Non-Technical Summary of:

"The War on Illegal Drug Production and Trafficking: An Economic Evaluation of *Plan Colombia*"[1]

by:

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Stylized facts, motivation, and contribution of the paper.

A large amount of resources has been spent on the so-called "war on drugs" under *Plan Colombia.*[2] According to Colombia's National Planning Department (DNP), between 2000 and 2005, the U.S. government disbursed about $3.8 billion dollars in assistance to the Colombian government for its war against illegal drug production, trafficking, and the organized criminal organizations associated withe these activities[3]. Colombia, for its part, spent about $6.9 billion during the same period. About one half of the Colombian expenses and three quarters of the U.S. subsidies went directly to finance the military components of the war against illegal drug production, trafficking, and the organized criminal organizations associated with these activities. More precisely, the U.S. and Colombia together spent, on average, about $1.2 billion per year between 2000 and 2005 on the military component of *Plan Colombia*, which corresponds to about 1,5% of Colombia's GDP during the

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[2] *Plan Colombia* is the official name of the program that, among other things, provides the institutional framework for the military alliance between the U.S. and Colombia in the war against illegal drug production and trafficking, and the organized criminal groups associated with these activities.

[3]Recent estimates of the United States Government Accountability Office (GAO) indicate that the total U.S. assistance under Plan Colombia between 2000 and 2007 reached $5.5 billion.

same period. Apart from the military component, aimed at reducing the supply of illicit drugs and improve security, there are two nonmilitary components of the U.S. assistance to Colombia: the first one aimed at "promoting social and economic justice" and the second one aimed at "promoting the rule of law." According to the United States Government Accountability Office (GAO), while the former accounts for about 15,3% of the total U.S. assistance to Colombia, the latter accounts for about 3,6%.

However, despite the large amount of resources spent during the current decade under *Plan Colombia,* most available measures show that cocaine consumption trends in consumer countries have not shown any decreasing tendency[4], nor have the wholesale and retail prices increased significantly, as might have been expected. In turn, according to the United Nations Office for Drug and Crime (UNODC), while the number of hectares of land cultivated with coca crops decreased from about 163,000 in 2000 (right before *Plan Colombia* was initiated) to about 80,000 in 2006 (a reduction of about 50%), potential cocaine production in Colombia only decreased from 687,500 kilograms per year in 2000 to about 610,000 kilograms per year in 2006 (a reduction of about 14%). The White House Office of National Drug Control Policy (ONDCP), the alternative source of information for data on coca cultivation and cocaine production in Colombia, estimates that potential cocaine production in Colombia increased by about 4% between 2000 and 2006, from about 530,000 kilograms to about 550,000 kilograms. In other words, almost the same amount of cocaine is being produced on half of the land that was being used for the cultivation of coca crops before *Plan Colombia*. This apparently paradoxical outcome is mostly explained by large increases in productivity per hectare. Whereas in 2000, one hectare of land cultivated with coca crops produced about 4.7 kilograms of cocaine per year, by 2006 the yield per hectare was about 7.4 kilograms per year, 60% larger than the yield before *Plan Colombia* was initiated.

The large increase in productivity observed between 2000 and 2006 has been a consequence of a number of factors, among others, the use of stronger and bigger coca plants, a

[4]According to the UNODC, the global trend of cocaine consumption has remained relatively stable during the last few years. However, this is a result of recent contractions in cocaine use in North America, where the highest prevalence rates of cocaine use (2,4%) still prevail, and increases in cocaine use in most of the other regions of the world: West and Central Europe, where the prevalence rate is about 1,2%, Oceania, with the second highest prevalence rate in 2006/07 of about 1,4%, South and Central America, with a prevelance rate of about 1,1%, Africa, with a prevelence rate of 0,2%, and South-East Europe, where the prevalence rate is 0,1%.

higher density of coca plants per hectare, better planting techniques, and the spraying of coca plants with molasses in order to prevent the herbicides used in eradication campaigns from destroying the leaves of the coca plants. These productivity-related adaptations have constituted a strategic response by drug producers to the intensification of eradication campaigns under *Plan Colombia,* and have rendered the latter ineffective in reducing the amount of cocaine effectively produced.

To make things worse, the small reduction in potential cocaine production observed in Colombia between 2000 and 2006 was more than offset by increases in production in Bolivia and Peru, the other two cocaine producer countries. More precisely, according to UNODC potential cocaine production in the three producer countries together increased from about 880,000 kilograms in 2000 to about 984,000 kilograms in 2006, an increase of about 12%.

