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Can Production and Trafficking of Illicit Drugs be Reduced or Merely Shifted?

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Abstract

The production of cocaine and heroin, the two most important drugs economically, has been concentrated in a small number of poor nations for 25 years. A slightly larger number of developing nations have been affected by large-scale trafficking in these two drugs. This paper reviews what is known about drug control programs and considers non-traditional options. The usual array of programs for suppressing drug problems, enforcement, treatment, harm reduction and prevention have been assessed almost exclusively in wealthy nations. Although treatment has been shown to be cost-effective, it is of minimal relevance for reducing the drug problems of nations such as Afghanistan, Colombia, Mexico or Tajikistan, which are primarily harmed by production and trafficking rather than consumption. Efforts to reduce drug production and trafficking have not been subject to systematic evaluation but the best interpretation of the available evidence is that they have had minimal effect on the quantities produced or trafficked. It is reasonable to conclude that international drug control efforts can do more to affect where these drugs are produced rather than the quantity. If that is the case, and given that spreading a specific level of production or trafficking to more rather than fewer nations probably decreases global welfare, it may be appropriate to consider a less aggressive stance to current producers and to make strategic decisions about the location of an industry producing a global bad.

This paper—a product of the Growth and the Macroeconomics Team, Development Research Group—is part of a larger effort in the department to understand the development consequences of crime and conflict. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at preuter@umd.edu.

CAN PRODUCTION AND TRAFFICKING OF ILLICIT DRUGS BE REDUCED OR MERELY SHIFTED?

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INTRODUCTION

Cocaine and heroin are produced in poor countries and exported, *inter alia*, to consumers in rich countries, where their consumption and sale cause considerable damage in the form of crime, disease, and addiction. The producing nations are then blamed for their failure to control production, accusations that are sharpened by the corruption that is ubiquitous around drug production and by the large rewards that accrue to some developing country players in the trade. While there is increasing acceptance that the fundamental problem for rich countries is their inability to control domestic demand for drugs,[1] the search for ways of controlling production continues, with rich countries both aiding and coercing poor producer nations in their efforts.

The findings on effects of interventions are discouraging. Little of a systematic nature is known about the effects of such programs as interdiction, crop eradication, "alternative development," or more general law enforcement aimed at reducing drug production and trafficking. The general impression is that such programs have been ineffective. Certainly it is the case that the world drug trade has continued to flourish even as the rhetoric of control has sharpened during the last quarter century and as the flow of funds for suppression has increased.

This paper focuses on cocaine and heroin for two reasons. First, cocaine and heroin are generally believed to account for the bulk of the income that flows to developing countries from illicit drugs, though the evidence is very soft; there are no systematic estimates of the flows from other drugs such as methamphetamines and marijuana.[2] Second, compared to drugs that are more widely used (in particular marijuana), cocaine and heroin produce particularly intense psychological and physical effects on users; cocaine use results in a form of psychological addiction by producing a high that encourages pursuit of more intense intoxication, whereas heroin use produces an actual physical dependence (Kleiman, 1992). For example, opiates account for approximately 70 percent of all treatment demand in Asia, followed by 64 percent in

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[1] President George W. Bush made such a statement in meeting with President Vicente Fox of Mexico in 2001. "One of the reasons why drugs are shipped—the main reason why drugs are shipped through Mexico to the United States is because United States citizens use drugs. And our nation must do a better job of educating our citizenry about the dangers and evils of drug use." (Office of the Press Secretary 2001).

[2] The most systematic effort to produce such estimates is contained in the 2005 *Word Drug Report* (Chapter 2), prepared by the United Nations Office on Drugs and Crime. Opium (mostly in the form of heroin) and cocaine are estimated to yield $65 billion and $70 billion in retail sales. Amphetamine Type stimulants (ATS) yield $44 billion and cannabis resin $25 billion. For cannabis herb (marijuana) the report cites a figure of $113 billion but concedes this has a weak base; the figure is far higher than can be reconciled with the systematic and well documented estimates for the U.S. marijuana market (ONDCP,

Europe and 62 percent in Australia. They are the principal vector for the spread of HIV in a number of countries. Cocaine is the biggest problem drug in the Americas, accounting for 58 percent and 40 percent of total drug treatment in South America and North America, respectively.

The paper begins by providing a description of how consumption, production and trafficking are distributed among countries. The following section offers some hypotheses about why both production and trafficking are so concentrated in so few countries. It then describes the ways in which governments have attempted to reduce both production and trafficking and summarizes what is known about the effectiveness of the different methods used. It concludes with comments about some major research questions.

1. ILLICIT DRUG TRENDS AND DEVELOPING COUNTRIES

This section provides background on the levels and trends in cocaine and heroin consumption; it shows which countries are most important and summarizes indicators of drug use in major developing countries.

CONSUMING COUNTRIES

There are no reliable data on the worldwide consumption of illicit drugs. The United Nations Office on Drugs and Crime (UNODC) reports the prevalence of illicit drug use through surveys of countries' governments in its annual *Global Illicit Drug Trends*. But with exception of the United States and (more recently) a few other industrialized nations,[3] countries have not developed the necessary capability to collect such information (and some have little desire to do so). Thus the UNODC survey responses suffer from lack of data, varying estimation methodologies across different countries, and biases that governments bring to the reporting of the level of consumption.[4]

According to the UNODC (2003, pp. 101-102), cannabis is the most widely abused drug worldwide (around 160 million people) followed by amphetamine-type stimulants (35 million people). Approximately 15 million people abuse cocaine, and a similar number abuse opiates;

2001). The *World Drug Report* contains estimates of "wholesale revenues" but it is unclear what share should be assignedto developing nations.

[3] Among those that regularly now both conduct general population surveys and attempt to estimate the number of "problematic" drug users, a term coined by the European Monitoring Center on Drugs and Drug Abuse, are: Australia, the Netherlands, Switzerland and the United Kingdom. There are good quality data from school surveys of 15-16 year olds in most European nations; The European School Project on Alcohol and Other Drugs: (ESPAD) can be found at www.espad.org

[4] On occasion there are gross inconsistencies that undermine confidence; for example, a nation might report more opiate addicts than opiate consumers or wholesale purity that is lower than retail purity.

Tables 1 and 2 report the 2002 UNODC figures on opiates and cocaine for major nations and regions, along with my judgment of recent trends. There is minimal use of cocaine in Asia or Africa.

The use of opiates is very broadly distributed both geographically and in terms of relative wealth. The bulk of opiate users[5] are in developing nations. Even though China has a very low estimated prevalence rate, which may reflect the low investment in data collection, it has more opiate addicts than all but three or four other nations, simply because of its population.[6] India, with a moderate estimated prevalence, has by far the largest number of opiate addicts, for the same reason. In most of Western Europe and the United States there has been little growth in opiate addicts.[7] Asia and Eastern Europe have seen sharp increases in recent years, with Central Asia being most affected (Ponce, 2002; Roston, 2002).

The bulk of cocaine users reside in a few rich countries. The United States dominates that market but there has been substantial growth in Western Europe since about the mid-1990s.

Retail expenditures are dominated by rich country consumers, simply because retail prices are so much higher in those nations.[8] However the prices received by growers and traffickers are not dependent on the final destination. A shift of consumption from Western Europe to China has no significance to Afghanistan producers in terms of revenue; the export price from Afghanistan is the same, regardless of the final consumption destination. Hence it is approximately true that consumers in the developing world account for most of the earnings of opium producers, as opposed to the revenues of traffickers and retailers in developed countries.

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[5] Opiates are products of the opium poppy; they include opium, which is usually smoked, morphine (rarely used), analgesics such as Oxy-Contin and heroin.

[6] An unpublished estimate based on a 2004 survey by Chinese researchers (Chen Xiaobo, Xie Hua and Zhou Tie) has generated an estimate of about 2 million heroin addicts.

[7] A series of estimates sponsored by the U.S. Office of National Drug Control Policy have been inconsistent with respect to trends. The most recent study, published in 2001 and reporting estimates for the period 1988-20000, showed a decline of about one third in the number of frequent users of cocaine and of heroin over that period.

