

# The Drug-Laden Balloon: U.S. Military Assistance and Coca Production in the Central Andes\*

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*Objective.* This article explores the empirical effects of U.S. drug policy on coca cultivation in the Central Andes. We assess the impact of U.S. military assistance on the production of coca in the Central Andes, while controlling for other explanatory variables that influence coca cultivation. *Method.* Using data from 1980–2001 for Colombia, Bolivia, and Peru, we perform a pooled cross-sectional time-series analysis. *Results.* The effects of U.S. military assistance on coca cultivation are *not* uniform across the Central Andes. Coca production decreased in Bolivia and Peru and increased in Colombia. Total coca production in the Central Andes, however, remained unchanged. *Conclusion.* This study is consistent with existing literature that points out the obstacles governments face as they attempt to suppress illicit goods. Specifically, our empirical findings support the idea of the “balloon effect,” whereby government efforts to “squeeze” illicit trade in one area result in the expansion of that trade elsewhere.

In the last 40 years, drug trafficking has become one of the most contentious and salient issues affecting U.S.-Latin American relations. The relationship is defined by the fact that the United States is the largest consumer of illicit drugs in the world, and the Central Andean region in South America, specifically Colombia, Bolivia, and Peru, is the greatest concentrated source for these drugs. Since the 1980s, in fact, U.S. anti-drug policy has centered on reducing the influx of drugs through massive amounts of monetary assistance, mostly in the form of military aid directed at eradicating the production of coca—the plant used to produce cocaine. The strategy of curtailing drug production from the Andean region has consistently been seen by U.S. policymakers as the best way to reduce consumption at home. The aim of U.S. policy is to affect the supply of

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cocaine by decreasing production, thus making cocaine cost prohibitive and thereby driving down the quantity demanded by consumers in the United States. Building on literature that emphasizes the obstacles that governments face as they attempt to suppress markets for prohibited goods, the goal of this article is to analyze empirically the relationship between U.S. military assistance and the production of drugs in the Central Andes. Specifically, does U.S. military assistance decrease the supply of drugs originating in the Central Andes? What other factors help explain drug production in the Andes? And, does the impact of U.S. anti-drug efforts vary across national contexts?

Aside from “snapshot” government reports, mainly from the U.S. General Accounting Office (1985, 1986, 1987, 1989) and the Office of National Drug Control Policy (various years), the effects of U.S. military aid on drug production in the Central Andes remain unexplored. There are several reasons why this research is important. First, a systematic study of the impact of American aid over time provides a more accurate guide to policymakers than the existing static analyses. Second, evaluating U.S. assistance on its own without taking other important variables into consideration, or entertaining the possibility that curtailing drug production in one part of a region affects production in other neighboring areas—in short, a “balloon effect”—may lead to an inaccurate conclusion regarding the effectiveness of the prevailing counternarcotics policy. Lastly, understanding the effects of current U.S. anti-drug policy can help confirm or contradict the criticisms of many policy analysts who believe that the United States has a “not in my backyard” policy toward fighting drugs, and is, thus, unwilling to address the larger scope of economic and political issues that have long been entangled with illicit drug cultivation in the Andean region (Youngers, 2002; Tickner, 2003).

Our article draws on existing literature that emphasizes the limitations that governments face as they attempt to regulate markets for prohibited goods, such as drugs, prostitution, and alcohol (during Prohibition). As is typical of black markets, government efforts to suppress illicit goods often lead to operational changes by producers; producers also respond with more sophisticated criminal behavior. Even when government policies are successful in decreasing supply, the market for such goods is rarely affected. These studies suggest that the current U.S. anti-drug policy toward the Andean region will encounter similar pitfalls and challenges. In fact, our results show that U.S. military assistance—the central variable under investigation—has had a definite impact in reducing the amount of coca cultivated in Bolivia and Peru, but not in Colombia. Our results also indicate important cross-country spillover in coca output as decreases in production in one country appear to be followed by increases in neighboring countries. These operational changes comprise the bulk of what is known as the “balloon effect,” which serves as the theoretical guide for this article. Overall, total coca production in the Andean region seems mostly unchanged.

After describing the “balloon effect” that typically surfaces when governments seek to regulate markets for prohibited goods, the second section of

this article provides a brief overview of U.S.-Latin American counternarcotics policy over the last two decades. Next, we outline seven sets of hypotheses that are likely to shape the production of coca in the Andean region. We then present our empirical findings and extend the discussion to the case of Colombia, where a unique set of circumstances has complicated U.S. anti-drug policies in the region. In the conclusion, we summarize our results and suggest directions for future research on this topic.