The interdiction of cocaine in producer and transit countries has shown a steady increase since year 2000. According to UNODC, about 110,000 kilograms of cocaine were intercepted in Colombia in 2000 whereas by 2006 the amount of cocaine seized from illegal drug producers and traffickers reached more than 181,000 kilograms. In Peru and Bolivia the amount of cocaine interdicted has also increased, although not as much as production has. In fact, despite the increase in the amount of cocaine interdicted in Colombia and in the other two producer countries, the amount of cocaine flowing towards the United States has not decreased. This is because the increase in production was larger than the increase in the amounts interdicted. Once the amount of cocaine interdicted and disrupted is subtracted from the amount of cocaine estimated to be flowing towards the U.S. (i.e. the amount of cocaine leaving from producer countries), we can obtain an estimate of the amount of cocaine reaching the U.S. borders. Our estimates, based on the GAO's figures, suggest that the amount of cocaine reaching the U.S. borders increased from about 420 metric tons in 2000 to about 620 metric tons in 2006. These figures are consistent with the pattern of wholesale prices observed in the U.S. between 2000 and 2006.

With the above stylized facts in mind, the general impression is that programs aimed at reducing the production and trafficking of illegal drugs have proved to be relatively ineffective in reducing the amount of drugs reaching consumer countries. For instance, a recent report by GAO recognizes that although security in Colombia has improved significantly during the current decade, the drug reduction goals of *Plan Colombia* were, after almost 6 years of its implementation, not fully met. However, and despite the large amount of resources spent by Colombia and the U.S. during the current decade, little of a systematic

nature is known about the effects, costs, and efficiency of the anti-drug policies implemented under *Plan Colombia*. In short, the main objective of our study, which is summarized in this report, is to fill this gap. More specifically, the paper provides a thorough economic and independent evaluation of the anti-drug policies implemented in Colombia between 2000 and 2006. Moreover, we identify the key fundamentals that are behind the low effectiveness (and large cost) of policies aimed at reducing the supply of illegal drugs that reach consumer countries, and use the framework to evaluate the future prospects of the war against illegal drug production and trafficking. In particular, we asses the impact of increases (or reductions) in the U.S. budget for *Plan Colombia* on different outcomes of the war on drugs and drug markets. We identify a key asymmetry in the preferred means used to fight illegal drug production and trafficking by producer and consumer countries. This asymmetry has lead, according to our results, to an apparent inefficiency in the allocation of resources between the two main fronts of the war against illegal drug production and trafficking.

What we do

In order to evaluate the effectiveness, costs, and efficiency of the anti-drug policies implemented between 2000 and 2006 under *Plan Colombia,* we develop a game theory model of the war against illegal drugs in producer countries. We assume, as seems to have been the case, that the war on drugs occurs on two main fronts: a conflict between the drug producing country's government and illegal drug producers over the control of the arable land suitable for cultivating the illegal crops necessary to produce illegal drugs; and a conflict between the drug producing country's government and drug traffickers over the fraction of illegal drug shipments that survives interdiction efforts. Importantly, we explicitly model illegal drug markets, which allows us to account for the feedback effects between policies and market outcomes likely to arise as a result of such large-scale policy interventions as *Plan Colombia*. We then use available data for the war on cocaine production and trafficking as well as observed outcomes from the cocaine markets to calibrate the parameters of the model.[5] Among other things, we calibrate the price elasticity of demand for cocaine

[5] We use different sources of information in order to check the robustness of the calibration results; we find that they are very robust to changes in the sources of information as well as to changes in the data used as the reference point for before and after *Plan Colombia*.

at the wholesale level in consumer countries, the relative effectiveness of the resources invested under *Plan Colombia* in the war against cocaine production and trafficking, and the costs perceived by the Colombian government from illegal drug production and trafficking activities. Using the results from the calibration exercise, we estimate important measures of the costs, effectiveness, and efficiency of the war on drugs in Colombia. Finally we carry out simulation exercises in order to assess the impact of an increase (or a reduction) in the U.S. budget allocated to the war on drugs under *Plan Colombia.* In particular, we estimate the effect of a three-fold increase in the total U.S. budget allocated to the war on drugs in Colombia on endogenous variables of the model, such as the quantity of drugs reaching consumer countries, the number of hectares of land under the control of drug producers, the fraction of drug shipments surviving the government's interdiction efforts, the market prices in consumer and producer countries, and on a measure of the intensity of the conflict generated by the war on drugs.