[8] For example, it was estimated that in Thailand, a relatively successful developing nation, the annual expenditure for a heroin addict in the mid-1990s was approximately $1150, compared to $30,000 in Italy. UNDCP (1997)

	Number of persons (millions)	Percent of population (over 15)	Trends
Asia	7.46	0.29	
- India	2.68	0.40	Slower growth
- China	0.96	0.10	Increasing
- Pakistan	0.74	0.90	Stable to declining
- Thailand	0.27	0.60	Continued decline
- Other	2.81	0.34	Mixed by region
Europe	4.56	0.70	
- Western Europe	1.57	0.42	Stable to declining
- Russian Federation	2.39	2.00	Strongly increasing
- Other Eastern Europe	0.60	0.38	Mixed
Oceania	0.14	0.63	Declining
Americas	1.86	0.30	
- United States	1.34	0.60	Declining
- Other	0.52	0.13	Some increases
Africa	0.92	0.20	Increasing
Global	14.94	0.35	Increasing

Source: UNODC (2003, pp. 107-128, 336); U.N. World Population Prospects 2002 Revision

Table 1: Annual Prevalence Estimates of Opiate Abuse, 2000-2001

The data presented so far report only numbers of users. What are needed to understand the market are estimates of quantities. Almost no data are available on the average quantities consumed annually by addicts in each country.[9] This reflects the fact that users can report only how much they spend on cocaine and heroin, not how much of the active drug they purchased, since the purity is highly variable and cannot be observed. There is some evidence to suggest that U.S. heroin addicts consume less per annum than their counterparts in Europe but absent more specific data, it is reasonable to assume that for the rest of the world the distribution of quantities consumed does mirror the distribution of users.

[9] A forthcoming study by Badillo et al. will provide the first fully documented quantity estimate outside the United States.

	Number of people (millions)	Percent of population (over 15)	Trends
Americas	9.08	1.50	Mostly stable
- United States	5.79	2.60	Declining
- Mexico	0.33	0.50	Stabilizing
- Argentina	0.51	1.90	Increasing
- Colombia	0.34	1.20	Some increase
- Peru	0.17	1.00	Some increase
- Bolivia	0.05	0.90	Stable
- Other	1.89	0.79	Mixed
Europe	3.71	0.57	Mostly increasing
- United Kingdom	0.95	2.00	Increasing
- Other West Europe	2.48	0.93	Mostly increasing
- East Europe	0.29	0.09	Mostly increasing
Oceania	0.23	1.03	Stable
Africa	0.91	0.20	Stable or increasing
Asia	0.15	0.01	Stable or decreasing
Global	14.08	0.33	Stable to increasing

Source: UNODC (2003, pp. 129-135, 337); U.N. World Population Prospects 2002 Revision

Table 2: Annual Prevalence Estimates of Cocaine Abuse, 2000-2001

PRODUCING COUNTRIES

A small number of nations account for the bulk of the production of coca and opium. According to official estimates by the UNODC (2003), three countries, Bolivia, Colombia, and Peru, account for the entirety of commercial coca production. There are reports of small amounts of coca being produced in Brazil and Venezuela, constituting a miniscule portion of world production. Table 3 displays the global production of dry leaf coca for various years between 1990 and 2004.[10] As shown, most coca is currently produced in Colombia, although Peru was

[10] A kilogram of cocaine requires approximately 400 kilograms of leaf as input. The precise figure varies, depending on the alkaloid content. There is variation among regions within the Andes; however

the primary producer a decade ago. Production in Bolivia and Peru declined sharply over the period.

	1990	1995	2000	2002	2004
Bolivia	77,000	85,000	13,400	19,800	25,000
Colombia	45,300	80,900	266,200	222,100	148,900
Peru	196,900	183,600	46,200	52,500	70,300
TOTAL	319,200	349,500	325,800	294,400	244,200

Source**:** http://www.unodc.org/pdf/WDR_2005/volume_1_web.pdf

Table 3: Cocaine production, 1990-2004 (selected years)

Afghanistan and Myanmar accounted for over 90 percent of global production of opium in 2004 (4,570 out of 4,850 metric tons). This two-country dominance in opium production has occurred in every year since 1988 (when systematic estimates began), except for 2001 when the Taliban successfully cut Afghanistan's production by over 90 percent.[11] Table 4 reports estimated global production of opium for various years between 1990 and 2004. As shown by the table, second-tier opium producers include Colombia, Laos, and Mexico. Pakistan, Thailand, and Vietnam comprise the third tier; once substantial producers in the 1980s and early 1990s, they now are almost insignificant.

It is useful to contrast this with cannabis, the other prominent psychoactive drug that has its source in a plant. U.S. production accounts for a substantial (though unknown) share of U.S. consumption, apparently much of it grown indoors. In Western Europe it is thought that the Netherlands accounts for a large share of the cannabis consumed in Europe.[12] Morocco and Mexico supply substantial quantities of cannabis resin and cannabis herb to Western Europe and the United States, respectively, but they are certainly not dominant. Cannabis' exceptional status probably rests on four factors: the bulkiness per unit value, which raises smuggling costs substantially; the high dollar yield per acre, which reduces risks of detection per dollar of

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there are no estimates of the quantities produced in each region and how they differ in terms of alkaloid content. See Drug Availability Working Group (2003).

[11] Even in that year, Afghanistan still supplied large quantities of opium and heroin to the world market out of stockpiles.

[12] No credible estimates of either marijuana consumption in Europe or of marijuana production in the Netherlands are available.

production; the existence of a boutique market of user/growers interested in developing better breeds of the plant; and the ease of entry, since the seeds are widely available and there are probably few economies of scale in growing beyond quite a small number of plants and there is no further processing.

	1990	1995	2000	2001	2002	2004
Afghanistan	1,570	2,335	3,276	185*	3,400	4,200
Colombia	0	71	88	58	50	73
Laos	202	128	167	134	112	45
Mexico	62	53	21	71	47	n.a.
Myanmar	1,621	1,664	1,087	1,097	828	570
Pakistan	150	112	8	5	5	40
Thailand	20	2	6	6	9	**
Vietnam	90	9	**	**	**	**
Other	45	78	38	40	40	40
TOTAL	3,760	4,452	4,691	1,596	4,491	4,850

Source: UNODC (2004, p. 16)

*Reflects production crackdown by Taliban

**Included in other

Table 4: Global Production of Opium for Selected Years (in Metric Tons)

TRAFFICKING COUNTRIES

As with production, the trafficking of coca and opium involves a relatively small number of nations. One indicator of which countries are involved in trafficking is drug seizures but it requires careful interpretation.[13] Seizures can be driven by production, local consumption, and transshipment; nations with large seizures that are neither producers nor major consumers are likely to be nations involved in trafficking to other countries. It is a one-sided indicator; some transshipment nations either as a result of corruption or limited enforcement effort, may have few seizures. Illustrating the weakness of seizure as an indicator, are the figures for Russia. It

[13] The annual series for most countries are quite noisy because a few large seizures can substantially affect the total. Over the long term, however, seizure data tends to suggest the actual level of trafficking. UNODC (2005) has shown that seizures track well an independently generated estimate of total production.

constitutes one of the three largest markets for heroin and serves as a transshipment country for Eastern Europe; yet Russia seizes barely one ton of heroin each year.

Table 5 lists the highest-ranking countries for seizures of cocaine and opiates (i.e., heroin, morphine, and opium) in 2001 by the percent of the world total. The table shows almost half of the cocaine seized in 2001 was seized in the United States, the largest consumer country, and in Colombia, the largest producer country. Spain and Mexico accounted for the next largest amounts of seized cocaine; these countries represent gateways for cocaine traveling into Europe and the United States, respectively. Venezuela, Ecuador, and Brazil were also responsible for smaller, though significant, amounts of seized cocaine. These countries border geographically the primary source countries of Colombia, Peru, and Bolivia. As compared to heroin, total seizures of cocaine account for a much larger share of estimated production (44% vs 18%).

Table 5 also shows that most of the opiates seized in 2001 came from countries that border Afghanistan; Iran, Pakistan, and Tajikistan together accounted for 51 percent of global opiate seizures. It should be noted that these levels occurred during a year in which the Taliban had dramatically slashed opium production, so they understate the amount of opiate trafficking that normally occurs there. Other major countries with opiate seizures, China and Turkey, are also located in Asia. Turkey, with a small domestic opiate market, is a principal transshipment route for European heroin, while China not only has a large domestic market but also serves as a transshipment route for heroin into some Western markets.[14]

[14] While China does indeed share a border with Afghanistan, it appears that few of the seizures of heroin come out of that border; they occur either near the border with Myanmar or in the interior. See Townsend (2005) for a discussion of the risk that Afghanistan will become a major source of opiates for the China market.