### Understanding the “Balloon Effect”

Governments around the world have long had to deal with vices and activities that create large black markets when such vices or activities are prohibited. Government policies that attempt to eradicate these commodities often stimulate operational changes but rarely eliminate such activity; thus creating a “balloon effect.” This effect refers to a scenario whereby law enforcement actions intended to eradicate illegal, albeit lucrative, activities simply cause alterations in criminal strategy. As the analogy to a balloon implies, government and law enforcement efforts represent the “squeezing” of a balloon; showing an immediate effect in contracting the balloon walls, but creating an increase in illegal activity at the ends of the balloon, that is, areas that are not being extensively targeted by law enforcement.<sup>1</sup> To date, existing research has shown that profitable illegal industries are able to effectively adapt and respond to changes in law enforcement activities (Basov, Jacobsen, and Miron, 2001). These responses occur in several ways.

First, when governments attempt to regulate illicit goods, producers of these goods make operational adjustments to cope with such strategies. Operational adjustments take two common forms. One form of adjustment occurs when producers of contraband goods respond to pressures created by enforcement actions by shifting production locations. For instance, during the era of Prohibition, alcohol production was not eliminated, but rather was moved to locations outside the United States, primarily to Canada. This relocation allowed alcohol producers and distributors to meet the high demand for alcohol despite government efforts to curtail production and consumption. Shifts in production locations are also observed in the illegal drug industry of East Asia. East Asia is a large producer of amphetamine-type stimulants (ATS), opium, and heroin (UNDCP, 2000–2001). Several years ago, most of the drug production, especially amphetamines, was concentrated in central Thailand. However, because of heavy law enforcement

<sup>1</sup>Wayne Bazant, Regional Coordinator for UNODC Regional Centre for East Asia and the Pacific, has been given credit for the specific analogy of a balloon to the way the illicit drug industry functions as a response to government and law enforcement activity (see Calvani, 2002). He has been referenced for this analogy in many writings, but he himself has limited his work on the phenomenon to UNODC reports and drug control conference presentations (see Bazant, 2002).

activities in that region, the drug industry shifted distribution of its products to other regions of Thailand, Laos, and Burma—an area also known as the “Golden Triangle” (Calvani, 2002).

A second form of adjustment made by producers of contraband goods in response to enforcement actions is to downsize and decentralize their operations. Again, this strategy is visible in the East Asian drug industry. Drug traffickers in that part of the world have resorted to smaller-scale operations that are temporary and harder to detect by law enforcement. These adjustments allow for less start-up costs, thereby minimizing losses when operations have to be relocated due to enforcement activities.

Existing literature has also noted that when governments attempt to suppress illicit goods, producers of these goods turn to more sophisticated organized crime (Salazar and Fierro, 1993). This characteristic was visible during Prohibition as alcohol producers streamlined their business to protect their lucrative commodity. The emergence of organized crime during this period was evident, with a deliberate connection formed among gangs in large cities to help smuggle and distribute alcohol. The most famous of these organized gangs was the one led by Al Capone in Chicago. As the demand for alcohol during Prohibition remained strong, Capone not only prospered with his bootlegging industry, but he expanded his enterprise to include many other vices, such as gambling and prostitution (Begreen, 1994). Homicide rates also increased as a consequence of bootlegging and the growth in competition among gangs. Overall, the large organized criminal syndicate operating during Prohibition contributed to the difficulty of law enforcement to curtail the distribution and consumption of alcohol. Similar to the organizational makeup during Prohibition, the drug trade industry in Asia is also not a self-contained criminal activity. The business of drugs is interwoven with arms and human trafficking, as well as money laundering and terrorism. In fact, recent activity in East Asia reinforces some of the causes and effects of the strategies we have thus far discussed, and points to the fact that government enforcement, although often concentrated and intense, has only a temporary effect on contraband goods. Despite the law enforcement activities in central Thailand over the last few years, as recently as November 2003, there were reports indicating that some of the narcotics trafficking networks eliminated by the government have been reformed (Davis, 2004). There are now new routes being used by these groups, as well as the use of previously existing networks, to shift heroin and amphetamines through other parts of Thailand for worldwide distribution.

Previous literature also suggests that when governments attempt to regulate illicit goods, the supply and demand for these products is rarely affected (Basov, Jacobsen, and Miron, 2001). Fluctuations in price that may result from enforcement activities actually lead to the substitution of one contraband product for another and not the elimination of the market altogether (Salazar and Fierro, 1993; Moreno-Sanchez, Kraybill, and Thompson, 2003). More importantly, due to exceptionally high returns,

producers of contraband goods have a much greater tolerance for risk than most legal businesses. These illegal industries have the ability to retain excess profits and secure investments, allowing these businesses to shift operational strategies and alter locations in response to enforcement activities. Again, both alcohol during Prohibition and illegal drugs available on the black market today demonstrate this transmutation.

Operational adjustments observed in other prohibited commodities can clearly be seen in the Latin American drug industry. Drug traffickers have resorted to new and innovative methods of smuggling their prohibited commodities. A good example of this was the large, partially constructed “narco-sub” discovered by Colombian National Police in Bogotá in 2000 (CBS News, 2000). Law enforcement authorities believed that the submarine would have been used to smuggle up to 10 metric tons of cocaine from Colombia to remote sites in the Caribbean where the drugs could then be more easily transported into the United States. Law enforcement officials at the time marveled at the capabilities and ingenuity of the drug industry. “In 32 years I have never seen anything like this,” said Leo Arreguin of the DEA (CBS News, 2000). Overall, this continuous adaptive behavior by producers of illegal commodities tells us that current U.S. anti-drug policy in this region is likely to find limited success.

