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Identifying New Approaches for U.S. Drug Policy using Ownership, Location, and Internalization Factors

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Abstract

Dunning's Eclectic Paradigm is used to assess the effectiveness and impact of U.S. drug prohibition policy on economic growth and political stability in Latin American countries as well as the decision making of Latin American Transnational Criminal Enterprises (TCE) in the cocaine-coca market. Results showed U.S. drug prohibition policy reduces the on-site supply but does not significantly reduce the transportation of cocaine and coca. U.S. drug prohibition policy also generated political instability for the region, and revealed policy externalities that facilitated TCE expansion. Tougher U.S. drug prohibition policy advances TCE by amplifying the impact that unemployment and local wages have on increases in cocaine-coca production, and by limiting the impact of control of corruption and economic freedom on coca eradication. Our results signal that a site-specific approach accompanied with policies that improve the farmers' economic freedom, such as land formalization rights, and policies that lower unemployment rate facilitate effective U.S. drug prohibition policy.

Keywords: Prohibition; Latin America; Transnational Criminal Enterprises; Dunning's Eclectic Paradigm; Cocaine-Coca Market

JEL: H50, O50, H80

1. Introduction

The Americas are the world's main supplier of cocaine-coca as measured in terms of cultivation, manufacturing, eradication, and seizures. Colombia, Bolivia, and Peru account for virtually all of the world's coca bush cultivation and cocaine manufacturing (Organization of American States (OAS), 2013d). Colombia, the world's top manufacturer, accounts for 42 percent of the world's cocaine output,[1] 64 percent of the world's land under coca bush cultivation,[2] and 52 percent of the world's land subject to coca bush eradication (United National Office of Drugs and Crime (UNODC), 2017b).[3] The majority of drug transportation occurs in and around Latin American countries. In 2016, the United States Department of State estimated that the Mexico-Central America corridor accounted for 90 percent of the cocaine trafficked into the U.S. (Bureau for International Narcotics and Law Enforcement Affairs, 2017).

United States drug prohibition policy spending uses a three-fold approach: (1) domestic law enforcement, (2) reduction of transportation of illicit drugs and, (3) international efforts to reduce illicit drug supply (Office of National Drug Control Policy (ONDCP), 2014). This paper assesses the effectiveness and impact of U.S. drug prohibition policy approaches in reducing the transportation of cocaine-coca, along with the reduction of existing supplies of on-site cocaine production and the eradication of coca fields (currently or potentially used for production), using *Dunning's Eclectic Paradigm*, when dealing with Central, North, and South America. The U.S. drug prohibition approach depends on the geographic positioning of distribution outlets and production-sites associated with the cocaine market with the belief that increases in policy spending restricting supply have an indirect relationship with cocaine's availability.

International business literature has addressed locational decisions of multinational enterprises by applying *Dunning's Eclectic Paradigm* (Dunning, 1977, 1988a, 1996, 2009; Dunning and McKaig-Berliner, 2002). Dunning's paradigm identifies the *Ownership*, *Location*, and *Internalization* characteristics that influence multinational enterprises decisions. *Ownership*, *Location*, and *Internalization* characteristics are drawn from macroeconomic theories of trade, international capital movements and location, and microeconomic theories of industrial organization, innovation, and firm site-selection (Tolentino, 2001).

This paper extends the existing literature by applying *Dunning's Eclectic Paradigm* to Transnational Criminal Enterprises. Enderwick (2009, 2016) and Mudambi and Paul (2003), all used *Dunning's Eclectic Paradigm* (from a theoretical perspective) to explain

[1] Estimates of cocaine manufacturing is based on the area under cultivation, coca yield estimates, and cocaine lab efficiency. In 2015, the total potential manufacturing of 100 percent pure cocaine for the world was 995 metric tons and Colombia's production was 420 metric tons (Office of National Drug Control Policy (ONDCP), 2016).

[2] The coca bush cultivation (hectares) reported for 2015 were: Colombia 159,000, Bolivia 36,500 and Peru 53,000 (Office of National Drug Control Policy (ONDCP), 2016).

[3] Eradication of coca bush (hectares) for 2015 were: Colombia 50,672, Peru 35,868, and Bolivia 11,020 (United National Office of Drugs and Crime (UNODC), 2017b).

the locational choices of Transnational Criminal Enterprises. We will take this approach one step further by empirically testing Dunning's Paradigm on illegal drug traffickers' locational behavior in the Americas.[4] When *Ownership*, *Location*, and *Internalization* characteristics are used in conjunction with U.S. drug prohibition policy it allows the observation of governmental efforts to regulate, destroy or inadvertently promote cocaine markets. Specifically, we investigate U.S drug prohibition policy's effectiveness at reducing cocaine-coca supply, its unintended effects at advancing Transnational Criminal Enterprises, and the impact of U.S. drug prohibition policy on the Latin American economy. Additionally, we will investigate whether *Ownership*, *Location*, or *Internalization* advantages exist to Transnational Criminal Enterprises, and if they result in strengthening or limiting effective U.S. drug prohibition policy. By identifying Transnational Criminal Enterprises' *Ownership*, *Location*, or *Internalization* characteristics, a national or local government could tailor a more effective drug prohibition policy.

This paper is organized as follows. Section 2 provides a literature review on U.S. drug prohibition policies. Section 3 discusses *Dunning's Eclectic Paradigm* as a framework to analyze the effectiveness of U.S. drug prohibition policy at reducing cocaine-coca supply, and its impact in Latin America. Section 4 and Section 5 discuss the variables used in the estimation and data sources, respectively. Section 6 outlines the empirical methodology which includes a discussion of missingness in the data. Section 7 provides a discussion of results. The final section presents our conclusions and policy implications.

2. U.S. Drug Policies

The United States has been involved in international drug control and has made efforts to decrease drug supplies since the beginning of the 20th century (Rosen, 2015). United States drug prohibition started in 1914 when Congress passed the Harrison Act which banned opiates and cocaine (Redford and Powell, 2016). Alcohol prohibition quickly followed, and by 1918, with the passage of the Eighteenth Amendment, the U.S. was officially a "dry" nation.