Cocaine		Opiates (Heroin, Morphine, and Opium) in heroin equivalents	
Colombia	32%	Iran	29%
United States	28%	Pakistan	21%
Spain	6%	Turkey	12%
Venezuela	5%	China	9%
Mexico	5%	Afghanistan	4%
Peru	2%	Tajkistan	4%
Netherlands	2%	Russian Federation	3%
Netherlands Antilles	2%	Other countries	18%
Boliva	2%		
Other countries	16%		
Total (% of estimated consumption)	356 tons (61)	**Total**	120 tons (32)

Source: 2006 UNODC World Drug Report, p. 70-72, 91.

Table 5: Highest Ranking Countries for Seizures of Cocaine and Opiates in 2004 (by Percent of World Total)

2. POSSIBLE EXPLANATIONS FOR THE PATTERN OF NATIONAL INVOLVEMENT IN THE DRUG TRADE

The concentration of coca and opium production in these few developing countries is an important fact for policymakers. It creates the sense, probably illusory, that success is just around the corner because only two or three countries need to exit the industry.

The concentration is a paradox for three reasons. First, many nations are capable of producing each drug. Historically, substantial opium production has been recorded in China, Iran, and Macedonia, for example, none of which now produces.[15] Australia, France, and Spain have entered the legal opiate market in recent times, obtaining production quotas from the International Narcotics Control Board under an international treaty agreement for that market (INCB, 2002). Coca has been grown commercially in Java (while under Dutch rule) and Taiwan (while under

Japanese rule) and could be grown in parts of the Andes that are not now involved (Spillane, 2000).

Second, technically it is possible to produce cocaine or heroin in industrialized nations. Hydroponic techniques, for example, can be used for both coca and opium poppies in regions with less than suitable climates. And with local production comes associated savings in transportation costs and the elimination of interdiction risks. However, the enforcement risks faced by producers in the United States or Western Europe are substantial and the compensation costs for these risks sufficiently high that local production has never developed.

Third, many developing countries that neighbor coca and opium producers are not or have not been major producers, although they might be involved in trafficking. Consider Thailand, for example, which was a major producer of opium in the early 1970s. Thailand has had a substantial heroin addict population since the 1970s. It continues to suffer from high levels of corruption, both in the military and the civilian government. Consequently, Thailand would seem to be a strong candidate for a large opium production sector. However, Thailand now produces very little opium and serves primarily as a consuming and transshipping country for Myanmar. Similarly, Venezuela and Ecuador have many of the pre-conditions for coca production and are regularly put on the list of candidate producers but have, after two decades of being at high risk, not entered the industry. Very specific factors may account for the observed differences.

The concentration and precise pattern of trafficking, as opposed to production, is also not easy to explain. Transshipment across other countries is not a universal feature of the drug trade. Substantial quantities of cocaine are shipped directly from Colombia to Western Europe, though Argentina and Brazil, with close commercial connections to the Iberian Peninsula (as indicated by Spain's high seizures), also play a role. In the 1980s, some Pakistani-produced heroin was sent directly to the United Kingdom. So transshipment is never simply geographic destiny, but geography is clearly a risk factor. Consequently, it is important to understand how the various economic, sociological, and political factors in different countries can drive the production and trafficking of coca and opium.

Structure of the International Drug Industry

One approach to exploring the question of which countries are more likely to produce and traffic in illicit drugs is to examine the structure of international drug industries. Table 6 provides approximate figures on the cost of cocaine and heroin at different points in the distribution system

[15] On China's historic involvement in production see Dikotter, Laamann and Xun (2004)Iranian

to the United States and Western Europe, respectively, in the year 2000.[16] As shown, the principal costs of these drug industries are associated with distribution rather than production. One pure kilogram of cocaine exported from Colombia in 2000 cost traffickers $1,050; of this amount, $650 covered farmers' cultivation costs. However, traffickers priced this same kilogram of cocaine for U.S. importers at $23,000. And, moving down to the retail level (through perhaps four transactions), the kilogram fetched $120,000 from consumers, sold in 500 milligram units at 50% purity. The story with heroin was similar: A pure kilogram of heroin produced in Afghanistan for less than $1,000, was exported from Turkey for $10,000, and by the time it reached consumers in Western Europe it was priced at $175,000.

The figures in Table 6 suggest three general propositions:

- The cost of production, as opposed to distribution, is a trivial share of the final price. That statement holds true even if one adds the cost of refining to that of growing coca leaf or opium poppies.
- Smuggling, which is the principal transnational activity, accounts for a modest share but much more than production and refining.
- The vast majority of retail prices in Western markets are accounted for by domestic distribution in the consumer country. Most of the domestic distribution revenues go to the lowest levels of the distribution system. If the retailer and lowest level wholesaler each raise their purchase price by 75 percent, which until recently was a low estimate of the margin, they account for two thirds of the final price.

Stage	Cocaine	Heroin
Farm-gate	$650 (Leaf in Colombia)	$550 (Opium in Afghanistan)
Export	$1,050 (Colombia)	$2,000-4,000 (Afghanistan)
Import	$23,000 (Miami)	$10,000 (Turkey export)
Wholesale (Kilo)	$33,000 (Chicago)	$50,000 (London)
Wholesale (Oz)	$52,000 (Chicago)	n.a.
Retail (100 mg. pure)	$120,000 (Chicago)	$175,000 (London)

Source: Drug Enforcement Administration; EMCDDA; UNODC; n.a. is "not available"

production prior to the 1979 Islamic Revolution is only fleetingly mentioned; see for example Booth (1996).

[16] I have chosen 2000 rather than 2002 because Afghanistan's opium price has been at an historic high following recovery from the cutback in production in 2001 and is now falling back closer to the levels of the late 1990s.

Table 6: Prices of Cocaine and Heroin Through the Distribution System in 2000 (per pure kilogram equivalent)

What explains these observations? A plausible, though still untested, explanation is that they reflect the costs of the risks, both from the government and from others in the business,[17] that traffickers and dealers, rather than producers, must bear (Reuter and Kleiman, 1986). First, coca and opium are grown in countries characterized by labor and land that have low prices relative to those in North America and Europe (Kennedy, Reuter, and Riley, 1993). The comparative advantage of these countries is reinforced by the reluctance or inability of governments in Bolivia and Peru (for coca) and Afghanistan and Myanmar (for opium/heroin) to act aggressively against growers or early stage refiners. Low opportunity costs for factors of production in conjunction with low enforcement risks result in very modest prices for the refined product, and they also ensure that production does not move upstream geographically.

It should be noted though that cheap labor, plentiful land, conditions that support coca or opium production, corruption, and weak governments are found in many nations.[18] Francisco Thoumi (2003) contrasts the distribution of illicit drug production across nations with that for legitimate agricultural products. Thoumi notes that coffee can be grown in many countries and, in fact, a large number of those countries do have producing and exporting industries. But very few potential producers are active in the coca and opium markets. With respect to government corruption, the totality of Myanmar's corruption and the need of the central government to allow indigenous groups to maintain independent export industries surely plays a role in opium production, as does the extreme weakness of the central government in Afghanistan since 1989. On the other hand, neither Bolivia nor Peru stands out as having a particularly weak government among those in the region. And a history of illicit drug production is a risk factor, but it is not essential. Mexico had no indigenous opium production until the United States government started limited production there during World War II because of interruptions to traditional sources.[19] Colombia also had no history of opium production before the development of poppy

[17] The government imposes costs through arrest, incarceration and seizures. Other participants impose costs through violence and theft.

[18] Norman Lyoaza (personal communication) has suggested that some countries may be advantaged in terms of how easily the drug production may be concealed. He suggests for example that Afghanistan's mountainous terrain makes it harder for the government to detect small fields.

[19] Mexico has always had plentiful supplies of marijuana but that drug appears not to have been commercially produced until the 1960s.

fields in the mid-1990s. Thus we can only suggest the factors that lead to specific countries acquiring important production roles.