Historically, U.S. anti-drug policy has been to de-emphasize social, economic, and cultural conditions that many have considered contributing factors to the prominence of the illegal drug business in the region. Political analysts argue that the United States’ long track record of trying to frame the problem of illegal drugs as mainly the responsibility of Latin American and, to a lesser extent, Caribbean nations, makes it difficult for the multitude of forces contributing to the lucrative drug industry to be addressed.

### **U.S.-Latin American Drug Trade: An Overview of the Central Andean Region**

In the 1980s, illicit drug production and trafficking was viewed by the U.S. government as a growing threat to national security (Salazar and Fierro, 1993). This, coupled with an increase in domestic cocaine and heroin consumption, forced policymakers to debate the best course of action for dealing with the illegal narcotics industry, and as a result, U.S. strategy turned to supply-side anti-drug initiatives (Andreas and Youngers, 1989; Crandall, 2002). Initially, policy efforts to diminish the flow of drugs available in the United States focused on interdiction operations, which sought to stop drug shipments from entering U.S. borders. The U.S. Customs Service, along with other law enforcement agencies, took a lead role in the so-called war on drugs. In the late 1980s, however, when drug seizures appeared to be insufficient to stop the flow of drugs, U.S. anti-drug policy evolved from interdiction measures to a greater emphasis on eradication efforts. Eradi-

cation policies directly targeted the production of illegal drugs in the Central Andes. Stated otherwise, for interdiction, the drug problem was defined by domestic consumption; for eradication, it was production abroad.

U.S. counternarcotics policy focusing on drug production in Latin America can be broadly understood by examining three initiatives: first, the “Andean Initiative” enacted in 1989 under the first Bush Administration (1989–1993); second, “Plan Colombia,” implemented in 2000 by the Clinton Administration (1993–2001); and lastly, the “Andean Regional Initiative,” unveiled in 2001 by the current Bush Administration (2001–present). Known also as the “containment model” of drug control (Hartlyn, 1988), collectively these initiatives seek to decrease the production of drugs consistently over a long period of time, making drugs cost prohibitive, and thereby driving down demand in the United States.

U.S. anti-drug policy with a clear directive toward targeting drug production was initiated in 1989 when, under the first Bush Administration, the U.S. funded the Andean Initiative. This initiative marked a new trend in anti-drug policy; almost all counternarcotics aid from that point forward was provided in the form of military assistance. The initiative was a five-year, U.S. \$2.2 billion aid package to Colombia, Bolivia, and Peru for the sole purpose of combating the production of narcotics (INCSR, 1990; GAO Report, 1991). After three years, however, the plan was declared a failure in its goal to reduce the supply of cocaine entering the United States (Crandall, 2002). The ineffectiveness of this plan prompted the Clinton Administration to decrease the amount of funding provided to the Andean region. The reduction brought an onslaught of criticism from many in the U.S. Congress who condemned the administration for taking a passive stance on the war on drugs. Given the internal demands from U.S. lawmakers and external pressures by the governments of Andean countries to continue the extensive funding, it did not take long for U.S. anti-drug policy to revert back to a proactive stance. In January 2000, the Clinton Administration announced an unprecedented \$1.6 billion package to fund Plan Colombia (Crandall, 2002).<sup>2</sup> In 2001, on the heels of Plan Colombia, the current Bush Administration unveiled the Andean Regional Initiative. This program seeks to deal with the heavy production of cocaine in Colombia, as well as its “spill-over” effects in Bolivia, Peru, and other neighboring countries. The Andean Regional Initiative involved more than \$600 million in 2001 and over \$700 million in 2003 (INCSR, 2001, 2002). From 1981 to 2001, the United States spent more than \$8.5 billion in combating the production of illicit drugs (Perl, 2006).<sup>3</sup> Naturally, this level of financial commitment continues to garner criticism both domestically and internationally.

<sup>2</sup>The majority of these funds were earmarked for combating drug production in Colombia, but some funding was also provided for counternarcotics efforts in Bolivia and Peru.

<sup>3</sup>This figure includes only eradication and other law enforcement efforts and does not account for economic development and other financial aid packages offered by the United States.

