. 1990; Kleiman 1989). Decreased quantity supplied (demanded) leads to higher prices for drugs and, in turn, increases profits (assuming costs unchanged) for all actors engaged in the illicit drug trade, including terrorist movements. Moreover, civil liberties and human rights activist critics allege that US crop eradication and interdiction counternarcotics policies in countries like Colombia and Afghanistan are actually producing more terrorism. Rather than having the intended effects, critics contend that crop eradication programs alienate the local peasantry by destroying their livelihoods, damaging their legitimate crops and degrading environmental resources while interdiction efforts are often accompanied by human rights and civil liberties violations that damage the legitimacy of counterterrorism officials (Del Olmo 1998; Falco 1996; Rubin and Sherman 2008). In short, these well-meaning strategies backfire by producing grievances among Afghans and Colombians, making them less likely to assist counterterrorism officials and, in extreme cases, radicalizing them and pushing them into the arms of the terrorist movements themselves.[6]

However, there is both theoretical and empirical justification for Hypothesis 3. Tackling the chaos component first, higher rates of crop eradication and drug product interdiction

[5] Indeed, Felbab-Brown (2009) and Makarenko (2004) document the shift of poppy cultivation from Thailand, Turkey and Burma to Afghanistan and the shift of coca cultivation from Bolivia to Colombia in response to improving political stability and security in the former countries and worsening state capacity in the latter.

[6] Though some empirical research has been conducted on the effectiveness of U.S. drug eradication efforts to reduce crop supplies (see for example Farrell 1998), to my knowledge, the assumption that eradication increases terrorism has not been subjected to rigorous empirical investigation involving multiple countries. The closest attempt at doing so is found in two excellent country studies of coca production and FARC guerrilla violence in Colombia by Holmes et al. (2007, 2006).

are indicators of enhanced domestic security and international border policing capacity. The chaos component of this hypothesis is the mirror image of the argument laid out in Hypothesis 2. When more resources are devoted to eradication and interdiction, states are better able to project power into previously uncontrolled territories. Regardless of the direct impact on prices, this should reduce terrorist activity if findings linking state failure and stateless areas are correct (Piazza 2007, 2008; Takeyh and Gvosdev 2002).

The better policing that accompanies higher rates of supply interruption has implications for the cash argument present in Hypothesis 3. Because interdiction and eradication reduce short-term quantity of drugs supplied, this raises prices and revenues for terrorist groups engaged in the drug trade. However, in the longer-term, effective interdiction and eradication may actually reduce drug trade profits. Higher rates of eradication and interdiction mean that counterterrorism agents are better able to capture, arrest and neutralize drug trade actors. This reduces the number of participants in the drug trade and elevates the risks borne by growers, storage agents, traffickers and distributors, thereby cutting into their profits. Any actor engaged in the drug trade thereafter may see their costs of operation increase to the point where they outstrip the revenue increases produced by reduced quantity supplied, leading to an overall reduction in group revenues. This robs terrorist groups of potential operating resources and blunts their ability to launch attacks (Caulkins 1995; Caulkins and Reuter 1998; Farell et al. 1996; Reuter and Kleiman 1986). Also, if their effects on supply are severe enough, increased eradication and interdiction efforts might push the market for illicit drugs into the elastic range of the demand curve. This would raise prices, prompting consumers to substitute other products, or to abstain from use. This seems like an unlikely outcome, given traditional assumptions about the inelasticity of demand for addictive substances like narcotics, but some evidence has been gleaned from economic and public health studies that users turn to other licit and illicit drugs or abstain from use, in the short term, when suppliers lower purity levels or when the product becomes less obtainable in response to supply disruptions (Kaplan 1983). Jofre-Bonet and Petry (2008) document that cocaine users—but not heroin users—substitute alcohol, marijuana and valium if prices dramatically increase or if supplies are erratic. These behaviors would, in the short term, adversely affect drug actor revenues, leading to less terrorist group vitality; a finding consistent with studies by Farell et al. (1996) and Moore (1990).