One might ask whether the new republics of Central Asia are likely to become major players in the international heroin business, providing more than transshipment to the Russian and Eastern European market. They certainly have low cost land and labor, as well as apparently favorable agricultural conditions for growing opium and a traditional expertise. Some governments, such as those of Tajikistan and Turkmenistan, are desperate for foreign currency, have few alternative sources and little concern about their standing in international organizations; they are unlikely to aggressively enforce prohibitions against growing opium poppies or to have the capability to do so even if they desired to. They are certain to be low cost producers.

But are they advantaged, compared to current low cost producers, notably Afghanistan and Myanmar? Though closer to Europe and with significant populations resident in Russia and perhaps even in Western Europe, the commercial connections with Western Europe are likely to be weak compared to Myanmar, which has established Thai and Chinese trafficking networks. The Central Asian republics will probably only become major players in the European opiate markets if there are disruptions (including rapid economic development) in the current major supplier countries.

This discussion has identified factors that might make a nation attractive for drug production and trafficking but not why the numbers actively participating are so small. It may be that drug-related corruption shows sharply declining marginal costs per transaction, or that there are high fixed costs to establishing international trading networks. The literature is silent on this matter, though Thoumi (2003) offers some suggestions on those non-economic factors that are most likely to affect national participation in the drug trade.

The modest share of Western retail prices associated with cocaine smuggling and illustrated in Table 6 is also easily explained.[20] Cocaine travels in large bundles at that stage; seizures suggest that shipments of 250-500 kilograms are quite common. Though large sums may be paid to American pilots for flying small planes carrying cocaine or for Honduran colonels to ignore their landing, these costs are defrayed over a large quantity. A pilot who demands $500,000 for flying a plane with 250 kilograms generates costs of only $2,000 per kilogram, less than 2 percent of the retail price. Even if the plane has to be abandoned after one flight, the capital cost of replacing the plane adds only another $2,000 to the kilogram price. For shipments in container cargo, seizure constitutes little more than a random tax collection; replacement cost

[20] This analysis draws heavily on Reuter (1988).

of the seized drugs is substantially less than the landed price, so high seizure rates have modest effect even on wholesale prices.[21] This contrasts sharply with street level dealing, where the risks of arrest and incarceration can be spread over only the few grams that the dealer sells (see Caulkins and Reuter, 1998 for a discussion of these issues).

Heroin smuggling appears to be less efficient than cocaine smuggling, at least as measured in dollars per kilogram. Heroin that exits Afghanistan at $1,000 per kilogram (in bundles of ten kilograms or more) sells on arrival in the United Kingdom for $50,000 per kilogram.[22] There have been a few multi-hundred kilogram shipments of heroin but they are very rare compared to those for cocaine. The drug often travels in small bundles that are swallowed (typically wrapped in condoms) by individual couriers.[23] "Body-packing," where the couriers are low wage earners, produces per kilogram smuggling costs of less than $10,000 in the United States. A body-packer can apparently carry about 3/4 of a kilogram. A payment of $5,000 for incurring a 1 in 10 risk in prison (perhaps acceptable for couriers whose legitimate wages are only about $2,000 per annum), along with $3,000 in travel expenses, produces a kilogram smuggling cost of just over $11,000 compared to a retail price of $500,000.[24] The remainder of the smugglers' margin is for assuming other kinds of risk.[25]

Importantly, smuggling costs depend on the ability to conceal drugs in a flow of legitimate commerce and traffic. Colombia and Mexico serve as the principal smuggling platforms to the United States in part because they have large immigrant populations in the United States and extensive air traffic and trade.[26] Though Mexico is a high cost producer, farm-gate prices for opium in Mexico being typically $2,000 to $5,000 per kilo, compared to less than $50 in Afghanistan prior to 2001, the low smuggling costs equalize total landed price. Colombia, a new

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[21] This is not an argument for abandoning interdiction but for recognizing the limits of its effectiveness in making cocaine or heroin more expensive and less available in mature markets.

[22] It is the absolute difference between export and import that measures smuggling efficiency. However for purposes of final consumption, the absolute price difference is not the interesting figure here; heroin doses are much smaller than those for cocaine (25-50 pure milligram vs. 200 pure milligrams).

[23] Nigerian traffickers seem to specialize in such smuggling. Mark Kleiman (personal communication) has estimated that Nigerian couriers body-packing heroin into New York in the early 1990s accounted for over 500 kilograms per annum, 3 to 5 percent of estimated U.S. consumption. That requires only three body packers every two days.

[24] The risk and payment figures here are moderately informed guesses; the purpose is simply to provide a sense of the magnitudes involved.

[25] The body packer costs are much lower for exports to Russia from Central Asia; body packers in Tajikistan may receive only $500 for smuggling heroin. Russia seizes very little heroin and the opportunity cost of the smugglers in terms of legitimate wages is no more than a few hundred dollars per annum. It is particularly difficult to explain the high mark-ups for smuggling heroin in to Russia.

[26] The 2000 U.S. Census counted 9 million residents born in Mexico. The figure for Colombia was only 600,000 but this was twice as many as for any other South American nation.

source for heroin also represents high farm-gate production with relatively low smuggling costs (Uribe, 2005).[27] Though Colombia and Mexico are minor producers of opium worldwide, accounting for perhaps three percent of the total, they are now the source of nearly two thirds of U.S. heroin.[28]

But geography also matters. Afghanistan's neighbors are at risk, for example. Iran's total dominance as a transshipment country until recently was probably a function of the existence of a substantial domestic Iranian market and the relatively good connections with Turkey, itself a traditional supplier of the United States and Western Europe until 1970.[29] As the Russian market grew after 1995, Tajikistan became an important transshipment country. The border between Afghanistan and Tajikistan was particularly porous, reflecting the flow of Tajik citizens to Afghanistan during the Tajikistan Civil War of the early 1990s, the weakness and corruption of the Tajikistan coalition government, and the ease of exit from Tajikistan through Kazakhstan to Russia. Uzbekistan, another Afghan neighbor with good links to Russia, has a much narrower, more defensible border and a stronger, richer central government; Uzbekistan, though suffering from a substantial drug use problem, seems to have only a modest trafficking role.

Mexico is perhaps the nation for which geographic destiny is strongest; it has been called a "natural smuggling platform" for the United States. Mexico serves as the principal entry country for cocaine, heroin, marijuana, and methamphetamine imported by the United States. At various times Caribbean nations and some nations in Central America have also served as transshipment countries; the latter are way stations to Mexico.

The drug trade readily uses indirect paths for smuggling. Seizures in Germany sometimes turn out to have traveled through Scandinavia into Russia and then exited through Poland to their final market. Ruggiero and South (1995, p. 75) describe "a joint Czech-Colombia venture to ship sugar rice and soya to Czechoslovakia…. This operation was used to smuggle cocaine, destined for Western Europe. In 1991, police say that 440 lbs. of cocaine were seized in Bohemia and at Gdansk in Poland, which would have been smuggled onward to the Netherlands and Britain."

Nigeria is an interesting transshipment anomaly, a nation that seems to have little potential role in the international drug trade. It is isolated from the any of the principal producer or

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[27] Uribe reports the price of a kilogram of opium latex, the raw production material on Colombia as about $340 in 2000. A kilo of heroin requires roughly ten kilos of opium latex; the same figure applies to opium.

[28] There is substantial disagreement about the share from these two nations (Drug Availability Working Group, 2003) but no disagreement that they are major suppliers to the U.S. and to no other major markets.

[29] Turkey had a substantial traditional opium market until the 1970s; thus the poppy industry served both domestic and export markets. There is now little domestic consumption of opium.

consumer countries and lacks a significant base of traditional domestic production or consumption. Nonetheless, Nigerian traffickers have come to play a substantial role in the shipping of heroin between Southeast Asia and the U.S. and also to Europe; recently these traffickers have even entered the cocaine business, though the cocaine production centers are still more remote from their home country. Nigerians have been identified as pioneers in the heroin trade in Russia and Central Asia as well, implausible as that may seem.[30]

The explanation is perhaps to be found in a complex of factors. Nigerians are highly entrepreneurial, have been misruled by corrupt governments over a long time, have large overseas populations, weak civil society, very low domestic wages, and moderately good commercial links to the rest of the world. Thus it is relatively easy to buy protection for transactions in Nigerian airports (corruption and a weak governmental tradition), to establish connections in both the source and rich consuming nations (large overseas populations) and to use existing commercial transportation (note that the drugs travel with passengers rather than cargo since Nigerian exports, apart from oil, are modest); smuggling labor is cheap (low domestic wages) and the entrepreneurial tradition produces many competent and enthusiastic smuggling organizers. Nigeria is not unique in most of these dimensions; however its size and connections with the rest of the world distinguish it from other West African nations. There is perhaps an accidental quality to its initiation into the trade, but these other factors plausibly play a major role.