If one evaluates the impact of U.S. foreign military aid policy on the reduction of drugs produced in the Central Andes, there seem to be different stories to tell, as military assistance has evoked varying responses from recipient countries. Compared to Colombia or Peru, Bolivia has had relative success in reducing the amount of land used for coca cultivation. For this reason, advocates of U.S. policy consider this country to be a success story, yet observers point to several factors present in Bolivia that will make complete eradication of drugs a very difficult task. First, Bolivia has the poorest economy in Latin America next to Haiti, and eradication of coca crops has cost the country's economy close to \$500 million a year (Ledebur, 2002). Second, alternative strategies for economic development aimed at replacing the loss to the national economy, as well as compensating coca farmers for their loss of income, have had little success. Reflecting "the anemic state of alternative development in Bolivia" (Argañarás, 1997:68), to date there are simply very few options available to farmers that are nearly as profitable as coca cultivation. Third, Bolivian state officials have confronted strong mobilizations by coca farmers who see their rights threatened by the continuation of U.S. crop-eradication policies. The political weight of coca farmers has resulted in some significant concessions by the Bolivian government, much to the dismay of U.S. policymakers, who simply view coca farmers as criminals. In short, the Bolivian government is caught between a rock and a hard place. On the one hand, it attempts to meet U.S. expectations of coca crop eradication, while on the other it tries to appease coca farmers, whose organization and mobilization efforts have made them an important political force.

Peru has had very mixed results in effectively implementing U.S. counternarcotics policy. During the 1980s, a top priority of the Peruvian government was combating the Shining Path (Sendero Luminoso), a Maoist guerrilla group that began violent incursions in the central highlands of the country. Whether or not, and to what extent, the Shining Path was linked to drug trafficking remains an open question (Youngers, 2002). Some government officials and Peruvian observers believe that at the height of the movement, the group extorted funds from drug traffickers to help fund its operations (e.g., Kay, 1999); while others believe that the Shining Path's involvement was simply to protect the land of coca farmers. Beginning in the 1990s, however, the Peruvian response to U.S. foreign aid policy began to change. As political violence came to an end, the government of President Fujimori (1990–2000) aggressively pursued forced eradication programs to meet U.S. policy demands. Compliance with U.S. policy was used as a mechanism to shore up support for the Fujimori regime and to improve its dictatorial image (Youngers, 2002). Although Peruvian coca farmers are not as organized as in Bolivia, the production of coca is important to the local economy and to these farmers. In both countries the absence of alternative strategies for development is quite evident.

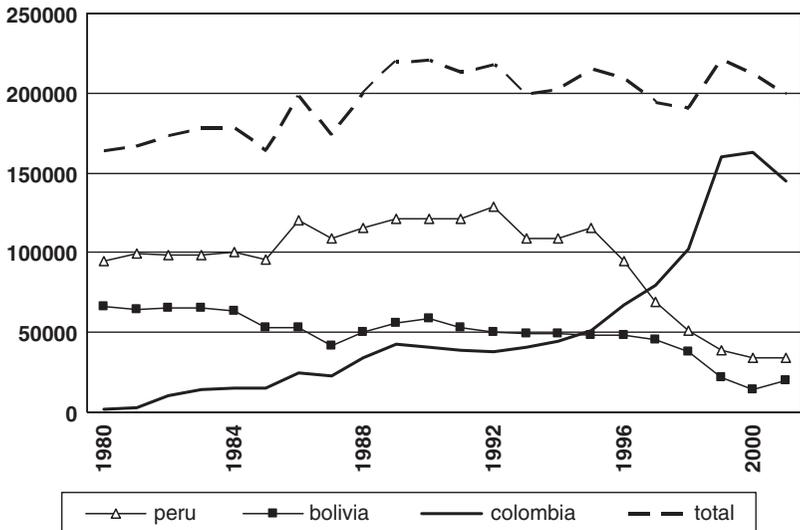
Paradoxically, Colombia has received more money to implement counternarcotics efforts than Bolivia and Peru combined, yet it has achieved the

fewest results (INCR reports, various years; Tickner, 2003). Colombia faces distinct challenges that have arguably contributed to its lack of success in the war on drugs. First, Colombia has suffered most from the “balloon effect” set in motion by U.S. counternarcotics policy. The “balloon effect” refers to the unintended increase in drug production in one area that results from the reduction of drug production in other areas. In the 1980s, both Bolivia and Peru were the main producers of coca, while the actual manufacturing of cocaine took place in Colombia. As U.S. anti-drug efforts focused on illicit crop eradication in Bolivia and Peru, the drug industry in the 1990s restructured its operations and began growing more illicit crop in Colombia; consequently, both production and manufacturing of cocaine became concentrated in one country (see Figure 1).

Equally important, U.S. anti-drug efforts resulted in the destruction of the large drug cartels that controlled the Colombian drug industry. Ironically, the elimination of the cartels did little to curtail the production and manufacturing of drugs. Instead, the Colombian drug industry became more diffuse and arguably more effective. Rabasa and Chalk (2001:14) describe this diffusion as materializing in numerous “boutique” groups that are “newer, less structured and ‘flatter’ organizations . . . most of which operate in small autonomous cells . . .” These less structured units have been able to

FIGURE 1

Total Coca Production and Coca Production by Country (Measured in Hectares of Coca Cultivated)



SOURCES: Data for 1980–1986 taken from the GAO Reports to Congress. Data for 1987–2001 taken from the International Narcotics Control Strategy Reports.

avoid capture and have made it much harder for law enforcement to get a handle on their scope and capabilities. In other words, the elimination of the large and visible cartels may have resulted in a more efficient and evasive drug industry. Second, the relocation of the drug industry in Colombia allowed drug producers to exercise power over rural farmers who refused to permit that their land be used for illicit crop cultivation. As a result, a large portion of Colombia's rural population has been displaced, leaving them with neither land nor home. Coca farmers in Bolivia and Peru, in contrast, are still in control of the coca fields. Third, possibly the most complicating factor affecting eradication efforts in Colombia today is separating the drug economy from the violent insurgent movement, a problem that is not present in either Bolivia or Peru.