With the Narcotics Drugs Import and Export Act of 1922, U.S. drug prohibition policy began to focus on combating the emergence of illegal criminal markets by controlling the flow of narcotics. In 1930, the Federal Bureau of Narcotics was created. Soon after the creation of the Federal Bureau of Narcotics, possession and transfer of marijuana was made unlawful under the Marihuana Tax Act of 1937 (Bonnie and Whitebread, 1970).[5] In 1951, the Boggs Act was passed which increased drug related penalties and introduced mandatory minimum sentences for the possession and sale of narcotics (Gill, 2008). In 1956, the Narcotics Control Act increased the minimum sentences of crimes specified in the Boggs Act. In 1970, the Controlled Substances Act (CSA) was enacted into law by Congress and has become the foundation for "the modern drug war" that U.S. drug policy

[4] No prior research has empirically tested *Dunning's Eclectic Paradigm* in association with Transnational Criminal Enterprises.

[5] In 1933, the Twenty-First Amendment repealed the Eighteenth Amendment revoking alcohol prohibition.

is fighting. In 1973, the newly formed Drug Enforcement Administration took over the enforcement of the CSA (United States Drug Enforcement Administration (DEA), 2020). The CSA was amended with the Anti-Drug Abuse Act of 1986 and 1988, which made the system more punitive to illicit drug offenders (Courtwright, 2004).[6]

United States drug control budgets have been mostly allocated to supply reduction efforts which include domestic law enforcement, international drug control efforts, and interdiction/disruption of illicit drug shipments. The estimates for the data used in this paper indicates that between 1995 and 2015, an average of about 70 percent of the U.S. drug control budget had been allocated to supply reduction efforts. However, according to Reuter and Kleiman (1986), U.S. illicit drug consumption is unresponsive to illicit drug supply prohibition efforts. Supply prohibition efforts have been found inefficient at raising the retail price of cocaine, which is a short-term indicator of the efficacy of supply reduction enforcement efforts to reduce illicit drug consumption (Caulkins and Reuter, 2010; Reuter and Kleiman, 1986).

Some early evidence indicates U.S. drug prohibition policy's inefficacy at reducing domestic cocaine supply and increasing U.S. cocaine retail prices. In terms of domestic law enforcement, between 1979 and 1989 the number of arrests for cocaine distribution increased (Reuter, 1991). The increase in domestic arrests did not offset the supply increases, given the fact that prices fell between 1979 and 1989.[7] The increase in domestic arrests also reduced the effectiveness of law enforcement efforts by diversifying the sources of supply (Reuter, 1991).

In terms of international drug control efforts, reduction of illicit drugs at the source-country has also shown to be ineffective at raising the U.S. cocaine retail prices and reducing domestic supply (Caulkins and Reuter, 2010). Several reasons appear to indicate the ineffectiveness of U.S. drug prohibition policy at the source-country level: 1) production costs, 2) market concentration, 3) limitations on the application of U.S. policy overseas, and 4) responses of suppliers to U.S. drug prohibition policy. The cost of production at early stages of the production process (i.e. cultivating and refining) is a small percentage of the cocaine's retail price, which is estimated to be less than one percent of the U.S. retail price for cocaine (Caulkins and Reuter, 2010) . Low market concentration (i.e. large number of market participants: large number of refining labs and farmers) at early stages of the cocaine production process also provides difficulties for the U.S. to reduce supply at the source-country (Caulkins and Reuter, 2010). A third reason is the limitation of applying U.S. drug prohibition policy overseas. Application of U.S. drug prohibition policy internationally is limited by the interests and capabilities of the source-country (Moore, 1990). Additionally, Moore (1990) indicates that in the past, U.S. prohibition policies have focused on crop control strategies such as eradication and crop substitution programs, but the prevalence of potential cultivating areas makes eradication policies a difficult task. Lastly, suppliers respond to U.S. drug prohibition policy by changing cultivation patterns. Roberts, Trace, and Klein (2004), assert that successful reduction in coca cultivation in Bolivia and Peru, resulted in increased coca cultivation in Colombia.

[6] In 2010, many states started the process of legalizing or decriminalizing marijuana.

[7] The average price of cocaine in 1989 was 50 percent lower than in 1979.

Similarly, U.S. drug interdiction policy has also been criticized for their successes in reducing supply and raising U.S. cocaine retail prices. Scholarly literature suggests that U.S. drug interdiction policy has not been effective because of: 1) smuggling costs, 2) substitution of smuggling routes, and 3) a focus on interdiction policy at finished inventories. Reuter (1992) reports that smuggling costs account for less than 10 percent of the U.S. cocaine retail prices, which means the size of the seizure must be large enough to affect the entrepreneur's assets, limiting the interdiction policy's financial impact on the narcotic traffickers (Caulkins and Reuter, 2010). Smuggling routes are also substituted in response to interdiction enforcement. Andreas (2000) suggests that U.S. drug interdiction efforts redirected air and sea smuggling routes to ground routes through Mexico.[8] Additionally, Moore (1990) indicates that entrepreneurs also hedge against the risk of losing total shipments by dividing it into smaller shipments. Finally, Moore (1990) claims that interdiction policy is focused on finished inventories instead of disrupting trafficking networks.

In addition, Reuter and Kleiman (1986) point out that supply prohibition efforts cannot decrease consumption because they do not change consumer preferences. The solo approach of illicit drug supply reduction in Latin American countries in conjunction with the external erosions of their institutions has failed (Rosen, 2015; Youngers, 2013; Youngers and Rosin, 2005). U.S. drug policy's collateral damages is forcing changes in policy from simply concentrating on current drug control policy failures to crafting alternative approaches (Youngers, 2013), such as liberalizing the aspects of control polices from the demand side (Organization of American States (OAS), 2013c).[9]

3. Dunning's Eclectic Paradigm

Dunning's Eclectic Paradigm identifies the advantages international businesses receive from *Ownership*, *Location*, or *Internalization* characteristics. *Ownership* variables are firm-specific advantages derived from resource control or firm ownership (McCann and Mudambi, 2004). Rugman and Gestrin (1993) describe *Ownership* advantages as the firm's competitive-production or marketing-based assets. *Location* advantages are derived from region-specific advantages, including resource access, factor endowments, networks, and institutions (McCann and Mudambi, 2004; Rugman and Gestrin, 1993). *Location* advantages are immobile endowments firms have to use conjointly with their *Ownership* advantages (Dunning, 2000, 2001). *Internalization* advantages result from reducing transactional costs by internalizing transactions formerly carried out in the market (Buckley, 1993), as well as, the firm's ability to appropriate returns on its asset ownership and synchronize cross border activities (Cantwell and Narula, 2001).