Immigrants in the destination country who are from the producing and trafficking countries have advantages in managing exporting, with better knowledge of potential sellers and corruption opportunities. Few potential U.S. importers speak any of the languages of the Golden Triangle (Myanmar, Laos and Thailand); English has more currency in Pakistan but not much in Afghanistan. Corrupt officials may be much more at ease in dealing with traffickers whose families they can hold hostage. Moreover, non-native traffickers are likely to be conspicuous in the growing regions. Nor are the exporters merely agents for wealthy country nations, in sharp contrast to the international trade in refined agricultural products. Khun Sa, a quasi-military leader associated with irredentist ethnic groups on the periphery of Myanmar, was the dominant figure in opium exports from the Golden Triangle for many years (Booth, 1996). The Colombian cocaine trade has spawned some spectacular figures, such as Pablo Escobar and Carlos Lehder, all of them of Colombian descent. If there are major U.S. or European individuals in the exporting business in the source countries, they have managed to escape detection.

[30] On Nigerians in the Central Asia trade see Reuter, Pain and Greenfield (2004).

3. SUPPLY SIDE CONTROLS TARGETED AT PRODUCING AND TRAFFICKING NATIONS

Many different approaches are used to attempt to reduce illicit drug use and related problems. Few policies and programs have been subject to systematic evaluation. Particularly striking is the absence of any research on the effectiveness of the principal class of programs used in most Western nations (particularly the U.S.), namely enforcement of prohibitions on selling drugs (Manski, Pepper and Petrie, 2001). Far more is known about the effectiveness of treatment of drug abuse and addiction.

Since almost all the research has been conducted in the industrialized world, predominantly the United States, evaluations reflect Western perspectives. In particular, there are almost no evaluations of interventions aimed at the demand side of poorer nations. In this section I review what is known about programs relevant to developing nations involved in production and trafficking; Boyum and Reuter (2005; Chapters 3-4) provide a broader review.

Production and Refining Controls

Three types of programs have been used to reduce source country drug production: eradication, alternative crop development, and in-country enforcement against refiners. Eradication, involving either aerial spraying or ground-based operations, has direct and indirect effects. It aims to both literally limit the quantity of the drug available for shipment to foreign consumers (in the short-run) and to raise the cost of producing those drugs, or otherwise discourage farmers from growing them (in the long-run). Alternative development is the soft version of production controls; it encourages farmers growing coca or poppies to switch to legitimate crops by increasing earnings from these other products. Alternative development strategies include introducing new crops and more productive strains of traditional crops, improving transportation for getting the crops to market, and various marketing and subsidy schemes. The concept can be broadened to alternative livelihoods, where the shift may be to non-agricultural activities (UNODC, 2005). Finally, source countries can pursue refiners more vigorously, perhaps using military equipment and training; much of the U.S. support for source country control has taken this form. There is little discussion of aggressive use of criminal sanctions against the peasant farmers.

Eradication

Few producer countries use aerial eradication, which is believed by many observers to cause environmental damage.[31] It is also politically unattractive since the immediate targets, peasant farmers, are amongst the poorest citizens, even when growing coca or poppy. Colombia and Mexico, neither traditional producers of drugs, have been the source countries most willing to allow spraying. In a few other nations (e.g. Bolivia) the government has allowed manual eradication, which is very labor intensive.

The term eradication has also been used for a program that mixes coercion and financial incentives: "voluntary eradication." In Bolivia, with U.S. funding, the national government in the 1990s offered farmers $2,000 per hectare for tearing out coca plants, and agreeing not to cultivate any others (Riley, 1996). Absent a good registration of pre-existing fields, this intervention also ran perilously close to being a price support program, since the unsuccessful coca farmer could sell his cultivated land to the government for the nominated price.

There is little evidence that eradication has been effective in recent years but rigorous evaluations are not available and are difficult to carry out. The share of the crop eradicated has been quite high in some recent years; for example, Mexico reported in 2001 that it had eradicated 15,350 hectares out of the estimated 19,750 hectares that were in production (UNODC, 2002). However, there has not been a consistent decline in Mexico's estimated potential production. That may reflect either the dubious nature of the estimates of eradication or that poppy prices are high enough that eradication of 80% of crops still provides farmers with an incentive to plant poppies. Both are plausible and both may apply.

In 2003 both the U.S. State Department (2003) and UNODC reported substantial reductions in Colombian coca production, reasonably ascribed to increased spraying with US supplied planes and helicopters. The 2004 figure showed little change. A U.S. government report in late 2005 that cocaine prices had risen and purity dropped did not inspire confidence; the changes over a six month period merely returned price and purity to the levels of late 2003.[32] In 2004 the U.S. government reported voluntary eradication in Bolivia may have substantially reduced coca production there in the 1990s.

Eradication has one major success story in modern times: Mexican opium production in the mid-1970s. An industry that had operated fairly openly in five northern states, with large,

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[31] See e.g. Washington Office on Latin America (no date)

[32] John Walters, Director of the U.S. Office of National Drug Control Policy made this claim in a speech. Two slides were released showing changes in price and purity. The price and purity figures for heroin appeared to be inconsistent with prior series.

unprotected fields, took approximately five years to adjust to the sudden introduction of spraying. Production subsequently became much more widely dispersed and growing fields were smaller and more frequently hidden in remote locations; good data are lacking but farm-gate prices may have been substantially higher as a result. By the early 1980s, Mexico was supplying as much heroin as before the spraying, but for about five years there was a substantial reduction in availability in the United States, particularly in Western states where Mexican supply dominated heroin markets (Reuter, 1992).

Alternative development[33]

In contrast to spraying, alternative development, a whole panoply of programs, almost always funded by Western donors, is politically attractive, since it provides resources for marginalized farmers. However, there are numerous obstacles to successful implementation. For example, it requires persuading farmers that the government will maintain its commitment over a long period; otherwise they will not be willing to incur the costs of shifting to new crops. In situations of political instability there will understandably be skepticism about the ability of, say, the Peruvian government to assure a dependable market, and a reliable transportation infrastructure, for tropical fruits from the Upper Huallaga Valley.[34] Moreover, in some regions, such as the Chapare in Bolivia, coca is grown in areas that have been cleared precisely for that purpose and the land is not promising for other crops; in this case finding ways of moving immigrant farmers back to their original communities has been an important part of the effort. There are a few instances of well-executed local crop substitution programs, in which farmers in a small area were persuaded to move from coca or poppy to legitimate crops. For example, in Northern Thailand, replacing opium poppy with commercial flowers greatly increased annual revenues per acre. In Bolivia, rubber has turned out to be more profitable in some areas of the Chapare (Mansfield, 1999). However, it does not appear that these programs have reduced drug production in any region of the world, as opposed to the specific areas targeted by the interventions.

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[33] Thoumi (2003) offers the following list of programs under the general rubric of alternative development: crop substitution; development of markets for legal agricultural products; industrialization of agricultural products to increase value added in rural areas; providing social infrastructure; and finally organization development in the communities involved and development activities in non-illicit crop producing regions that expel migrants to coca and poppy areas (Chapter 11).

[34] Infrastructure development has potentially counter-productive effects. It is believed that the creation of better roads in the Chapare in Bolivia during the 1980s, intended to help the distribution of legitimate agricultural products, had the effect of providing easier access for small planes to pick up coca paste (Riley, 1996).