Today there is almost no literature on Colombia that disassociates the drug industry and the guerilla warfare being waged against the government (Crandall, 2002; Tickner, 2003). "Current [political] instability in Colombia derives from the interaction and resulting *synergies* stemming from two distinct tendencies: the development of an underground criminal drug economy and the growth of armed challenges to the state's authority" (Rabasa and Chalk, 2001:xiii). The "synergy" refers to the fact that the strength of the insurgent forces—guerilla and paramilitary—is directly linked to their control of drug-producing areas. A main criticism of U.S. counternarcotics policy in Colombia is that it ignores this "synergy" as well as other socioeconomic factors originating from the aforementioned "balloon effect." These other factors include displacement of the rural population by coca producers and extensive human rights violations (i.e., kidnappings by guerillas and potentially hazardous aerial fumigations led by the Colombian and U.S. governments).

To summarize, U.S. anti-drug policy shifted from interdiction measures in the early 1980s to eradication beginning in the late 1980s. Military assistance packages have been central to reducing the amount of drugs produced in the Central Andes. However, it also appears that the unilateral emphasis on eradication efforts by the United States may have simply led to a restructuring of the drug-production business, from Bolivia and Peru in the early 1980s to Colombia beginning in the early 1990s. In other words, eradication may have contributed to the "balloon effect" observed in Colombia. Clearly, as mentioned above, other political, economic, and social factors are at play in Colombia, making the long-term success of current U.S. anti-drug measures in this country quite suspect.

## Hypotheses

The literature discussed above suggests seven hypotheses about the impact of U.S. military assistance on the production of coca in the Central Andes. Two of these directly examine U.S. policy efforts to reduce the production

of coca (e.g., interdiction and eradication). The remaining hypotheses aim to account for country characteristics (e.g., the economy, rural population, alternate crop production) and the alleged “balloon effect” observed in Colombia. These hypotheses provide a first cut at the empirical evaluation of the effects of U.S. foreign military aid policy.

The “containment model” (Hartlyn, 1988) has shaped U.S. counternarcotics policy in the Andean region for the past 15 years. Policy based on this model seeks to drive down the production of drugs consistently over a long period of time.<sup>4</sup> Therefore:

*H<sub>1</sub>: The more U.S. military assistance directed toward anti-drug efforts, the less production of coca in the Central Andes.*

Drug interdiction is a second U.S. policy effort aimed at reducing the supply of drugs entering its borders. It is possible that eradication ( $H_1$ ) and interdiction may pose an unintended tradeoff in the war on drugs: as more cocaine is seized, production may increase to compensate for lost shipments. So, as a logical extension of eradication policies, we state the following hypothesis.

*H<sub>2</sub>: The more drugs seized in the United States, the more production of coca in the Central Andes.*

Critics of U.S. counternarcotics policy have long argued that economic development, and not eradication ( $H_1$ ), is the best way to eliminate illicit crops in the Andean region. A stronger economy should provide other viable options for what the United States has characterized as “narco-farmers,” and consequently the amount of coca being planted should decrease. In fact, writing about the possible solutions to Colombia’s armed conflict, described later, Solimano (2000) emphasized the importance of high-quality economic growth. Hence:

*H<sub>3</sub>: The more the economy grows, the less production of coca in the Central Andes.*

Along with general economic development, drug policy analysts state that the success of U.S. military assistance targeting coca eradication is greatly dependent on alternative crops that coca farmers are able to profitably cul-

<sup>4</sup>As the supply of drugs from the Central Andes decreases, the “street price” of drugs in the United States would be expected to skyrocket. Data on the average “street price” of cocaine in the United States from 1981 to 2000, however, shows a consistent, steady decline from U.S. \$423 to \$184, demonstrating that cocaine is even more inexpensive after supply-side policy initiatives were implemented than it was before (Youngers, 2002; U.S. Department of State, 2002).

tivate (Salazar and Fierro, 1993). Consequently, the amount of land used to cultivate coca is in large part a function of the price farmers receive for the coca crop compared to the price of crops that can be substituted for coca (see Moreno-Sanchez, Kraybill, and Thompson, 2003). Therefore, in order to more accurately test the effects of U.S. military aid on coca production, we control for *coca price* (the farm-gate price of coca base) and *substitute crop price* (the farm-gate price of alternative crop). These variables lead to the following two hypotheses.