4 Models and variables

To test the above hypotheses I use a series of 16 negative binomial cross national time series regression estimations[7] to model the effects of drug crop cultivation, wholesale prices and eradication and interdiction efforts on both domestic and transnational terrorist attacks in approximately 170 countries for the period 1986 to 2006. This produces between 2,868 and 3,787 country-year observations per model. There are two dependent variables for the study. The first is a count of domestic terrorist attacks occurring within each country-year derived from a new database developed by Enders et al. (2011) that separates domestic and transnational attacks reported in the Global Terrorism Database (GTD) compiled and published by the START center at the University of Maryland. Domestic attacks are incidents perpetrated

[7]The paper adopts a cross-sectional analysis rather than a global times series analysis even though the main independent variables in the study are global aggregates. However, a robustness check using reshaped bivariate global time series analyses produces findings consistent with the main findings of the paper. Results available from author.

by nationals within their own home countries against co-nationals, excluding incidents perpetrated against diplomatic targets and incidents with multiple nationalities of victims. The second is a count of transnational terrorist attacks launched by nationals of countries against foreign nationals or foreign targets from the International Terrorism: Attributes of Events (ITERATE) database compiled and published by Mickolus et al. (2009).[8] Transnational terrorist incidents are sorted by the country of national origin of the perpetrators. They may involve a local terrorist group targeting a foreign national, a foreign terrorist group attacking a local target or an attack spanning more than one country. The use of ITERATE as a source for transnational terrorist events is recommended by Enders et al. (2011) who show that ITERATE is more consistently coded than the transnational terrorist event data in GTD.

Comparing results across two dependent variables—domestic and transnational terrorism—is crucial to the study. It takes into consideration the possibility that illicit drugs and counternarcotics strategies have different effects on different types of terrorism. For example, it may be that because it is an international market in which the bulk of profits accrue to agents engaged in the trans-border traffic of products, the illicit drug trade or counternarcotics policies have a greater impact on transnational terrorist activity. However, it may also be the case that illicit drugs wreak greater chaos effects on local governments and law enforcement authorities. Therefore, increases in drug crop production or drug trafficking might boost domestic terrorism while intensified eradication efforts might reduce domestic terrorism. Furthermore, modeling the effects of the drug trade and counternarcotics policies on both transnational and domestic terrorist events, derived from two different databases, provides a test of the robustness of the predictive value of the independent variables.[9]

The nature of the dependent variable—a raw count of terrorist incidents per country-year observation—suggests the use of a negative binomial regression estimation technique rather than an ordinary least squares or Poisson model. The distribution of values is highly uneven across observations producing a large variance in the data (see Brandt et al. 2000; Cameron and Triverdi 1998; King 1988). The results reported in the article are, therefore, derived from the negative binomial estimations. The dependent variable contains a large number of zeros and in theory zero values in the data can be of two types: "certain" and "non-certain" zeros. I therefore rerun the models using a zero-inflated negative estimation binomial technique that fits both a full negative binomial model or "non-certain zero," which includes the independent variables and all covariates, and a zero-inflated logit or "certain zero" model that includes one variable, an indicator of local press freedom, that predicts the likelihood that the count of terrorist activity is zero due to restriction on media reporting of such events (see Drakos and Gofas 2006).[10] This robustness check produces the same results,[11] indicating that the findings of the study are not dependent on the estimation technique.

[8] The study uses counts of terrorist attacks rather than casualties incurred per attack as the dependent variable for two reasons. First, missing data complicates an analysis of illicit drugs, counternarcotics policies and casualty rates of terrorist attacks. For example, in the 34.4% of the attacks in the GTD domestic terrorism database produced by Enders et al. (2011) the number of persons injured or killed is unknown. Second, the use of terrorist incidents rather than terrorist casualties as an indicator of terrorist activity and the threat of terrorism is more conventional in the recent empirical literature (see Young and Findley 2011).

[9] Drakos and Gofas (2006) argue that measurement biases mar event-count terrorism data, posing difficulties in interpreting the results of empirical analyses.

[10] Note, in running the zero-negative binomial models, I also conducted Vuong tests to determine if they were more efficient than negative binomial estimations (Vuong 1989). The results of the Vuong tests reveal that the zero-inflated technique is only more efficient when the dependent variable is counts of domestic terrorist attacks, not international terrorist attacks.

[11] Available from the author.