Previous applications of *Dunning's Eclectic Paradigm* have been widely applied to legal operating enterprises (Dunning, 1996; Dunning and McKaig-Berliner, 2002). However, the relevance of *Dunning's Eclectic Paradigm* to Transnational Criminal

[8] The South Florida Task Force, launched in 1982, targeted air and smuggling routes in the Southeast (Andreas, 2000).

[9] For example, in the U.S., decriminalization of marijuana for personal use in some states.

Enterprises emanates from its similarities to multinational (legal) enterprises (Enderwick, 2009). Both multinational enterprises and Transnational Criminal Enterprises emphasize profits as their principal business objective and are resource mechanisms that respond to market and institutional failures. They both also attempt external growth strategies, and establish worldwide facilities for production, marketing, and distribution. Their production contributes to economic output and growth, and both have international supporting services.[10] They also respond to changing global business environments accruing benefits from new distribution markets, increasing international income inequalities, and advanced communication and transportation technology (Enderwick, 2009).

Dunning's Eclectic Paradigm is used as our framework for investigating the connection between U.S. drug prohibition policy and Transnational Criminal Enterprises locational behavior in Latin America in relation to the cocaine-coca market. Specifically, we will empirically determine how *Ownership*, *Location*, and *Internalization* variables motivate Transnational Criminal Enterprises locational decisions in Latin America, assess the effectiveness of U.S. drug prohibition policy along with its relationship to the *Ownership*, *Location*, and *Internalization* variables. Moreover, we will evaluate the economic and political impact of U.S. drug prohibition policy in Latin America.

Applying *Dunning's Eclectic Paradigm* to a country is inconsistent with previous uses. However, given the illegality of Transnational Criminal Enterprises, the advantages for illegal enterprises stem from a country's characteristics and its competitive advantages. In the Transnational Criminal Enterprise framework *Ownership* advantages result from a country's "history of narcotics cultivation, weak law enforcement" and "stem from strategies of risk reduction including operating from a low risk home base" (Enderwick, 2016). In the case of *Location* advantages, Transnational Criminal Enterprises take advantage of the favorable conditions in host countries. As Transnational Criminal Enterprises move operations to other countries, the location advantage relies on the new home-country advantages. For example, "legality" of the illicit drugs under domestic law can be easily exploited by Transnational Criminal Enterprises. In countries like Bolivia, the legal production of coca under domestic law has permitted the growth and relocation of organized drug traffickers (Enderwick, 2016). In this way, *Location* advantages to Transnational Criminal Enterprises stem from the new home-country opportunities. *Internalization* advantages for Transnational Criminal Enterprises come from the country's market failures, the benefit of maintaining secrecy, the lack of market prices for intermediate goods and services, and the lack of legal forms of compliance (Enderwick, 2016).

Other economic theory points to industry advantages stemming from a home-country competitive advantage. Porter (1990) asserts that a nation's competitive advantage is tied directly to industry advantages, since nations play an important role on how industries operate. Porter's diamond of national competitive advantage explains how nations provide a "favorable home base for companies to operate internationally" (Porter, 1990). In this

[10] Transnational Criminal Enterprises are more likely to pursue alliances instead of mergers or acquisitions, and they employ contract killers and money launders.

context, *Dunning's Eclectic Paradigm* can also translate into home country's characteristics that facilitate nations to be successful in particular industries.[11]

The evaluation of U.S. drug prohibition policy in *Dunning's Eclectic Paradigm* framework for Transnational Criminal Enterprises is done by estimating two main models. In the first model, illicit drug supply of cocaine-coca[12] is estimated through direct (cultivation, potential production, and eradication[13]) and indirect indicators (transport seizures). Model 1 (equation 1 below) is used to empirically determine how *Ownership*, *Location*, and *Internalization* variables motivate Transnational Criminal Enterprises locational decisions in the Americas. In addition, Model 1 is used to assess the effectiveness of the U.S. drug prohibition policy and its relationship to the *Ownership*, *Location*, and *Internalization* variables. Specifically, for Model 1, each i^{th} illicit drug supply indicator ($i = 1$ for seizures, $i = 2$ for cultivation, $i = 3$ for potential cocaine production, and $i = 4$ for eradication) in the j^{th} country at time t is defined as,

$$\begin{aligned} \text{Log}\left(Supply\ Indicator_{ijt}\right) &= \beta_0 + \beta_1 \log\left(Prohibition_t\right) \\ &+ \beta_2 \left(\log\left(Prohibition_t\right) \times x_{ljt}\right) + \sum_l \beta_{3l} x_{ljt} \\ &+ \beta_4 \log\left(U.S.\,Cocaine\ Price_t\right) + \beta_5 Big\ Country_j + \varepsilon_{ijt}, \end{aligned} \tag{1}$$

where $Prohibition_t$ measures U.S. drug prohibition policy, x_{ljt} represents the l^{th} *Ownership*, *Location*, or *Internalization* variable, $U.S.\,Cocaine\ Price_t$ is the U.S. cocaine

[11] Porter (1990)'s theory of a country's competitive advantage defines four different attributes for a nation that explains how industries, and therefore firms, are established and operated. The first attribute defined in Potter's theory is the nation's "factor conditions" referring to the nation's factors of production relevant to countries to compete in an industry. The second attribute, "demand conditions," refers to home market demand conditions that force companies to innovate and become more competitive. The third attribute, "related and supporting industries," refers to the presence of supporting and related industries (and that are internationally competitive) in the home country which facilitates mutually beneficial interactions to innovate. Last, the "firm strategy, structure, and rivalry" attribute, is defined as the country's atmosphere affecting how firms are established and operated. Dunning's *Ownership*, *Location*, and *Internalization* advantages can't exactly translate one-to-one to match Porter's theory attributes, but can be framed within Porter's theory. Dunning's *Ownership* advantages resemble the "factor conditions" attribute in Porter's theory. Dunning's *Location* advantages can be associated to Porter's "related and supporting industries" attribute. Related and supporting industries in the home country that are internationally competitive are affected by the host country characteristics. Host country characteristics affect home-country related and supporting industries interaction with other home-country firms and their business strategies. Dunning's *Internalization* advantages can be associated to the "firm strategy, structure, and rivalry" attribute, as market failures driving internalization are circumstances affecting how industries operate.

[12] Figures on cultivation, production, eradication, and seizures depict the dominant role of the Americas in the illicit drug market. Ninety percent of the world's cocaine seizures were reported in the Americas, with production being concentrated in Colombia, Peru, and Bolivia (United National Office of Drugs and Crime (UNODC), 2010a, 2010b).