H<sub>4</sub>: *The more farmers are able to profit from alternative crops, the fewer hectares of coca are planted in the Central Andes.*

H<sub>5</sub>: *As the farm-gate price of coca goes up, more hectares of coca are planted in the Central Andes.*

Rural population can inform us about the demographics of coca production in particular, and the economy in general. Given the lack of state presence characteristic of poverty-stricken rural regions in the Central Andes, a lower concentration of the rural population dependent on coca production may make it easier for the United States to eliminate illicit crops. Conversely, a higher concentration of the rural population depending on coca production—as seen in both Bolivia and Peru, but less so in Colombia—may bring to light the importance of alternative economic options, that is, crop substitution, all while making the implementation of U.S. counternarcotics policy more difficult. Hence the following:

H<sub>6</sub>: *The more people living in rural areas, the more production of coca in the Central Andes.*

Our last hypothesis seeks to account for the geographical relocation of drug production as a consequence of U.S.-sponsored eradication policies. As noted earlier, in the 1980s, both Bolivia and Peru were considered to be the main producers of coca, while Colombia was the main manufacturer of cocaine. In the 1990s, however, as eradication policies achieved moderate results in Bolivia and Peru, coca production drifted more toward Colombia (see Figure 1). This suggests a compensation effect, whereby increases in production in one country result in lower production elsewhere, and vice versa. If a compensation effect were taking place, then our empirical findings would be consistent with existing research that emphasizes the obstacles that governments encounter as they attempt to eliminate markets for contraband goods. Therefore:

H<sub>7</sub>: *The less production of coca in one country, the more production of coca in the neighboring country.*

## Data and Methods

The dependent variable is *coca cultivation* measured in hectares (2.46 hectares = 1 acre). The amount of coca cultivated is viewed as a good measure of how much cocaine is actually produced since there is virtually no other use for the coca plant. Cocaine is also the most prolific drug produced in the Andean region and 85 percent of its production has a market in the United States. The main explanatory variable is *U.S. military aid per capita* expressed in 1,000s of constant U.S. dollars ( $H_1$ ). As noted earlier, since 1989, almost all U.S. counternarcotics assistance to the Andean region has come in the form of military aid.

We test the effects of interdiction operations ( $H_2$ ) on the basis of *cocaine seizures*. Since we are interested in determining the total amount of cocaine taken out of the illicit market, the variable is measured as the total pounds of cocaine seized by U.S. Customs in a given year.

Our four domestic explanatory variables are *GDP per capita* ( $H_3$ ), *substitute crop price* ( $H_4$ ), *coca price* ( $H_5$ ), and *rural density* ( $H_6$ ). Measured in U.S. dollars, GDP per capita accounts for economic productivity; increase in productivity indicates a stronger economy that typically results in both higher levels of employment and individual income. Since there is no data available on the number of farmers engaged in coca cultivation, rural density is used as a proxy for this measure. Rural density is rural population divided by arable land area. We recognize the fact that this alternate measure does not fully capture the amount of the population involved in coca cultivation. Furthermore, there are rural citizens in the Central Andean region who do not engage in coca cultivation or are not involved in any type of farming. The fact that this measure does not disaggregate coca farmers from the rest of the rural population is also a limitation.

*Coca price* is the farm-gate price for coca base that farmers receive, measured in U.S. dollars per kilogram. *Substitute crop price* is the farm-gate price of coffee (producer price), also in U.S. dollars. Although in different parts of the Andean region coca can be replaced by a mixture of several alternative crops, coffee is considered to be one of the most consistent and viable economic options for coca farmers in many of the regions of the three Central Andean countries under investigation (U.S. Congress, Office of Technology Assessment, 1993; UN General Assembly, 1998). Since both coca and coffee are perennial crops, we expect the price of these crops and, consequently, the amount of land being used for plantation, to be dependent on production conditions from the previous year.

We test the "balloon effect" ( $H_7$ ) of eradication policies by creating an additional variable: *coca cultivation from neighboring countries*. We constructed this variable by adding the total of coca cultivation from the other two countries under analysis. To avoid the potential problem of endogeneity (coca cultivation in one country affecting production in the other two countries), we lag this variable by one period. This supports our theoretical

argument that the compensation effect from increases or decreases in coca production in one country would not be observed in the other countries for some time. Further, we also attempt to account for any bias in our findings resulting from the issue of endogeneity by including two versions of our model: one with the variable *coca cultivation from neighboring countries* and one without (see Table 1).

Given the small sample size and at least seven different explanatory variables for each country, we perform a pooled cross-sectional time-series analysis.<sup>5</sup> All observations are yearly for the period 1980–2001.<sup>6</sup> We also lagged all explanatory variables in the model except rural density. These variables are expected to have a delayed effect on the amount of coca cultivation taking place in a particular year. Moreover, in the model we add an interaction term between U.S. military aid per capita and Colombia. The interaction term *U.S. military aid per capita \* Colombia* was created by multiplying U.S. military aid per capita times the dummy variable scored 1 for Colombia and 0 for both Bolivia and Peru. This interaction term seeks to account for the likely differentiated effect of U.S. military aid policy. As discussed earlier, Colombia faces far greater difficulties in the war on drugs compared to both Bolivia and Peru. To name but one example, the country currently sustains an increase rather than a decrease in coca production (see Figure 1).