4.1 Operationalizing illicit drug markets and counternarcotics strategies

A challenge, and limitation, of the study is that the key factor linking illicit drugs to terrorism in the cash argument—drug trade revenues used by terrorist movements to finance planning, operations and attacks—cannot be measured directly due to absence of data. In lieu of reliable indicators for terrorist group revenues derived from illicit drug production and trafficking, I am compelled to operationalize indirect measurements of the effects of drug markets on terrorist group behavior. The study searches for a relationship between illicit drugs and terrorism using two indicators of the "size" of the illegal drug market: (1) the volume of illicit drug production measured in terms of land hectares used for drug crop cultivation globally; and (2) an estimate of the market for illicit drugs, and indirectly the revenue that may be obtained by producing and trafficking, measured by wholesale prices of opiates and cocaine in Western Europe and North America. Drug wholesale prices are operationalized using Western European and North American data because countries in these regions contain the bulk of illicit drug consumers during the time period examined. For this study, a number of justifications can be called upon for using indicators that estimate the size of the illicit drug market through drug crop production and wholesale market prices for drugs. As discussed previously, terrorist movements most frequently engage in the drug trade as taxation and protection agents, extorting tribute from drug crop cultivators and domestic and trans-border traffickers (Felbab-Brown 2009; Goodhand 2000; Makarenko 2004). Drug crop cultivation rates and wholesale price indicators measure the size of the drug trade where terrorist movements are most likely to benefit from it (Kleiman 2004: 2). Also, U.S. illegal drug policy has a disproportionate emphasis on halting drug production and trafficking through eradication and interdiction and on arresting and prosecuting traffickers and dealers, areas of the market where terrorist actors are involved (Caulkins et al. 2005). I can therefore be confident that my measurements are in line with U.S. counternarcotics policy imperatives.

The study also limits its analysis to cocaine and opiate—heroin, opium and morphine—drug markets. Though terrorist groups have been alleged to traffic nearly all types of illicit drugs—opiates, cocaine, cannabis, methamphetamines, synthetic drugs—for simplicity the study limits its analysis to only opiate poppy and coca cultivation, marketing, interdiction and eradication. International trade in opiates and coca-based drugs represents the vast majority of the total illicit drug market world-wide in terms of dollar value and opiates and cocaine are the substances primarily targeted in international seizure and eradication campaigns (Keh 1998; United Nations Drug Control Program 1999). Narrowing the focus to the effects of cocaine and opiates is still likely to capture real effects of the drug trade on patterns of terrorism.

There are four independent variables in the study, all of which are derived from data published in the *World Drug Report* by the United Nations Office on Drugs and Crime (UNODC) and are calculated both for opiates and for coca-based drugs: natural log measures of global hectares of illicit poppy and coca crop cultivation; wholesale illicit opiate (heroin, opium and morphine) and cocaine prices in Western European and North American markets standardized to inflation-adjusted 2007 U.S. dollars; natural log measures of global hectares of poppy and coca crop eradicated; and tons of opiates and cocaine seized globally through interdictions. The assumption is that drug production chains, drug markets and drug eradication and interdiction strategies are transnational in nature, and that significant actors engaged in the illicit drug trade, like terrorist movements, are participants in the transnational process. That assumption drives the decision to examine global production, price and counternarcotics strategies rather than local ones. Data on opiate and coca-based drug production, prices, crop eradication and interdiction are limited to the period 1986 onward, so

this constraint dictates the timeframe of the study. Each of the independent variables are lagged one period to help clarify the direction of causation.

A host of conventional control variables are included in all models. These include the natural log of the gross national income of the country to control for the level of economic development and natural logs of the national population and country geographic area. These variables are also used by Eyerman (1998), Abadie (2006) and Wade and Reiter (2007) in their empirical studies of terrorism. The sources for these two variables are various years of the World Bank's *World Tables* and they are expected to be positive predictors of terrorism. Li (2005) found a country's level of participation in the political process, the number of years since its last substantial regime change and the degree to which it placed constraints on executive power predicted the rates of transnational terrorism it experienced. I therefore include these three variables as controls. Li (2005) also controlled for the degree of income inequality in countries in his study, and I do the same using national GINI coefficients, and for Cold War and post-Cold War effects. The sources for both executive constraints and the regime durability score is the Polity IV database. The source for political participation is the participation indicator of the Vanhanen Index of Democratization, compiled and made available in the Quality of Government database (Teorell et al. 2011) while GINI is derived from the United Nations Development Program's *World Development Report*. Walsh and Piazza (2010) found that regimes characterized by physical integrity rights violations—abuses of the basic human rights of their citizens—experienced significantly higher rates of terrorism while Piazza (2008) found that regimes plagued by state failures both experienced and produced more transnational terrorism. I control for these in the models as well.