Main findings

From the calibration exercise, we find that the price elasticity of demand for cocaine at the wholesale level is about -0.62. Thus, consistent with other empirical evidence, we find that the demand for cocaine at the wholesale level is inelastic to changes in the wholesale price of cocaine. We also find that the U.S. government has paid for about 20% of the expenses related to the Colombian government's conflict with drug producers over the control of arable land, in the form of eradication equipment, chemicals, and other materials, as well as military equipment and training for the armed forces of Colombia. With respect to interdiction, we find that the U.S. has funded about 65% of the related expenses. We estimate that the Colombian government perceives a cost of about \$40 cents per dollar received by the cocaine producers (a cost of about \$700 per kilogram of cocaine successfully produced) and a cost of about \$6 cents per dollar received by drug traffickers (a cost of about $\$1,900$ per kilogram of cocaine successfully exported).

The marginal cost to the U.S. of reducing the successful production and trafficking of cocaine by one kilogram, by subsidizing the Colombian government in its war against drug production, is estimated to be about $\$86,300$; by contrast, subsidizing the Colombian government in its war against drug trafficking, the marginal cost is estimated to be about $\$9,800$. The large difference between these two marginal costs tells us that the allocation

of subsidies to the two fronts of the war against drugs has not been efficient. Moreover, we estimate that under an efficient allocation of subsidies, the U.S. should only be funding the Colombian government on the interdiction front of the war on drugs. Under such a scenario - that is, whereby all the funding to *Plan Colombia* (about $465 million per year) is used to subsidize interdiction efforts - the marginal cost of reducing the successful production and trafficking of cocaine by one kilogram would be about $11,200. Had the subsidies been allocated efficiently between the two fronts of the war on drugs during the period in question, we find that the cocaine supply in consumer countries would have been 2% lower than it actually was. That is, instead of having been about 398,800 kilograms between 2005 and 2006, it would have been about 390,600 kilograms. Although this seems to be a relatively low efficiency cost due to the misallocation of subsidies between the two fronts of the war on drugs, reducing by 8,200 kilograms the amount of cocaine reaching consumer countries would cost about $90 million to the U.S. and about $20 million to Colombia.

Ironically, another interesting result from our estimations is that, if allowed to choose on its own the optimal allocation of U.S. subsidies, the Colombian government would allocate all of it to funding its war against drug producers over the control of arable land, and none of it to funding its interdiction efforts. This would happen because, according to our estimates, Colombia perceives a much higher cost per dollar received by drug producers (about 40 U.S. cents per dollar) than that per dollar received by drug traffickers (about 5 U.S. cents per dollar). Thus, the Colombian government prefers to attack drug producers' sources of income, rather than those of drug traffickers. This finding is consistent with the view that the cocaine producers (mainly the FARC and paramilitaries) generate a much larger cost to Colombia than do illegal drug traffickers.

Despite the fact that both Colombia and the U.S. have an interest in fighting against illegal drug production and trafficking, they are not necessarily in agreement concerning the optimal strategy for the war on drugs. While Colombia's incentive in the war on drugs is to reduce the sources of income that criminal organizations get (from illegal drug production and trafficking) in order finance attacks against infrastructure, civilians, and the armed forces, to corrupt politicians, and so forth, the U.S. government's incentive is to curtail the supply of drugs reaching U.S. markets. This creates an asymmetry between the two countries in the means, but not the ends, of the war on drugs. In fact, when we allow the available data to determine what the optimal allocation of resources has been between the two fronts of the war on drugs, we find that resources were allocated to both fronts, and

not only to one of them, as each country would have preferred if allowed to decide on its own. Our interpretation of this finding is that both countries need each other in the war against illegal drug production and trafficking, and thus, are willing to move away from their preferred allocations in order to collaborate with one another.

Turning now to the results of our simulation exercises, we find that a three-fold increase in the U.S. budget allocated to *Plan Colombia* would reduce the amount of cocaine reaching consumer countries by about 15%. More precisely, assuming that the subsidies to the two fronts of the war on drugs are allocated efficiently, an increase in the U.S. budget for *Plan Colombia* from about $465 million to about $1,5 billion would reduce the quantity of cocaine reaching consumer countries from about 400,000 to roughly 332,000 kilograms. Furthermore, such an increase in the U.S. budget would also increase the fraction of drugs that are interdicted from about 28% to about 41%. Additionally, inasmuch as under an efficient allocation of subsidies, the U.S. would not be funding the Colombian government in its war against drug producers, the fraction of land under the latter's control would remain constant at about 20%, which implies that the number of hectares of land cultivated with coca crops would be about 100,000. The marginal cost to the U.S. of reducing the production and successful exportation of cocaine by one kilogram would increase from about $10,000 per kilogram to slightly more than $26,000 per kilogram. Also, following a three-fold increase in the U.S. budget allocated to the war on drugs in Colombia, the intensity of the war on drugs[6] would increase by about 45%, from about $4.5 billion to more than $8 billion per year. Finally, a three-fold increase in the U.S. budget allocated to *Plan Colombia* would decrease drug traffickers' profits by about 9% (from about $9 billion per year to roughly $8.2 billion per year), while increasing the drug producers' profits by about 12% (from about $35.3 million per year to about $39.4 million per year).