## Empirical Results

In Table 1, we present the main results from our analysis. *U.S. military aid per capita*—the central variable under investigation—has a negative and significant impact on coca production. However, there is no significant relationship for Colombia as the positive effect of the interaction term *U.S. military aid per capita \* Colombia* cancels out the negative effect of *U.S. military aid per capita*. These results suggest that the effects of U.S. military aid policy are not uniform across the Andean region.

Moreover, *drug seizures* have a positive and statistically significant effect on coca cultivation, suggesting a possible tradeoff between eradication and interdiction policies. Increases in the cultivation of coca may be in part a response to efforts to stop the supply of drugs. It is possible that the drug industry compensates for the loss of cocaine shipments that do not make it onto U.S. streets. Given the lack of consistent and accurate data on the supply and demand of drugs, this relationship may be hard to determine.

<sup>5</sup>We used Stata's panel-corrected standard error procedure. Autocorrelation was modeled as a first-order process with panel-specific autoregressive terms. The results do not change with a common autoregressive coefficient for all panels.

<sup>6</sup>The dependent variable coca cultivation and the explanatory variables coca cultivation from neighboring countries, drug seizures, coca price, and substitute crop price were logged to achieve distributional normality.

TABLE 1  
Determinants of Coca Cultivation in the Central Andes, 1980–2001<sup>a</sup>

Dependent Variable	Coca Cultivation	
	Model 1	Model 2
U.S. military aid per capita <sub>-1</sub>	-0.101 (-2.39)**	-0.090 (-2.23)**
U.S. military aid per capita <sub>-1</sub> *Colombia	0.121 (2.61)**	0.087 (1.94)*
Coca cultivation from neighboring countries <sub>-1</sub>		-1.145 (-4.54)***
Cocaine seizures <sub>-1</sub>	0.142 (2.20)**	0.205 (3.23)***
GDP per capita <sub>-1</sub>	0.000 (1.27)	0.000 (0.88)
Rural density	0.005 (1.85)*	0.004 (1.50)
Coca price <sub>-1</sub>	-0.005 (-0.03)	-0.076 (-0.51)
Substitute crop farm-gate price <sub>-1</sub>	-0.072 (-0.63)	-0.043 (-0.36)
Colombia	-2.458 (-3.30)***	-1.772 (-3.11)**
Peru	-0.610 (-1.17)	-0.700 (-1.65)*
Constant	8.629 (5.23)***	22.324 (6.02)***
Observations	66	66
R <sup>2</sup>	0.90	0.89

<sup>a</sup>SOURCES for data not mentioned in the article are available from the lead author upon request.  
\*\*\**p* 0.01; \*\**p* 0.05; \**p* 0.10.

NOTE: Panel-corrected *z* statistics in parentheses.

The tradeoff between eradication and interdiction policies, however, suggests that different facets of the “containment model” may be somewhat counterproductive when pursued simultaneously.

*Rural density* also has a positive and significant effect on coca production (See Model 1, Table 1). This suggests that the implementation of supply-side policies may be complicated by the concentration of people living in areas that are dependent on the coca crop for their livelihood.

In contrast to prior research based on Colombia (Moreno-Sanchez, Kraybill, and Thompson, 2003), *substitute crop price* and *coca price* do not have a significant effect on the amount of coca cultivation that takes place in the Central Andean region. Our findings do not support the idea that a viable crop substitute for coca, or the price of coca itself, is important to the success of supply-side anti-drug policies. The insignificance of alternative crops may

be a result of the fact that there are a very limited number of legal crops that can be offered to farmers in place of planting coca. Moreover, these alternative crops, like coffee, can experience a great deal of fluctuation in price and are much tougher and more expensive to harvest than coca (Rojas, 2003). In contrast, the price of coca offered to farmers can be easily increased by drug traffickers at very little extra cost, given the relatively high retail price of cocaine (Moreno-Sanchez, Kraybill, and Thompson, 2003). This, plus the lack of alternative crop viability, makes it easier for the drug industry to compete for arable land, and thus entice farmers to grow coca instead of other crops.