The inclusion of the latter as a covariate—an index developed by Piazza (2008) that measures on a 12-point additive scale the intensity and geographic size of state failure events in countries using data from the Political Instability Task Force (PITF)[12]—is particular crucial to the analysis. It measures the effects of general political stability on terrorism and operationalizes the size of territory in counties over which state control and ability to project unrivaled power is contested. This, plus ancillary tests showing aggregate state failure measures to be significant predictors of the main independent variables in the study,[13] helps to clarify the empirical link between drug crop cultivation and drug crop eradication that are important for the chaos argument. It is a guard against spuriousness in the first set of models where the effects of drug crop cultivation on terrorism are examined. Because poppy and coca crops require degrees of non-policed acreage and because Piazza (2008) has found that un-policed ("stateless") territory is a feature of countries that experience and produce higher rates of terrorism, it is crucial to include a measure of state ability to project uncontested power internally and to control its domestic territory.[14] Finally, I also insert a one-year lag of the dependent variable—domestic or transnational terrorist attacks—into all models to control for previous terrorist activity, to address distortions due to temporal clustering of terrorist activity and as a further test for robustness of the main results.[15]

[12]The aggregate state failure score is built as an additive index of four variables from PITF that each can take values of zero to three based on the intensity and scope of the particular failure in the country: Ethnic War, Revolutionary War, Genocides and Politicides and Adverse Regime Changes (Piazza 2008: 476).

[13]Results of Pearson's R coefficients for the Aggregate State Failure index and illicit drug indicators are available from author.

[14]The main negative binomial and robustness check zero-inflated negative binomial models in the study were rerun dropping Aggregate State Failure Index and produced the same core results. Results available from author.

[15]The one-year lagged dependent variable is a significant positive predictor of next year's terrorist activity in all models. When removed the main results of the study are not changed. Results available from author.

Table 1 Summary statistics

Variable	Obs.	Mean	St. Deviation	Min	Max
GTD Terrorism Incidents (Domestic)	5893	7.4	32.9	0	524
ITERATE Terrorism Incidents	5803	1.3	5.1	0	110
Log Gross National Income per cap	5800	7.2	1.6	3.5	14.1
Log Population	5800	1.8	1.7	−2.8	7.1
Log Area	6364	11.8	2.1	5.7	16.6
GINI Coefficient	5813	43.4	8.9	17.8	84.8
Aggregate State Failure (PITF)	5805	.5	1.6	0	13.5
Physical Integrity Index (CIRI)	3837	4.8	2.3	0	8
Political Participation (Polity IV)	5701	3.2	.99	.5	5
Executive Constraints (Polity IV)	5813	3.4	1.5	−8	6
Durable	5808	21.9	27.4	0	197
Log Opiate Poppy Cultivation	3440	13.3	.2	11.8	12.5
Log Coca Cultivation	3440	12.1	.1	11.9	12.3
Wholesale Opiate Prices	3784	103.7	49.7	45.5	205
Wholesale Cocaine Prices	3784	51.8	16.9	33.5	90
Poppy Eradication	3440	9.8	.80	8.2	10.9
Coca Eradication	3440	10.2	1.4	8.0	12.1
Opiate Seizure	3439	101.8	60.0	30	244
Cocaine Seizure	5332	243.1	202.7	5	750

The summary statistics for all variables used in the study are reported in Table 1.

5 Results

The results of all negative binomial models support the three hypotheses in the study, suggesting that the international trade in and production of illicit opiates and cocaine is a sustaining force for terrorism while actions to halt the cultivation and distribution of opiates and cocaine both reduce terrorism. These results are displayed in Tables 2 through 5.

The model results portrayed in Table 2, models 1 through 4, support the first hypothesis of the study that increases in illicit drug prices yield higher rates of terrorism. Wholesale opiate and cocaine prices in Western consumer markets are positive predictors of domestic and transnational terrorist attacks in all models. In terms of magnitude of effect the results indicate that a U.S. $100 increase per kilogram of opiate-family substances within wholesale markets in North America or Western Europe yields four more domestic and six more transnational terrorist attacks per country-year. The substantive impact of increased cocaine wholesale prices on terrorism is even more dramatic. Per each U.S. $100 increase in cocaine per kilogram, countries experience eight more domestic and 15 more transnational attacks.