[13] The degree of eradication also reflects the extent by which authorities prioritize coca cultivation eradication (United National Office of Drugs and Crime (UNODC), 2017c)

retail price index, $Big\ Country_j$ is a dummy variable taking the value of one if the country j^{th} is a main producer of cocaine-coca and zero otherwise. The unobserved disturbances for each observation in equation (1) are represented by ε_{ijt}. The interaction of the U.S. drug prohibition policy with each of the *Ownership*, *Location*, and *Internalization* variables (i.e. $\log(Prohibition_t) \times x_{ijt}$), allows us to identify how *Ownership*, *Location* or *Internalization* variables strengthen or limit U.S. drug prohibition policy. In addition, the interaction terms allow us to assess U.S. drug prohibition policy's unintended effect at advancing Transnational Criminal Enterprises.

The second model (equations 2 and 3 below) evaluates the economic and political impact of U.S. drug prohibition policy in Latin America. Equations 2 and 3 estimate the impact of U.S. drug prohibition policy on real GDP growth and political stability, after controlling for the impacts of the *Ownership*, *Location*, and *Internalization* variables that determine Transnational Criminal Enterprises locational decisions. The simultaneous regression of real GDP growth and political stability is defined as,

$$\begin{aligned} Real\ GDP\ Growth_{jt} &= \theta_0 + \theta_1 \log(Prohibition_t) + \sum_l \theta_{2l} x_{ljt} \\ &\quad + \theta_3 \log(U.S.\ Cocaine\ Price_t) + \theta_4 Big\ Country_j + \varepsilon_{1jt} \end{aligned} \tag{2}$$

$$\begin{aligned} Political\ Stability_{jt} &= \delta_0 + \delta_1 \log(Prohibition_t) + \sum_l \delta_{2l} x_{ljt} \\ &\quad + \delta_3 \log(U.S.\ Cocaine\ Price_t) + \delta_4 Big\ Country_j + \varepsilon_{2jt}, \end{aligned} \tag{3}$$

where ε_{1jt} and ε_{2jt} are the unobserved disturbances for the real GDP growth and political stability equations, respectively. The simultaneous regression of real GDP growth and political stability allows us to consider the correlation among real GDP growth and political stability.

4. Definition of Variables

Table 1 describes and lists the illicit drug supply and impact indicators. Cocaine-coca seizures from both Latin America and the U.S. are used to signal regional drug availability. Cocaine-coca market production is measured using coca cultivation and potential cocaine production.[14] On-site seizures are measured using coca eradication. Real GDP growth and political stability are the impact indicators measuring U.S. drug prohibition policy impacts in Latin America.

[14] Potential cocaine production is defined as the amount of cocaine that would be produced yearly if all the area under coca cultivation was converted into 100 percent pure cocaine hydrochloride (United National Office of Drugs and Crime (UNODC), 2010b).

Table 1. Descriptive statistics - independent variables

Dependent Variables	No. Obs.	Description	Mean	Std. dev.
Illicit Drug Supply Indicators				
Cocaine-Coca Seizures	359	Total drug seizure of cocaine-coca (kilograms)	137,946	371,350
Coca Cultivation	60	Net coca cultivation for main coca producers (i.e. Colombia, Bolivia, and Peru) (hectares)	63,614	44,381
Potential Cocaine Production	60	Potential pure cocaine production for main coca producers (i.e. Colombia, Bolivia, and Peru) (metric tons)	252	134
Coca Eradication	60	Coca bush eradication for main coca producers (Colombia, Bolivia, and Peru) (hectares).	46,524	62,408
Impact Indicators				
Real GDP Growth	360	Growth of real GDP given in constant 2011 U.S.D (%)	3.5	3.35
Political Stability [a]	306	Political Stability and absence of violence/terrorism (index; range -2.5 and 2.5)	-0.3	0.67

[a] Political stability and absence of violence/terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism (The World Bank, 2017b). Higher values of the index represent countries with greater political stability.

U.S. drug prohibition policy, focusing on transport seizures and international illicit drug control expenditures, along with the *Ownership*, *Location*, and *Internalization* variables are described in Table 2. Transport seizures are measured using interdiction expenditures directed at disrupting drug distribution profits by the interruption of illicit drug transportation into the U.S. (Office of National Drug Control Policy (ONDCP), 2013). International illicit drug control spending includes the eradication of crops, prosecution of traffickers, elimination of processing capabilities, promotion of alternative crops, and the investigation of money laundering or financial crime activities (Office of National Drug Control Policy (ONDCP), 2013). Prohibition is expected to negatively impact Transnational Criminal Enterprises by reducing the supply of illicit drugs. Mejia and Restrepo (2014) report a significant reduction, approximately 200 to 500 metric tons, in Colombia's net cocaine supply as result of successful interdiction policies in 2007. In addition, prohibition can cause input prices to increase. The United Nations Office on Drugs and Crime (UNODC) reported that Peru's coca eradication efforts in 2013 caused the average price of dried coca leaf to increase by 30 percent (United National Office of Drugs and Crime (UNODC), 2015). Unfortunately, prohibition also positively impacts Translational Criminal Enterprises by increasing illicit drug retail prices.[15]

[15] For example, wholesale prices for cannabis users in the western U.S. went from $3,500 dollars per pound with prohibition to an estimated $2,000 dollars per pound with partial illicit drug prohibition (Caulkins, 2014).

Table 2. Descriptive statistics – dependent variables

Explanatory Variables	No. Obs.	Description	Mean	Std. Dev.
Prohibition Variables				
U.S. Interdiction Expenditure	20	U.S. expenditure on interdiction illicit drug control (millions of constant 2011 U.S.D)	2,887	645
U.S. International Expenditure	20	U.S. expenditure on international illicit drug control (millions of constant 2011 U.S.D)	1,474	571
Ownership Variables				
Control-of-Corruption Index	306	Index; range -2.5 (more corruption) and 2.5 (less corruption)	-0.19	0.79
Location Variables				
Unemployment Rate	360	Unemployment, total (% of total labor force)	7.6	3.69
Relative Minimum Wage	338	Country's monthly relative minimum wage (local minimum wage in constant 2011 U.S.D as a percentage of U.S. minimum wage in constant 2011 U.S.D; %)	25.57	21.68
Human Capital Index	360	Human capital index based on years of schooling and returns to education (Index)	2.46	0.44
Openness	359	Trade (% of GDP)	62.87	31.12
Distance	360	Distance from US centroid to country's centroid (in miles)	3,185	1,489
Internalization variables				
Economic Freedom	360	Index of Economic Freedom (Index; range 0 (repressed) to 100 (free))	63.06	8.74
Tariff Rate	334	Tariff rate, applied, weighted mean, all products (%)	6.39	3.58
Internet Access	360	Individuals using the internet (% of population)	20.96	20.35
Instrumental Variable				
IV		Political Administration (Republican party=1; 0 otherwise)	0.4	0.49
Demand Proxy				
U.S. Cocaine Price	20	Average U.S. Cocaine retail price index adjusted for purity (base year 2011)	83	26