*Coca cultivation from neighboring countries* represents the amount of coca produced in two of the three countries under analysis. Supporting the “balloon effect” notion and consistent with existing research that emphasizes the limitations that governments face as they attempt to regulate markets for contraband goods, decreases in production in some countries lead to increases in production in other countries as indicated by the negative and statistically significant coefficient for this variable. The overall results of our model remain quite robust even after addressing the potential endogenous effect of this variable (see Table 1, Model 2). These results are largely consistent with the present changes in the U.S.-Latin American drug trade documented earlier. In fact, as U.S. military aid policy shifted more toward eradication measures in the late 1980s, the drug industry also restructured its operations geographically. Military aid effectively “squeezed out” coca production in both Bolivia and Peru, but then greater coca production began to take place in Colombia. Eradication thus placed Colombia on the receiving end of the “balloon effect,” in particular since the early 1990s. Further, if the drug industry simply relocates geographically in response to eradication measures, curtailing drug production remains an uphill battle. In fact, the most recent preliminary measures of coca cultivation for 2003 and 2004 show that Colombia may be exhibiting a decline; while at the same time cultivation may be increasing in Bolivia and Peru (*Economist*, 2003).

To summarize, *U.S. military aid per capita*—the main explanatory variable under consideration—had a distinct effect on coca production across the Central Andes. From the point of view of U.S. policymakers, it has had the desired effect of decreasing coca production in at least two countries, Bolivia and Peru. In contrast, in Colombia, coca production is more complicated, partly because of the “balloon effect” resulting from the reduction of coca output in Bolivia and Peru, the displacement of the rural population in areas overtaken by the drug industry, and the increasing relationship between guerilla movements and drug traffickers in what has come to be known as a “narco-guerrilla” (see Rabasa and Chalk, 2001).

The Colombian “narco-guerrilla” is a prime example of how more sophisticated organized crime surfaces as governments attempt to suppress illicit goods. The ties between Colombia’s Revolutionary Armed Forces of Colombia (FARC) and narco-traffickers are indeed well documented, and

set this country apart from the other coca-producing countries of Bolivia and Peru. In exchange for monetary compensation from both the drug industry and coca farmers, the FARC offers coca producers protection from government eradication efforts, while at the same time generating funds for its own battles against the Colombian government. Stated otherwise, since U.S. policy efforts seek to decrease coca production, they also affect FARC's "own wallets," thus creating incentives to increase, rather than decrease, coca output over time. In addition, as a result of the "balloon effect" and the growing strength and decentralized relocation of the drug industry, a large portion of Colombia's rural population has been displaced, leaving drug producers in charge of the crop land. The displacement of the rural peasantry seen in Colombia runs diametrically opposed to the organization and mobilization of coca farmers characteristic of Bolivia, and observed recently in Peru (see "Mil cocaleros llegan a Lima," *El Comercio*, April 24, 2004).

## Conclusion

Using available data, this article empirically evaluates the effects of U.S. military aid on coca production in three countries: Bolivia, Peru, and Colombia. Our main findings are twofold. First, our comparative study reveals that the effects of U.S. military assistance on reducing coca production are not uniform. Eradication operations have been relatively successful in "squeezing out" coca production in both Bolivia and Peru. Second, and consistent with the former finding, as U.S. drug policy focused more on eradication, the drug industry gravitated toward Colombia. In all, country-specific characteristics matter, and U.S. policy toward the Andean region may be better served by taking into account some of these country differences. As our results indicate, Colombia is indeed a special case, warranting further investigation.

Our empirical findings are also consistent with existing literature that suggests that government policies are likely to fail when they seek to regulate markets for lucrative prohibited goods. This body of research notes that law enforcement activities often lead to shifts in operational strategies (i.e., the "balloon effect" observed in the Central Andes) and more sophisticated organized crime (i.e., the "synergy" between the FARC and the drug industry in Colombia), with marginal or no effect on the market for these products (i.e., coca production in the Andean region remains alive and well).

Much of the criticism directed at U.S. policy is that aid allocated for military support comes at the expense of assistance for economic development and social programs. However, our results also appear to indicate that economic development as measured by GDP per capita in the Central Andes is unlikely to affect the production of drugs. Perhaps other forms of economic influence are likely to shape the production of coca at the grass-roots level. As William Easterly (2002:xii) would have it, "people respond to incentives," and coca farmers "do what they get paid to do." Therefore, as

long as eradication practices continue to ignore the incentives for cultivating coca, the solution to the problem of drugs may not be on the supply side, but rather lies in U.S. and worldwide demand.

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**Appendix: Variables and Summary Statistics**

TABLE A1

Variable	Mean	SD	Min	Max
Coca cultivation	10.82845	0.8133223	7.740664	12.00151
U.S. military aid per capita <sup>a</sup>	2.768764	3.600336	0.007287	23.10487
U.S. military aid per capita*Colombia	1.101098	3.252563	0	23.10487
Cocaine seizures	11.1443	1.452885	7.271078	12.40232
Rural density	225.4208	101.8725	105.1889	463.4803
GDP per capita <sup>a</sup>	1771.956	653.5075	797.542	2685.534
Coca price <sup>a</sup>	6.883826	0.5999548	5.587249	8.00102
Substitute crop price <sup>a</sup>	3.978988	0.4636836	2.612432	4.659003
Coca cultivation from neighboring countries	11.71351	0.3618576	10.79343	12.19955

<sup>a</sup>Variables are measured in constant U.S. dollars, base year 2000.