The results presented in Table 2 are robust to the inclusion in the models of several highly significant covariates. Across models 1 through 4, gross national income, population and aggregate state failures are highly significant positive predictors of both types of terrorism, while physical integrity rights protections is a highly significant negative predictor of domestic and transnational terrorism. In every model, the rate of terrorism in the previous year is also a significant positive predictor of terrorism, indicating clustering of attacks in the

Table 2 Illicit drug wholesale prices and terrorism, 1986 to 2006

	(1)	(2)	(3)	(4)
Dependent Variable:	Domestic Terrorism	Domestic Terrorism	Transnational Terrorism	Transnational Terrorism
Opiate Wholesale Prices	.004(*.000*)***		.006(*.000*)***	
Cocaine Wholesale Prices		.008(*.002*)***		.015(*.002*)***
log GNI per cap	.116(*.047*)*	.113(*.047*)*	.267(*.060*)***	.277(*.060*)***
log Population	.339(*.048*)***	.335(*.048*)***	.242(*.069*)***	.267(*.069*)***
log Area	−.108(*.047*)*	−.106(*.047*)*	−.009(*.044*)	−.021(*.045*)
GINI Coefficient	.006(*.006*)	.006(*.006*)	−.000(*.007*)	.002(*.008*)
Durable	−.003(*.002*)	−.003(*.002*)	−.002(*.003*)	−.001(*.003*)
Executive Constraints	.286(*.071*)***	.285(*.070*)***	−.006(*.046*)	.027(*.068*)
Political Participation	.006(*.003*)	.006(*.003*)	.001(*.003*)	.001(*.003*)
Physical Integrity Index	−.229(*.033*)***	−.226(*.033*)***	−.252(*.034*)***	−.254(*.032*)***
Agg. State Failure Index	.103(*.021*)***	.105(*.021*)***	.106(*.027*)***	.097(*.025*)***
Cold War Dummy	−.080(*.113*)	−.153(*.140*)	.754(*.091*)**	−.046(*.127*)
Terrorist Attacks$_{t-1}$	.005(*.000*)***	.005(*.005*)***	.020(*.003*)***	.020(*.004*)***
Constant	.392(*.648*)	.367(*.647*)	−7.536(*2.163*)***	−2.789(*.803*)**
Wald χ^2	941.50***	1042.49***	334.36***	349.21***
n	3,262	3,262	2,949	3,210

All models are negative binomial regression estimations. Robust, country-clustered standard errors in parentheses. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .00$

temporal domain in countries. These findings are consistent with previous empirical studies of terrorism, and are consistent across all of the results portrayed in Tables 2 through 5. The other control variables are significant in only some of the models. Countries with larger land areas experience less domestic terrorism, but not less transnational terrorism—a counterintuitive finding that is at odds with Eyerman's (1998) study. The politico-institutional indicators found by Li (2005) to be significant predictors of terrorism produce mixed results across all models. Executive constraints are, as expected, a positive predictor, but only for domestic terrorism. Political participation, contra Li (2005), is not found to be significant in any of the models, nor are the Gini coefficients or regime durability. The dummy variable measuring Cold War temporal effects is highly erratic across the models. It is a positive predictor of both domestic and transnational terrorism in some models, is not significant in others and is actually a negative predictor of domestic terrorism in model 9. In robustness tests wherein the insignificant or inconsistently significant covariates are removed, the core results—that drug production and prices are associated with higher levels of terrorism and drug eradication and interdiction are associated with lower levels of terrorism—remain the same.[16]

Table 3, models 5 through 8, shows that increases in opiate poppy and coca cultivation are significant positive predictors of both increased incidence of domestic and transnational terrorism. This provides support for the second hypothesis, that higher levels of drug crop

[16] Available from author.