Transnational Criminal Enterprises often use prohibition as an *Ownership*, *Location*, and *Internalization* advantage. Prohibition as an *Ownership* advantage is associated with the effect of regulation on how Transnational Criminal Enterprises manage their business operations. As firms become more globalized, the ownership advantage relies more on their ability to manage and coordinate a network of geographical activities (Dunning, 1988b). Government regulation (or prohibition) affects Transnational Criminal Enterprises by lowering the marginal cost and raising the marginal benefits to violence because their

transactions cannot use the legal and judicial system (Miron and Zwiebel, 1995). Governments that fail to enforce property rights in an illegal market, decrease costs of illegal methods of enforcement, leading to more private and less public enforcement (Mudambi and Paul, 2003).

Prohibition as a *Location* advantage is associated with institutional failures. Wealth transfers from the Transnational Criminal Enterprise to policy makers are indicative of political rent-seeking behavior, oftentimes result from institutional failures and policies. This behavior is associated with governmental regulation which forces changes to the enterprise's operations (Butler and Castelo, 1998). Other forms of regulation such as domestic market prohibitions, incentivize Transnational Criminal Enterprises to locate in jurisdictions with lower levels of state policing and political risks (Mudambi and Paul, 2003). Successful prohibition also drives Transnational Criminal Enterprises to different locations to substitute transit routes and relocate production sites (Enderwick, 2016).

Prohibition as an *Internalization* advantage is associated with the effects of regulation on prices. Governmental regulation dealing with market failures oftentimes distorts prices which incentivizes the internalization of Transnational Criminal Enterprises' activities (Mudambi and Paul, 2003). Prohibition also incentivizes Transnational Criminal Enterprises to internalize their functions in order to reduce the risk of apprehension and punishment, such as with Peruvian coca traffickers, whom increased their profits by internalizing their cocaine production processes because of prohibition (Mudambi and Paul, 2003). Strong governmental regulation makes it difficult to find market prices for intermediate goods and services, encouraging *Internalization* advantages (Enderwick, 2009; Mudambi and Paul, 2003). *Internalization* is also an advantage when secrecy is critical, especially when strong regulation rescinds government supported claims to the illegal good and related property (Mudambi and Paul, 2003).

Prohibition is expected to have a negative impact on economic growth. Public institutions face increased costs when dealing with health concerns caused by drug use, increased drug violence, and corruption. Large amounts of public resources must also be allocated for any drug prohibition policy to work. Moreover, concentrating governmental resources into a small portion of the economy robs other economic sectors of potential governmentally sponsored economic development.[16] In Brazil, between 2007 and 2012, the population of people incarcerated for drug trafficking increased by 123 percent (Organization of American States (OAS), 2013a). In the U.S. the 2007 economic cost of illicit drug use, lost productivity, and crime was estimated at $193 billion dollars (National Drug Intelligence Center, 2011).

Prohibition is also expected to have a negative impact on political stability. Similarly to the U.S. alcohol prohibition of the 1920s, drug prohibition moves transactions into the shadow economy where criminal enterprises can profit and undermine a country's institutions. Rosen (2015) asserts that illicit financial flows (e.g. money laundering) associated with drug trafficking have penetrated legitimate economic institutions while undermining legitimate social and political systems. Furthermore, the illicit drug industry

[16] In Mexico, the government expenditure to combat drug trafficking in relation to GDP, is three times larger than the amount spent by the U.S. (Organization of American States (OAS), 2013a).

oftentimes serves as a conduit for wealth increases by politicians and persons in power as institutional corruption creates a lack of transparency and accountability (Organization of American States (OAS), 2013a).[17] Political instability also occurs when a lack of legal job opportunities and excessive prohibition spending takes away potential funds needed for a country's growth and development (Thornton, 1991).

Ownership advantages for Transnational Criminal Enterprises are reduced or negated by the enterprises' illegal status along with the associated risk of property seizures (Enderwick, 2009). *Ownership* advantages also improve the illegal enterprise's ability to operate effectively by lowering risk and reducing the likelihood of detection (Enderwick, 2009). The *Ownership* variable is captured by the control-of-corruption index (see Table 2). The control-of-corruption index measures the scope by which public power is used for private gain (The World Bank, 2017b). The effect of the control-of-corruption index on Transnational Criminal Enterprises locational decision is ambiguous. In countries with high levels of corruption (i.e. low values for the control-of-corruption index), Transnational Criminal Enterprises become influential of a country's regulatory practices and legislation, reduce risk of interdiction, and facilitate drug trafficking (Berlusconi et al., 2017; Giommoni et al., 2017). Mudambi and Paul (2003) assert that *Ownership* advantages result from Transnational Criminal Enterprises controlling resources providing means to coerce others, making the control of resources rather than the direct ownership, the principal source of their advantage. However, weak governments make corruption levels disadvantageous to Transnational Criminal Enterprises by increasing the cost of doing business (e.g. increases in the value of bribes) (Mudambi and Paul, 2003). Thus, greater values for the control-of-corruption index is advantageous to Transnational Criminal Enterprises by lowering the cost of doing business, but it is disadvantageous by increasing risks in the transportation and production of illegal drugs. Greater control of corruption is also expected to spur economic growth and generate political stability. Latin American countries spend at least 10 percent of their GDP dealing with corruption (United National Office of Drugs and Crime (UNODC), 2008) and the control of corruption indicates a level of governmental effectiveness and rule of law.[18]

Transnational Criminal Enterprises can gain access to a country's illegal drug supply and demand by exploiting *Location* advantages (Enderwick, 2009), such as unemployment rate, relative minimum wage, human capital, openness, and distance (see Table 2). The local unemployment rate and the human capital index are considered local endowments, while local wages are considered an input cost advantage (McCann and Mudambi, 2004; Rugman and Gestrin, 1993). The *Location* variable, unemployment rate, is expected to give locational advantages to Transnational Criminal Enterprises, as higher unemployment rates facilitate the growth of organized crime (Sung, 2004). Increased unemployment significantly increases expected illegal earnings (Uggen and Thompson, 2003) and many unemployed urban youths are recruited by gangs (Howell and Decker, 1999; Spergel, 1991). Higher unemployment rates are expected to be detrimental for

[17] In 2009, the director of the national police in Guatemala and others under his command were fired after large amounts of confiscated cocaine went missing (United National Office of Drugs and Crime (UNODC), 2010a).