A recent report by the Independent Evaluation Unit of the UN ODC reached very pessimistic conclusions: "There is little empirical evidence that the rural development components of AD [Alternative Development] on their own reduce the amount of drug crops cultivated. Agriculture, economic and social interventions are not seen to overcome the incentive pressure exerted by the market conditions of the illicit drug trade. Where reduction in drug cropping occurs it seems other factors, including general economic growth, policing, etc., can be identified as contributors to the change that takes place." (UNODC, 2005a)

A recent study of the Chapare for the World Bank Institute (Reuter, 2006) suggests that a combination of large scale development funding and aggressive enforcement can move the locus of production. Whereas in the early 1990s the Chapare was the principal producer of coca leaf for the illicit market in Bolivia, by 2005, before the election of Evo Morales as president, only 7,000 hectares were in coca cultivation (UNODC, 2005c). The Yungas had become, as the result of heavy investment of aid by both the United States and European governments, a relatively attractive rural area, with good quality physical and social infrastructure. Production had shifted both within Bolivia (to the Yungas) and to other countries.

There are two distinct frames for assessing production controls; those of the targeted nation and of the global market. It is entirely plausible that a well-executed eradication or alternative development program could reduce production in a specific country or sub-national region; it is less plausible that successes even in a few nations could substantially reduce global production of either opium or coca. The reasoning is simple and rests largely on the fact that production costs (both cultivation and refining) constitute a trivial share of the retail price of drugs in the major Western markets. As noted earlier, the costs of the coca leaf that goes into a gram of cocaine is usually less than $0.50; the retail price of that same gram sold at retail in the West is more than $100.

Suppose that stepped-up eradication led to a doubling of the price of coca leaf, so that it cost $1 for refiners to buy the leaf that goes into one gram of cocaine. Assuming that the $0.50 per gram cost increase was passed along to traffickers and dealers, the resulting change in the retail price of cocaine would be negligible.[35] Indeed, leaf prices in the Andes have increased

[35] There is a controversy as to whether price increases are additive rather than multiplicative across successive distribution levels (Caulkins, 1990). However, the arguments for a multiplicative relationship do not apply at the pre-import level. Since the largest proportionate increases occur at the smuggling stage, even the Caulkins model would suggest very modest retail price increases from rising leaf prices. As a matter of historical observation there appears to be substantial variation in coca leaf prices that is not reflected in retail cocaine prices in rich nations.

more since the mid-1990s, with no evident effect on the retail price of cocaine, which declined over the period.

The story for alternative development is analytically identical. If the introduction of new infrastructure in Afghanistan increases the returns from growing wheat, so that many farmers now switch from growing poppy, then refiners will raise their prices in order to keep sufficient land and labor in poppy production. That may lead to shifts of production across provincial or national boundaries or simply to increased payments to the current growers. The change in Western heroin prices from the higher farm-gate opium price is so slight that production will be unaffected. It should be noted, though, that the poppy farmers are now better off than they were before the alternative development programs; alas, they are still growing poppies.

However this argument views the issue exclusively from the side of the rich consumer countries. A very successful program in one country, whether it be eradication or alternative development, might raise poppy or coca costs sufficiently to make another nation more attractive as a production center. For the innovating country, this is still a desirable result, even if global drug consumption is hardly changed. For the other nation or nations that see increases in production, or which enter the industry for the first time, the result is increased damage. We return to this issue later.

In-Country Enforcement

The United States has also invested in building institutional capacity to deal with the drug trade in major producer countries. Each year the State Department's *International Narcotics Control Strategy Report* (INCSR) argues that the central problem of drug control in other countries is political will and integrity. Training investigators, strengthening the judiciary, and improving extradition procedures are the stuff of efforts to deal with this issue. Unfortunately, in both Colombia and Mexico the corruption problems have seemed endless, imbedded in a larger system of weak integrity controls. For example, in Colombia, where the Army has taken on a major role in drug control, particularly with respect to coca growing, allegations of involvement in mass killings are well substantiated and have been a major source of controversy about U.S. funding (Youngers and Rosin, 2004). Mexico has also had a succession of drug-related corruption scandals at the highest levels; for example, in 1998 the Mexican drug czar, an Army general, was convicted of involvement with major drug traffickers. Despite the election of a president (Vicente Fox) in 2000 who had no ties to the old system of corruption, the problem continues, as illustrated by a flood of drug-related murders involving police both as victims and assailants. The story for Pakistan and Thailand among Asian trafficking and producing nations differs only in that the violence is less conspicuous.

The United States has also promoted efforts to crack down on refining facilities in producer countries. This may have limited potential because refineries have little fixed capital and can be cheaply and rapidly replaced.

Trafficking and Smuggling Controls

Another set of control programs aims at the smuggling of drugs into the wealthy nations. Most large seizures are made through interdiction, i.e. as cocaine or heroin is being moved across or toward borders. Indeed, interdiction seizures may account for as much as 40 percent of total cocaine production; large seizures are made by the exporting Andean countries, some of the transshipment nations (particularly Mexico), and by U.S. Coast Guard and Customs. Heroin seizures appear to be a much smaller share of total production, perhaps only 18 percent, as indicated in Table 5.[36] Most of the heroin seizures are made in Asia, close both to the production centers (Afghanistan and Myanmar) and to the largest consumer populations (India, China, Iran, Pakistan).

The effect of interdiction on the availability of cocaine has been examined in only a small number of studies (e.g. Reuter, Crawford and Cave, 1988; Crane, Rivolo and Comfort, 1997). Interdiction is like a stochastic tax; shipments and agents (crew members, pilots, unloaders) are subject to a probability of interception and the smuggler incurs costs to replace the shipment and to provide compensation to agents for the risk of being incarcerated. This will be reflected in the margin that smugglers charge, i.e. the difference between the price at which they purchase (export from source/transshipment country) and the price they charge in the destination country.

In Table 7 (abbreviated from Reuter and Greenfield, 2001), the difference between export and import values for world agricultural trade amounted to about 6 percent of the export value; absent data for a particular product or market, the Food and Agricultural Organization typically applies a standard "add factor" of 12 percent. In glaring contrast, the cross-border mark-up on, for example, Tajikistan-Russia heroin shipments is thought to be vastly larger, perhaps a ten fold increase, even though what is crossed is just a pair of land borders.[37] Another indication of the high effectiveness of interdiction is the high price per kilo of shipping drugs across international borders. It costs less than $100 to send a kilogram of coffee by express mail from Bogota to London; it costs $10,000 to send a kilo of cocaine between the same two cities.

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[36] This is the percentage of estimated total world production reported as seizures in UNODC (2003). It may be an overestimate because seizures are not purity adjusted and often are very much less than 100 percent pure.

[37] Tajikistan is separated from Russia by Kazakhstan. Citizens of both Kazakhstan and Tajikistan have the right to enter Russia without visas; the Russian border is moreover very long and lightly guarded.

Agricultural Products	Exports	Imports	Industrial Products	Exports	Imports
Cereals & preparations	54	57	Iron & steel	126	138
Fruits & vegetables	71	79	Chemicals	526	547
Sugar & honey	16	17	Automotive products	549	566
Coffee, tea & spices	31	32	Office & telecom equipment	769	792
Beverages & tobacco	57	57	Textiles & clothing	334	352
Alcoholic beverages	30	30	Other manufactures	1182	1966
Tobacco	22	21	**Total manufactures**	4186	4361
Total agricultural products	417	441			

SOURCE: United Nations Food and Agriculture Organization (2000), World Trade Organization (2000)

Notes: Exports valued FOB and imports valued CIF; totals may not add due to rounding; n/a means not available

Table 7 World Trade of Selected Agricultural and Industrial Commodities for 1999 (in billions of current U.S. dollars)

Unfortunately, tougher interdiction does not seem to raise prices much. Figures for the U.S. in recent years suggest that seizures of cocaine have increased as a share of total shipments in recent years while import prices have fallen. Reuter, Crawford and Cave (1988) built a simulation model in which smugglers used past interception data to make decisions about which routes to pursue. Given the low export price of cocaine and low inputs of both equipment and personnel costs per gram, it turned out to be difficult to raise retail prices substantially with more aggressive interdiction. Crane, Rivolo and Comfort (1997) examined the effects of temporary spikes in seizure rates in source zones and found that they did increase retail prices substantially; there has been considerable controversy about the researchers' development of a price series[38] and of their approach to modeling the short-run effects of interdiction events to reach this conclusion (see Manski, Pepper and Thomas, 1999).