Table 3 Illicit drug crop cultivation and terrorism, 1986 to 2006

	(5)	(6)	(7)	(8)
Dependent Variable:	Domestic Terrorism	Domestic Terrorism	Transnational Terrorism	Transnational Terrorism
Opiate Poppy Cultivation	.916(*.156*)***		.474(*.165*)**	
Coca Cultivation		1.044(*.213*)***		1.683(*.287*)***
log GNI per cap	.111(*.046*)*	.114(*.046*)*	.267(*.060*)***	.280(*.060*)***
log Population	.356(*.049*)***	.354(*.049*)***	.242(*.069*)***	.250(*.069*)***
log Area	−.106(*.047*)*	−.107(*.047*)*	−.009(*.044*)	−.014(*.044*)
GINI Coefficient	.005(*.006*)	.005(*.006*)	−.000(*.007*)	−.000(*.007*)
Durable	−.003(*.002*)	−.003(*.002*)	−.002(*.003*)	−.002(*.003*)
Executive Constraints	.223(*.071*)**	.221(*.071*)**	−.006(*.046*)	−.027(*.049*)
Political Participation	.006(*.003*)	.006(*.003*)***	.001(*.003*)	.002(*.003*)
Physical Integrity Index	−.206(*.033*)***	−.207(*.033*)***	−.252(*.034*)***	−.252(*.034*)***
Agg. State Failure Index	.112(*.021*)***	.117(*.022*)***	.106(*.027*)***	.107(*.027*)***
Cold War Dummy	.465(*.087*)***	.179(*.098*)	.754(*.091*)**	.431(*.099*)***
Terrorist Attacks$_{t-1}$	.005(*.000*)***	.005(*.000*)***	.020(*.003*)***	.020(*.003*)***
Constant	−10.789(*2.099*)***	−11.752(*2.774*)***	−7.536(*2.163*)***	−22.204(*3.631*)***
Wald χ^2	981.21***	1030.68***	334.36***	410.10***
n	2,998	2,998	2,949	2,949

All models are negative binomial regression estimations. Robust, country-clustered standard errors in parentheses. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .00$

cultivation yield higher rates of terrorist activity. The interpretation of the magnitude of the relationship between drug crop cultivation and terrorism is facilitated by examining the raw, rather than adjusted by natural log, hectares of cultivation. A 100,000 hectares increase in poppy cultivation is predicted by the models to yield .5 more domestic terrorist attacks and .2 more transnational terrorist attacks per country-year. A 100,000 hectare increase of coca cultivation yields .4 more domestic and .7 more transnational incidents of terrorism.

Tables 4 and 5 provide support for the third hypothesis that higher rates of drug crop eradication and drug product seizure yield lower levels of terrorism. In Table 4, natural logged hectares of opiate poppy and coca crop eradication are significant negative predictors of both domestic and transnational terrorist attacks. In Table 5, rates of opiate product and cocaine seizure are significant negative predictors of domestic and transnational terrorism. Based upon these results—again, rerunning the models with the raw, rather than logged, measures for eradication to ease interpretation—for each 100,000 hectares of opiate poppy destroyed through eradication efforts, one would expect a decrease of 3.7 domestic attacks and 2.3 transnational attacks per country-year observation. For each 100,000 hectares of coca destroyed, 0.5 fewer domestic and transnational terrorist attacks should occur. For every 1000 metric tons of opiate drug product seized through interdiction efforts, countries should experience two fewer domestic attacks and six fewer transnational attacks. For every 1000 metric tons of cocaine seized, countries should experience 0.8 fewer domestic attacks and two fewer transnational attacks. The results indicate that though substantive, the negative effects on terrorism of coca eradication and interdiction are more modest than for poppy eradication and interdiction.

Table 4 Illicit drug crop eradication and terrorism, 1986 to 2006

	(9)	(10)	(11)	(12)
Dependent Variable:	Domestic Terrorism	Domestic Terrorism	Transnational Terrorism	Transnational Terrorism
log Poppy Eradication	−.686(*.073*)***		−.465(*.089*)***	
log Coca Eradication		−.230(*.035*)***		−.254(*.038*)***
log GNI per cap	.112(*.048*)*	.114(*.047*)*	.272(*.060*)***	.281(*.062*)***
log Population	.353(*.050*)***	.354(*.050*)***	.248(*.070*)***	.253(*.071*)***
log Area	−.109(*.047*)*	−.109(*.047*)*	−.014(*.044*)	−.017(*.045*)
GINI Coefficient	.006(*.006*)	.006(*.006*)	−.000(*.008*)	.001(*.008*)
Durable	−.003(*.002*)	−.003(*.002*)	−.002(*.003*)	−.001(*.003*)
Executive Constraints	.261(*.074*)***	.235(*.072*)**	−.002(*.047*)	−.022(*.058*)
Political Participation	.005(*.003*)	.006(*.003*)	.001(*.003*)	.002(*.003*)
Physical Integrity Index	−.225(*.035*)***	−.219(*.033*)***	−.258(*.034*)***	−.263(*.035*)***
Agg. State Failure Index	.094(*.022*)***	.104(*.021*)***	.100(*.026*)***	.098(*.026*)***
Cold War Dummy	−.775(*.133*)***	−.202(*.122*)	−.094(*.129*)	.059(*.107*)
Terrorist Attacks$_{t-1}$	.005(*.000*)***	.005(*.005*)***	.021(*.003*)***	.018(*.004*)***
Constant	7.883(*.955*)***	3.422(*.737*)***	3.022(*1.086*)**	.979(*.778*)
Wald χ^2	1175.45***	858.42***	344.05***	300.97***
n	2,998	2,998	2,949	2,949