[18] In this research, the correlation between the control-of-corruption index, government effectiveness, and rule of law is 0.9.

economic growth and political stability. The second *Location* variable, relative minimum wage, is the ratio of the minimum wage between Latin American countries and the U.S. Low wages are advantageous to Transnational Criminal Enterprises because they lead to a greater likelihood of corruption (Cadot, 1987). Uggen and Thompson (2003) found that during the 1970s, a recessionary period in the U.S., as legal earnings decreased expected illegal earnings increased. Lower local wages decrease the opportunity costs of legal employment and in some population cohorts generate higher crime rates (Gould et al., 2002). Low wages can also be a disadvantage to Transnational Criminal Enterprises when affecting worker's productivity. Greater performance related payments can spur productivity and increase output (Booth and Frank, 1999). Higher minimum wages can also be limiting to economic growth and might increase political instability if higher wages increase unemployment (Gould et al., 2002; Siebert, 1997). The third *Location* variable, the human capital index, measures the country's average years of schooling and educational rate of return (Feenstra et al., 2013). Reduced human capital levels give locational advantages to Transnational Criminal Enterprises because low skill levels imply a low opportunity cost of committing crime (Lochner, 2004). Lochner (2004) also finds a significant effect of education on property and violent crimes for low skill workers. Human capital increases are expected to positively affect economic growth and political stability.[19] The *Location* variable, openness, captures the advantages that globalization gives to Translational Criminal Enterprises. Globalization can increase income inequality allowing Translational Criminal Enterprises to target marginalized segments of the population (Enderwick, 2009). For example, countries suffering increasing inequalities may offer Transnational Criminal Enterprises a marginalized labor force attracted to illegal activities. Greater openness has also been found to increase economic growth (Singh, 2010), but its effect on political stability is ambiguous. The effect of openness on political stability depends on the country's trading arrangements and trade policy (Kim, 1996; Mansfield and Pevehouse, 2000). The last *Location* variable, distance, is measured as the distance from the U.S. centroid to each country's centroid. The variable distance is included to capture geographical proximity to the U.S. market. Geography creates a *Location* advantage when drug flows increase from lower to higher income countries (Enderwick, 2009) affecting the countries' political stability.[20] "Transnational Criminal Enterprises contribute to political, economic and social instability through corruption payments" (Enderwick, 2016), and political instability has been found to reduce economic growth (Alesina et al., 1996).

The *Internalization* variables include economic freedom, tariff rate, and internet access (see Table 2). Economic freedom measures a country's average score for its ratings for rule of law (i.e. property rights and judicial effectiveness), government size, regulatory efficiency (i.e. business freedom, labor freedom, and monetary freedom), and open markets (The Heritage Foundation, 2018). We expect lower economic freedom to

[19] The net effect of increased human capital levels could be detrimental to economic growth if a brain drain of higher educated individuals occurs.

[20] The distance variable is highly correlated with other variables used in the estimation. Therefore, it was only included in equations (2) and (3). These equations measure the impact of the U.S. drug prohibition policy in Latin America. The closer in distance to the U.S., the more likely a country experiences political instability, because of the illicit drug flow to the U.S.

encourage the development of the shadow economy and other illicit activities, which promotes Transnational Criminal Enterprises. Enste (2010) discovered that labor and product market regulations, for twenty-five OECD countries, were the primary causes for the development of shadow economies. Lack of property rights also increase the size of illicit economies. Muñoz-Mora et al. (2018) found that decreases in a land formalization index (i.e. worse property rights) significantly increases land area allocation to coca crops. Tariff rates[21], are measured by the country's weighted tariff rate for all products and capture the effect that market liberalization have on Transnational Criminal Enterprises. Transnational Criminal Enterprises are affected by market liberalization as more trade facilitates the laundering of illicit drug proceeds through Trade Based Money Laundering (Financial Action Task Force (FATF), 2006). Internet access is measured as the percentage of individuals in the total population who have used the internet in the past three months. Internet access captures the use of technology to internalize transactions and expand market opportunities for Transnational Criminal Enterprises (Enderwick, 2009, 2016). An increasing proportion of drug users are obtaining drugs over the darknet, and the internet has also reshaped relationships between suppliers, intermediaries, and buyers in drug trafficking (Lavorgna, 2014; United National Office of Drugs and Crime (UNODC), 2017b). Greater restrictions to voluntary exchanges (i.e. lower economic freedom and higher tariff rates) and less accessibility to technology are also expected to be detrimental to economic growth and political stability.

In addition to the U.S. drug prohibition policy and the *Ownership, Location,* and *Internalization* variables, Table 2 also lists an instrumental variable used to identify U.S. political administration's views toward illicit drug control (prohibition) and a proxy for U.S. cocaine demand. The instrumental variable takes a value of one for Republican administrations and zero otherwise. Republican administrations are expected to have tougher prohibition policies and allocate greater funding to illicit drug control.[22] Finally, the U.S. cocaine retail price index adjusted for purity is used as a proxy of demand.

5. Data

Data from 1996-2015 is used in the analysis for Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, United States, Uruguay, and Venezuela. Cocaine-coca seizure data was obtained from the United National Office of Drugs and Crime (UNODC) (2017a), and data for coca cultivation and potential pure cocaine (hydrochloride) production was obtained from the Office of National Drug Control Policy (ONDCP) (2016). Coca

[21] Tariff rates were included as a proxy for international market regulation. Tariffs are expected to indicate difficulties in moving products internationally. There is evidence of Transnational Criminal Enterprises using legitimate commerce to smuggle illicit drugs. Boyum and Reuter (2005) point that in the early 1990s cocaine had been smuggled through legitimate commerce, a practice that became more common with the North American Free Trade Agreement (NAFTA). Transnational Criminal Enterprises therefore should be negatively impacted by tariff rates, because countries with high tariffs generally impose more restrictions and a greater cost of allowing products to enter their country.