That leaves open the question as to why cross-border prices are so high yet more enforcement does not have the desired consequence. Consider again the border between Afghanistan and Tajikistan, whose passage increases the price of a kilogram of opium many fold. This border has been porous throughout the period in which the heroin trade between the two countries has developed. As a share of the estimated flow, seizures have been modest; Greenfield

and Reuter (2004) present figures for seizures and flow that suggest the rate is less than 5 percent. Nor do smugglers face much threat of incarceration from law enforcement, requiring high payments to smuggling labor. Perhaps the border guards seizing a small share of the flow have the capacity to do so and are charging high prices for withholding their authority. Detailed descriptions of smuggling activities are inconsistent with this. There are multiple border control agencies (including, until recently, a Russian military division, staffed by Russian officers and Tajik soldiers) thinly spread out along a border that has many difficult-to-guard mountain passes.

Perhaps the market for smuggling is characterized by cartel or monopoly control. This would account for both the high margin and the lack of sensitivity to the higher interdiction (i.e. tax rate). This is possible in some markets but the best known ones, for shipment to the United States, have been characterized, since the fall of the Cali and Medellin cartels in the early 1990s, by large numbers of small smuggling enterprises. Perhaps they continue to co-ordinate but there is no obvious mechanism for them to accomplish the discipline that legal cartels have rarely managed over sustained periods of time.

I can offer no good account for the high margins charged by drug smugglers in so many settings. The data on risks (seizure, incarceration) and prices (the difference between import and export prices) are not nearly precise enough to allow formal empirical modeling. The apparent lack of response to increased interdiction severity also remains a puzzle.

4. NON-TRADITIONAL DRUG CONTROL METHODS

In addition to the supply and demand interventions noted above, there are a variety of approaches – which I broadly label 'non-traditional' – that have not been widely discussed, but which probably bear closer examination: de facto legalization of production or trafficking, buying up the crop, and choosing a strategic location to allow production for the global market. Each has substantial operational or political risk but explicating these risks helps clarify the considerations involved in policy toward drugs and development.

De Facto Legalization of Production or Trafficking

Can a nation simply ignore drug production and trafficking? Both for treaty reasons, and because legalization is so shocking to other nations, legalizing and openly taxing or regulating the production and distribution of these drugs for international markets is clearly not a possibility.

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[38] That price series did not distinguish transactions by size but assumed a fractal distribution for transactions along the chain from import to wholesale

However it is very different if a nation simply fails, as the result of explicit policy consideration, to enforce laws against producing or trafficking in these drugs.

There are at least three reasons for considering this option. First, it might lead to minimal corruption around the trade; neither producers nor traffickers would have reason to pay police or other authorities if the latter are known to lack political backing to eradicate crops or arrest producers and refiners. Second, it reduces political tension, since the government is not seen as opposed to interests of small producers. Third, it increases earnings of peasant farmers in that nation, since it may induce a rise in their share of world production.

However, there are also substantial risks in pursuing such a policy. Some important nations with major drug problems would object and might retaliate through Official Development Assistance cuts, both bilateral and multilateral. Second, the state would not be able to tax the industry, which now takes a larger share of productive resources; to levy explicit taxes would be a move so close to legalization as to raise the question of treaty compliance. The Netherlands, which has de facto legalized sale of small amounts of cannabis at coffee shops, has not been able to subject these sales to an explicit tax (MacCoun and Reuter, 2001). Third, it creates an ambivalence to the role of the state in enforcing generally agreed upon norms.

It is striking that no nation has actually adopted such a policy. There are regions of nations in which the government takes little action against producers or traffickers, such as the Shan State in Myanmar or the Upper Huallaga Valley in Peru in the 1980s. However they all seem to be instances in which the state has generally weak authority; it simply could not take actions.

Buying Up the Crop

The fact that global production and trafficking are so concentrated presents an opportunity for effective interventions, particularly if it is possible to co-ordinate across sectors within countries and across nations. One policy option that is mentioned from time to time is pre-emptive purchase of the drugs in the dominant producing country by Western governments, perhaps acting through an international agency. The total cost of purchase of all Afghanistan's opium production prior to 2001 might have been no more than $250 million,[39] a small fraction of what is spent by wealthy nations to deal with the problems of their heroin addicts. Such a pre-

[39] The figure would be higher for 2002-2005, given that opium prices have remained higher than before the Taliban opium ban (UNODC, 2005).

emptive purchase, if successful in making heroin much harder to obtain, might drive many addicts into treatment[40] or otherwise lead them to desist from heroin use for a period of time.

There are two standard objections to this, one practical and the other conceptual. The practical objection is that it would be impossible to make this pre-emptive purchase discreetly. Traffickers would soon become aware of the new entrants in the market and would bid against them. The price of opium in Afghanistan would soar and the program would end up costing taxpayers a great deal more and still not prevent opium from continuing to flow into the illegal market, albeit at higher prices. The conceptual objection is that the intervention would exacerbate long-term problems. In face of the increase in demand at the farm-gate level, growers would now plant more, thus worsening the world heroin problem after the pre-emptive buying program ended.

Though both objections have some power, neither individually nor jointly are they decisive. The traffickers in the short run might not have access to funds to bid the prices very much higher than they are now; over time they can increase their sales revenues enough to do so but perhaps not in the first year. Nor does failure to buy the whole crop mean that users would be unaffected by the program; if the governments succeed in purchasing half the product, there will still be substantial hikes in export prices. These might be large enough to raise retail prices in some countries, motivating a large number of addicts to desist, with or without formal treatment.

The fact that there will be an increase in production, and presumably lower prices, in the following years, has relatively little consequence for the global market. A decline in the price of opium has minimal effect on the price of heroin in the major consumer markets. The claim here is of an asymmetry. A sharp reduction in physical availability might generate a price spike that would in fact affect final demand but that a glut cannot have the opposite effect because declines in opium farm-gate prices have minimal effect on retail prices. Thus the short-term gain from the price spike may not be offset by any harm from the increased production that it generates, whether in Afghanistan or in some other nation that entered the market because of the perception that returns had increased.

I offer this not as a complete analysis of the effects of a pre-emptive purchase but rather to indicate the kind of innovation that needs careful analysis. The sudden rise in prices might lead another nation to enter the market, thus spreading the problem and eliminating one of the attributes that make pre-emptive purchase possible. If crops can be expanded rapidly, then the program might be so short-lived as to be not worth the effort. One would have to consider not

[40] A number of U.S. studies have found that higher prices for cocaine have increased treatment seeking.

only whether it is possible to obtain the desired spike but also whether it is possible to co-ordinate treatment efforts in consumer countries to provide resources so that the system is able to take advantage of the short-term opportunity.

Strategic Location

It is plausible to suggest that even programs that succeed in raising the price of coca and opium will fail to substantially reduce world consumption of cocaine and heroin. The reason is simply that the elasticity of retail price with respect to the price of opium or of coca paste is too low; raising Afghan opium prices by 50 percent may generate, even in Iran (a middle income neighbor of Afghanistan), no more than a 5 percent increase in retail price[41] and thus a very modest decline in consumption. That has important policy implications, as it suggests that control efforts will result in shifts in location rather than reductions in the volume of production. Afghanistan's decline in production will be compensated, perhaps with a lag, by increases in production elsewhere.

Drug production then becomes a global public bad, like toxic waste disposal. Some nations will have to bear the consequences of the global demand for drugs so long as that demand cannot be suppressed. In the case of waste disposal, there are compensation mechanisms that hopefully do not distort decisions. For other global public bads, such as the sex trade, no such compensation mechanisms have been developed, in part because what is conspicuous is the revenue generated by the trade rather than the institutional and social problems that accompany it.

The global policy decisions are then whether it is (a) desirable to have production dispersed across many countries or concentrated in a few; (b) desirable to have production stably located in specific countries or moved around; (c) possible to determine which countries are likely to suffer the least bad consequences from becoming major producers and traffickers; and (d) possible to develop compensation mechanisms for those nations that end up with the industry.

Many or few? It can be argued that many countries with a small opium industry will result in less total harm than a few countries each with a large industry. A few hundred opium farmers scattered across a broad area will generate only opportunistic corruption and the funds available from the farmers will not be sufficient to purchase central government protection.