All models are negative binomial regression estimations. Robust, country-clustered standard errors in parentheses. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .00$

6 Study limitations

Though the study provides the first systematic evidence that the illicit drug trade fuels terrorism and that counternarcotics strategies reduce terrorist activity, it is, however, a first cut that suffers from limitations common to early analyses. Better data, different model specifications and different research designs can be used to test the robustness of the core results. This may include: extending the time series by developing imputed data for drug price, production, eradication and interdiction indicators; examining the effects of local, rather than international, illicit drug markets and counternarcotics efforts on terrorism; examining the effects of other illicit substances on terrorism and changing the focus from an aggregate view to a cross-sectional examination of the effect of the drug trade on terrorist movements themselves. The results indicate that the illicit drug trade is a robust contributor to domestic and international terrorist activity, but future work might also more thoroughly investigate and test the actual causal mechanisms linking drugs to terrorism. In particular, it would be useful to evaluate the relative importance of the cash versus chaos elements of the illicit drug trade on terrorist group vitality. This would help determine whether the supply of revenue derived from the drug trade sustains terrorist activity more than the opportunities provided by the degraded policing and security environments that are part and parcel with the illicit drug economy in places like Colombia or Afghanistan.

Table 5 Illicit drug interdiction and terrorism, 1986 to 2006

	(13)	(14)	(15)	(16)
Dependent Variable:	Domestic Terrorism	Domestic Terrorism	Transnational Terrorism	Transnational Terrorism
Opiate Seizure	−.002(*.000*)**		−.006(*.000*)***	
Cocaine Seizure		−.000(*.000*)**		−.002(*.002*)***
log GNI per cap	.105(*.047*)*	.119(*.046*)**	.285(*.063*)***	.283(*.057*)***
log Population	.350(*.049*)***	.334(*.048*)***	.247(*.071*)**	.274(*.066*)***
log Area	−.101(*.047*)*	−.109(*.045*)*	−.011(*.046*)	−.025(*.043*)
GINI Coefficient	.005(*.006*)	.008(*.006*)	−.000(*.008*)	.004(*.008*)
Durable	−.003(*.002*)	−.003(.003)	−.001(*.003*)	−.000(*.003*)
Executive Constraints	.206(*.071*)**	.320(*.068*)***	−.039(*.050*)	.062(*.078*)
Political Participation	.007(*.003*)*	.004(*.003*)	.002(*.004*)	.000(*.003*)
Physical Integrity Index	−.206(*.033*)***	−.224(*.033*)***	−.263(*.037*)***	−.248(*.029*)***
Agg. State Failure Index	.115(*.021*)***	.097(*.023*)***	.099(*.026*)***	.093(*.025*)***
Cold War Dummy	.218(*.098*)*	.028(*.110*)	.215(*.085*)*	.215(*.105*)*
Terrorist Attacks$_{t-1}$	.005(*.000*)***	.006(*.000*)***	.019(*.004*)***	.021(*.004*)***
Constant	1.253(*.630*)*	1.015(*.609*)	−1.083(*.740*)	−1.404(*.734*)
Wald χ^2	1030.82***	1093.99***	306.30***	445.84***
n	2,866	3,784	2,819	3,723

All models are negative binomial regression estimations. Robust, country-clustered standard errors in parentheses. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .00$

7 Conclusion

The results of the models find that illicit drug prices, illicit drug crop cultivation and drug eradication and interdiction strategies are significant predictors of domestic and international terrorism, and that the relationship is robust to multiple specifications. These results seem to be consistent with the argument that addressing the illicit drug trade, using commonplace, though controversial, counternarcotics strategies, will yield security benefits vis-à-vis the threat posed by terrorism. By depriving terrorist groups of the substantial source of financial wherewithal that the illegal narcotics trade provides, and by improving policing and government control over geographic areas used for growing drug crops and trafficking, across borders, drug products, counterterrorism officials can hope to see a reduction of both international and domestic terrorist activity.

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