[22] Our data shows Republican administrations spent 2.6 percent more on international and interdiction policies than Democratic administrations. Discussion of the exclusion, exogeneity, and relevance are presented in the results section.

eradication data including both manual and spraying eradication methods were obtained from the ONDCP and the UNODC (Office of National Drug Control Policy (ONDCP), 2016; United National Office of Drugs and Crime (UNODC), 2010a, 2011, 2015, 2017a). Data for U.S. interdiction expenditures (cocaine-coca transit reductions) and international expenditures (production site supply limitations) were taken from the National Drug Control Strategy budget summary reports for the 1998 fiscal year through the 2017 fiscal year (Office of National Drug Control Policy (ONDCP), 2018).[23]

The political stability and control-of-corruption index were obtained from the Worldwide Governance Indicators database (The World Bank, 2017b). Minimum wage data was obtained from the International Labour Organization (ILO), DatosMacro, the national institute of Bolivian statistics, and the national bank of Colombia (Banco de la República de Colombia, 2018; Datosmacro, 2018; Instituto Nacional de Estadística (INE), 2018; International Labour Organization (ILO), 2018). The Penn World Table version 9.0 provided the human capital index (Feenstra et al., 2013). The distance measures were obtained from the geographic data provided by the Portland State University Department of Economics (Porland State University, 2009). The Index of Economic Freedom was obtained from the Heritage Foundation's 2018 report (The Heritage Foundation, 2018). Real GDP statistics, the unemployment rate, openness, tariff rate, and internet access variables were obtained from the World Development Indicators database (The World Bank, 2017a). The U.S. cocaine retail price index adjusted for purity was taken from the World Drug Report 2019 (United Nations, 2019).

6. Econometric Estimation

Two approaches, a Maximum Likelihood with Missing Values estimator (MLMV) and Multiple Imputation analysis, were used to deal with missing values in the data when estimating the impact of U.S. drug prohibition policy on the illicit drug supply indicators, real GDP growth, and political stability. MLMV is used in the estimation of coca cultivation (equation 1 for $\boldsymbol{i} = 2$), potential cocaine production (equation 1 for $\boldsymbol{i} = 3$), and coca eradication (equation 1 for $\boldsymbol{i} = 4$), using *Stata*'s Structural Equation Modeling (SEM) command. The MLMV method assumes joint normality of all variables and allow us to obtain more efficient estimates when missing values are Missing at Random (MAR) (StataCorp, 2017). MLMV estimates the log-likelihood of missing data by grouping data according to missing value patterns (StataCorp, 2017).

Multiple Imputation analysis is used to estimate crop seizures (equation 1 for $\boldsymbol{i} = 1$), and the effect of prohibition (equations 2 and 3) in Latin American countries.[24] The

[23] 1996-2015 final expenditure data was reported from several federal agencies but during that time frame some agencies were terminated or merged, while other agencies/programs were added to the National Drug Control Budget. For consistency, we used the interdiction and international expenditures from those agencies/programs that were included in the 2012 fiscal year budget (Office of National Drug Control Policy (ONDCP), 2011).

[24] The MLMV approach is not used because the assumption of multivariate normality of all variables does not hold. The MLMV is used for the estimation of cultivation, potential cocaine production, and eradication

multiple imputation approach minimizes bias, maximizes the use of available information, and obtains appropriate estimates of uncertainty (UCLA: Statistical Consulting Group, 2018b). There are three steps in the multiple imputation method: 1) imputation, 2) analysis, and 3) pooling. In the imputation step, the missing values are replaced with m multiple sets[25] of estimated values to obtain m complete data sets. *Stata's* multiple imputation (MI) command was used to impute missing values using chained equations. The estimation of missing data by chained equations uses separate conditional distributions for each imputed variable (UCLA: Statistical Consulting Group, 2018b).[26] In the analysis step, each of the m data sets are used to perform the regression analysis. In step three, pooling, the coefficients and standard errors are adjusted to reflect the uncertainty of the imputed values. Maximum Likelihood estimators and robust standard errors were estimated in each regression. Goodness of fit statistics (i.e. R-Squared) were calculated using the method outlined by the Institute for Digital Research and Education (IDRE) (UCLA: Statistical Consulting Group, 2018a).[27]

Consistent estimates require explanatory variables to be independent of the unobserved time-varying shocks and country's heterogeneity. The Correlated Random Effects (CRE) framework was used to account for the correlation between the explanatory variables and the country's unobserved heterogeneity (Saenz and Thompson, 2017). The CRE framework was implemented by including the average of time-varying explanatory variables as covariates in each estimated regression. A Control Function (CF) approach was used to control for the correlation between the U.S. drug prohibition policy variable and the time-varying shocks that affects the Transnational Criminal Enterprises locational decisions. The CF approach includes the estimated residuals from the prohibition policy regression,[28] as well as the explanatory variables, in the estimation of equations (1), (2) and (3). Significance of the differential effects of prohibition, were assessed by using a significant-joint hypothesis of the prohibition and its interaction effect.[29]

Highly correlated variables were excluded from the analysis to avoid multicollinearity. A Variance Inflation Factor (VIF) for each variable was estimated after excluding highly

because it is easier to implement and produces similar results to those of multiple imputation without requiring imputed values (UCLA: Statistical Consulting Group, 2018b).

[25] Twenty-five multiple sets were imputed for the estimation of equation 1 for $\boldsymbol{i} = 1$ (i.e. seizures), using Data Set 1. Fifty multiple sets were imputed for the estimation of equations 2 and 3 (i.e. real GDP growth and political stability) using Data Set 3. The number of imputations were chosen so that the number of imputations were higher than the highest Fraction of Missing Information as discussed in UCLA: Statistical Consulting Group (2018b).

[26] The Stata's command used was "mi impute chained" using predicted mean matching (PMM) as the option for the univariate imputation method. Stata's PMM option matches the missing value to the observed value with the closest linear prediction. The PMM is used because it maintains the distribution of the observed values in the missing part of the data (StataCorp, 2013). The truncated regression option was used in the imputation of tariff rate for the estimation of real GDP growth and political stability because it produced a distribution of the imputed values closer to the distribution of the observed values in comparison to PMM.

[27] IDRE established methodology when using multiple imputation to calculate the R-Squared.

[28] The prohibition variable was regressed on the instrumental variable, and same set of covariates and observations used to estimate each of the $\boldsymbol{i}^{th}$ illicit drug supply indicator (equations 1) and impact indicators (equations 2 and 3).