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[41] The retail price of a kilo of pure heroin in Iran (sold in small and somewhat dilute units) in the year 2000 was about $5.000-10,000 at a time when the 10 kilograms of opium required to produce that kilo of heroin cost less than $500. The figures on Iranian prices come from the UNODC *Global Illicit Drug Trends*; they show broad ranges. For example, the 2002 report quoted the street price as $0.70-2.30 for a gram that was 4-20% pure.

However, that may not be a stable equilibrium; sub-national regional concentration may develop and pose a substantial threat to provincial, if not national, government integrity.

Allowing two or three nations to dominate production, effectively the situation that has characterized the last 20 years, results in fundamental undermining of governmental authority in those countries. The term narco-state has been thrown around loosely[42] but it is fair to say that the task of re-establishing the central government in Afghanistan has been made substantially more difficult by the flow of revenues from opium and heroin, which has allowed regional warlords to independently maintain and equip substantial militias. Similarly, Colombia's long-running civil war has been deepened and prolonged by the ability of both FARC and of the newer paramilitary to finance their activities with funds from taxing coca production and refining. However, at the margin, shifting 25 percent of the industry to, say, Ecuador might do less to reduce the damage in Colombia than it does to worsen Ecuadorian integrity and stability. It may be that globally it is preferable to manage the problem in Colombia, rather than pressure it to act aggressively and motivate re-emergence in Bolivia.

Move or Stabilize? The damage caused by the industry is also partly a function of whether it has been stably located. Systemic corruption is not irreversible but once the norms and networks supporting it have developed, restoring good governance is difficult. Pushing Myanmar's production into Cambodia and then on into Vietnam may cause the latter two countries great harm without much helping the fight to improve the welfare of the people of Myanmar.

Which Nations? If it is accepted that the global community can make a strategic choice about where the industry locates, then one can ask whether total harm can be reduced. For example, size is a consideration. A small nation such as Tajikistan may be substantially corrupted by accounting for trafficking even as little as 20 percent of Afghanistan's production, whereas Brazil is so large that a shift of trafficking networks for Colombia's cocaine output to that nation will have only modest effects. Brazil may also be more capable of moderating the adverse effects of the trafficking-related corruption. However, the population potentially affected by government failure is very much greater in the larger nations. Should the world prefer 5 million Tajikistan citizens to have their government totally captured by the drug trade, rather than have governance for 70 million Iranians somewhat worsened by trafficking?

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[42] Shortly after Jacques Chirac became president of France in 1995 he canceled his first meeting with the Dutch Prime Minister, accusing the Netherlands, with its tolerant drug policies, of being a "narco-state". The Dutch were appropriately horrified at the mischaracterization of their country.

Compensation mechanisms Whether it is possible to create a mechanism that is politically acceptable and that does not encourage weak nations to seek out the industry is another matter. Indeed, it could be argued that simply letting the producing nations keep the revenues from the drug trade without sanctioning them is compensation enough.

There is generally something disturbing about such policy realism and it is not clear that it is a politically stable option. What if global public opinion does not accept the premise that drug production is demand driven? Can the government of Colombia responsibly accept that it will continue to be a major cocaine producer without acting aggressively to suppress the trade? The taint of the business may simply be too great for any nation which has prospects of attracting substantial legitimate foreign investment.

5. CONCLUDING OBSERVATIONS

This has been a speculative essay because there is little empirical or conceptual literature. Gross facts about global drug problems are readily available: e.g., Afghanistan produces most of the world's opium and the U.S. consumes a large share of the world's cocaine production. However there is no precision about magnitudes; e.g. estimates of Colombian cocaine production have been revised by 50% around the year 2000 because of new information on yields of alkaloid and the frequency of crops, while the error bands around estimates of the number of heroin addicts in Europe are very broad indeed.

The body of research and evaluation on drug policy interventions, apart from drug treatment, is thin. There are no more than three empirical studies (using that term generously) of the effects of increased intensity of interdiction. There are literally no evaluations of the consequences for major drug markets of crop eradication or lab seizure efforts in producer countries.

Conceptual matters are no better. There are barely a handful of articles by economists on the peculiar configuration of the global drug market. Economist's curiosity has largely been confined to clever possible explanations for paradoxical effects of enforcement (e.g. Poret, 2003). I will conclude this article by identifying three questions that seem worthy of economists' attention:

1. What factors determine a nation's comparative advantage in the production or trafficking of illegal drugs?

2. How stable is the configuration of producer and trafficker countries?

3. Is long-reduction in global supply possible?

Comparative Advantage

The factors of production for cocaine or heroin at first glance appear to be those of any agricultural commodity; labor and land that is agronomically suitable. However under conditions of prohibition the scarce factor is some form of "domestic tranquility", the ability to grow, process, and transport the commodity at low risk. In explaining Colombia's dominant role in the South American cocaine industry, Thoumi (2003; Chapter 3) offers a conceptual model that emphasizes the lack of social capital and weak governance as the basis for low operating costs for the industry. He also notes the difficulty of disentangling historically the relationship between weak government institutions and the presence of the drug trade, which itself weakens those institutions.

The configuration is state-dependent (pun intended). A principal cost is presumably that of obtaining official co-operation. The cost of such co-operation is highest for the first transaction, since in subsequent transactions both sides know that the other can be trusted. An established producer country is one in which many such corrupt relationships have been created, providing lower costs for all phases of the industry within that country.

International transportation costs take on a new meaning in this setting as well; they are also determined less by the conventional factors than by the risk of seizure and the penalties faced by interdicted couriers; the relevant risks may those imposed by other countries. Thus, if it were possible to make transportation through all neighboring countries (China, Iran, Pakistan, Tajikistan, Turkmenistan and Uzbekistan) very risky and expensive, Afghanistan might lose its attraction as a producing site. This is not intended as description of a policy option; closing trafficking is harder than eradicating production, which does require fixed sites.

Stability

Cocaine and heroin look like "footloose" industries. The specific knowledge, personnel and capital required are minimal. Small changes in the profitability of specific nations should lead to rapid changes in location. Yet there has been surprising stability. The same three nations have dominated cocaine and the same two have dominated heroin for the last 20 years. The only new entrant has been Colombia into heroin production.

At the sub-national level there has been much more change. For example, Afghanistan's opium production long concentrated in a few southern and eastern provinces is now spread throughout the country. Bolivian coca production was concentrated in the Jungas until about 1980, when unemployed tin miners moved to the Chapare and is now moving back to the Jungas.

What this suggests is that the nation is a relevant unit of analysis; there is a system of distribution and trafficking that can accommodate to changes in the site of production.

Note that in the trafficking sector, nationalities rather than nations may be involved. Nigeria is not an important trafficking location, Rather it is the diaspora of Nigerians throughout the world that serves as a supply of trafficking labor, linked loosely to the mother country. The decision may be which nations Nigerians find most advantageous to use for transshipment. However, the reverse relationship is also possible: There are nations that are advantaged for transshipment and it is Nigerians as labor who are advantaged for certain roles in those countries.

Global Supply Reduction

This paper reflects what is now nearly a traditional pessimism about the long-run prospects of supply reduction at the source country level. The elasticity of demand for cocaine and heroin with respect to source country prices appears to be almost zero; as noted above, the raw material costs of opium and coca are barely 1% of the retail price in rich countries and perhaps no more than 10 percent in the large markets in poorer nations.

However, this is a static and crude model of price formation. Is it possible to impose a series of short-run supply disruptions that might cumulatively make a difference? The market for these drugs appears to be less well integrated globally than markets for many legal commodities, perhaps reflecting the high fixed costs and risks of establishing new trafficking routes. These drugs are the subjects of epidemics (e.g. Caulkins, Behrens, Knoll, Tragler and Zuba, 2004). A supply disruption for two or three years at the right moment in an epidemic can make a substantial difference for a particular country.

There is also an implicit model of price formation that underlies this; small dollar but large percentage increases in raw material costs do not affect final prices because they are passed along additively. Caulkins (1990) has argued that the relationship might be multiplicative, at least for price increases somewhat further up the chain. The historical record is inconsistent with the multiplicative model for coca and opium prices; these have been subject to large fluctuations that have not been seen in retail prices reported in the U.S., though the quality of the price data is low. More serious testing might find that this model is not correct.

Cocaine and heroin appear likely to present global problems for the foreseeable future. A better understanding of the economics of production and trafficking would help policy makers both assess existing options and develop new ones.

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