We conduct robustness checks of our results by using data from different sources, changing the reference years for before and after *Plan Colombia,* and changing some assumptions on the variables that we use to calibrate the model, finding that all of the results are maintained.

[6]This measure of the intensity of conflict generated by the war on drugs is defined as the sum of the resources spent by all the involved actors.

Why is the war on drugs so costly/ineffective?

According to our estimates, the elasticity of the quantity of cocaine reaching consumer countries with respect to changes in the U.S. budget allocated to *Plan Colombia* is about 0.017, if resources are allocated to the war against illegal drug production, and about 0.107, if resources are allocated to interdiction efforts. In other words, if the U.S. budget for *Plan Colombia* increases by 1% (an increase of about $4.6 million), and this increase is assigned entirely to the war on production, the quantity of illegal drugs reaching consumer countries would be reduced by about 0.017% (by about 68 kilograms); if the same amount of resources were allocated to interdiction efforts, the amount of cocaine reaching consumer countries would be reduced by about 0.107% (by about 430 kilograms). Both elasticities are relatively low, but one of them (the one associated with the war on illegal drug trafficking) is 6 times greater than the other (the one associated with the war on illegal drug production). One of the key factors underlying these low elasticities is the low price elasticity of demand for drugs. The intuition behind the key role played by the price elasticity of demand on the effectiveness of policies aimed at reducing the supply of drugs is very simple; if the demand for drugs is inelastic, a shift to the left of the supply of illegal drugs induced by the war against illegal drug production and trafficking would only have a minor effect on the quantity of drugs transacted and a relatively large effect on drug prices.

We identify two more factors that play a key role in the effectiveness of the war on illegal drug production and trafficking. The first is the relative importance of the factor being contested in each of the two fronts of the war on drugs; the second is the relative effectiveness of the resources invested by the government in each of the two fronts of the war on drugs (*vis-à-vis* the resources invested by drug producers and drug traffickers respectively). Regarding the first factor, we find that the relative importance of land in the production of cocaine is about 21%, whereas factors complementary to land in illegal drug production have a relative importance of about 79%. In other words, the war on illegal drug production (which constitutes a conflict over the control of arable land suitable for cultivating coca crops) targets a relatively unimportant factor of production. However, we find that the war on illegal drug trafficking, which targets the routes used to transport illegal drugs, focuses on a relatively important factor, the drug routes, which have a relative importance of about 92% in the production of illegal drug shipments (the remaining 8% represents the relative importance of cocaine bought in the producer country). Regarding the second

factor, on the one hand, we estimate that the resources invested by drug producers in the conflict over the control of arable land are about 1.8 times more efficient than those invested by the government. On the other hand, we estimate that the resources invested by drug traffickers in order to avoid the interdiction of drug shipments are about half as efficient as the resources invested by the government in interdiction efforts. In other words, we find that the Colombian government is much more efficient, relatively speaking, in fighting illegal drug trafficking than in fighting against illegal drug production.

Concluding remarks

A large amount of resources has been spent on the war on drugs in Colombia under the so-called *Plan Colombia.* However, most available measures show that the results have not been the expected ones. The amount of cocaine reaching consumer countries remains relatively stable seven years after the initiation of *Plan Colombia,* and the price of cocaine at different stages has not risen. Thus, the general impression is that policies aimed at reducing the amount of drugs reaching consumer by curtailing their production and trafficking have been relatively ineffective. However, and despite the large amount of resources invested in this war, no independent evaluation of the anti-drug policies implemented under *Plan Colombia* had been done. Our main aim is to fill this gap. In particular, the paper evaluates the costs, efficiency, effectiveness, and future prospects of the war against illegal drug production and trafficking under *Plan Colombia*.

The results from this paper should help policymakers shape more effective (and less costly) anti-drug policies and, hopefully, encourage future research in order to evaluate the costs and benefits of alternative policies, such as demand side controls (treatment and prevention policies) or the legalization (with the appropriate controls) of illegal drugs.