[29] Joint hypothesis are based on F-statistic tests and are less affected by multicollinearity (Wooldridge, 2016).

correlated variables (see Table 3 below) for three data sets. Data Set 1 includes observations for the Latin American countries and the U.S. to estimate cocaine-coca seizures. Data Set 2 includes the observations for the main cocaine-coca producers (i.e. Colombia, Peru, and Bolivia) and it is used in the estimation of coca cultivation, potential cocaine production, and coca eradication. Data Set 3 includes data for the Latin American countries to assess the impact of U.S. drug prohibition policy in the region. Results from Table 3 confirmed multicollinearity is not a potential problem since the values for the VIFs are below 10.[30]

Table 3. Variance Inflation Factors (VIF)

Variable	Data Set 1	Data Set 2	Data Set 3
	No. Obs. 360	No. Obs. 60	No. Obs. 340
Log(Prohibition) – U.S. Interdiction Expenditure	1.82	---	1.95
Log(Prohibition) – U.S. International Expenditure	---	1.95	1.72
Control-of-Corruption Index	4.04	1.74	9.21
Unemployment Rate	3.39	6.42	3.81
Relative Minimum Wage	3.04	3.67	2.65
Human Capital Index	3.68	4.18	6.05
Openness	1.45	6.62	1.98
Log(Distance)	---	---	2.18
Economic Freedom	2.74	3.36	2.54
Tariff Rate	3.68	---	3.92
Internet Access	7.86	---	8.11
Log(U.S. Cocaine Price)	2.93	1.87	3.4
Big Country	1.3	---	1.47

---: not applicable (variable not used in the estimation). Same Multiple Imputation analyses used in the estimation of Model 1 (equation 1 for $i = 1$; seizures) and Model 2 (real GDP growth and political stability) were used in the VIF estimation for Data Set 1 and Data Set 3, respectively. MLMV was used to estimate the VIF for Data Set 2.

Three steps were used in the estimation of the i^{th} illicit drug supply indicators (i.e. seizures, cultivation, potential production, and eradication) from equation (1), and the impact indicators (i.e. real GDP growth and political stability) from equations (2) and (3). First, the U.S. drug prohibition variable was regressed on the instrumental variable, the *Ownership*, *Location*, and *Internalization* variables, the demand proxy, the big country dummy variable, and the average of time-varying explanatory variables. Second, we obtain the estimated residuals from the prohibition regression in step one and included them as a covariate in the estimation of the illicit drug supply and impact indicators. Third, we regress

[30] Wooldridge (2016) states that choosing an arbitrary value for the VIF to conclude that multicollinearity is a problem is difficult. However, Wooldridge (2016) points to choosing a VIF greater than 10 to establish multicollinearity is a problem. Wooldridge (2016) argues that a VIF greater than 10 is equivalent to an R-squared from regressing the explanatory variable on all other independent variables of above 0.9.

each i^{th} illicit drug supply indicator on the estimated residuals obtained in step two, the prohibition variable, and XY.[31] We regress again each i^{th} illicit drug supply indicator including one interaction effect at a time. For the estimation of the impact indicators, the independent variables used in the system of equations (2) and (3) were the estimated residuals obtained in step two, the prohibition variable, and XY. If the estimated residuals were insignificant, they were dropped, and the equation was re-estimated using the remaining variables.

6.1 Missing at Random (MAR) Assumption

For the MLMV and the Multiple Imputation analysis to minimize bias and obtain more efficient estimators, missing values have to be Missing at Random (MAR) (Newman, 2014). According to Allison (2010), data for a variable is MAR if the missingness of the variable depends on observed data, and not on the measures of the variable itself after controlling for the observed data. There is no available test to assess if the data is MAR, but we can diagnose MAR by looking at the correlation between missingness and observed data, and by estimating the probability of missingness as a function of the observed data.

Table 4 presents the percentage of missing observations in each of the data sets used in the estimations. Based on the percentages of missing observations, we analyze the MAR assumption for those variables where the percentage of missing observations in greater than 5 percent.[32]

Table 4. Variables with missing data (percentage of missing observations)

Variable	Data Set 1: Cocaine-Coca Seizures Estimation	Data Set 2 Cocaine-Coca Producers Estimation	Data Set 3 Latin American Countries Estimation
	No. Obs. 360	No. Obs. 60	No. Obs. 340
Political Stability	---	---	15
Cocaine-Coca Seizures	0.28	---	---
Control-of-Corruption	15	15	15
Relative Minimum Wage	6.11	1.67	6.47
Openness	0.28	0	0.29
Tariff Rate	7.22	---	7.65

---: not applicable (variable not used in the estimation). Missingness is due to the source's reporting of the data, and not the value of the variable itself.

[31] XY stands for the *Ownership*, *Location*, and *Internalization* variables, demand proxy, Big Country dummy, and the average of time-varying explanatory variables. The following variables were excluded because of multicollinearity issues: the distance variable was excluded from the estimation of seizures, cultivation, potential production, and eradication; the tariff rate, internet access, and the Big Country dummy were excluded from the estimation of cultivation, potential production, and eradication.

[32] Variables with less than 5 percent missing data only represent one missing observation in each data set and are not expected to influence the bias or efficiency of the estimator.

A missingness-dummy variable was created for each variable with more than 5 percent of missing observations. The missingness-dummy variable takes a value of 1 if the variable has a missing observation and zero if otherwise. These dummy variables were used to estimate the pairwise correlations between missing data and the observed variables[33] (Table 5), and to estimate the probability of missingness as a function of the observed data (Table 6).

For the data used in the estimation of cocaine-coca seizures (i.e. Data Set 1), Table 5 indicates the missingness in the control-of-corruption index, relative minimum wage, and tariff rate variables are significantly associated (i.e. correlated) with observed data. Estimation of the probability of missingness in Table 6 confirms that the missingness depends on the observed data itself. For example, missingness in the control-of-corruption index can be predicted by the observed values of cocaine-coca seizure data, human capital index, economic freedom, openness, and internet access.

Similarly, for the data used in the estimation of coca cultivation, potential cocaine production, and coca eradication (i.e. Data Set 2), Table 5 indicates that missingness in the control-of-corruption index is significantly correlated with the observed data. Estimation of the missingness probability in the control-of-corruption index in Table 6 indicates that missingness depends on the observed values of U.S. international expenditures, unemployment rate, relative minimum wage, and economic freedom.

Finally, for the data set used in the estimation of the impact of U.S. drug prohibition policy in Latin American countries (i.e. Data Set 3), the pairwise correlation (Table 5) estimations indicate that missingness is significantly correlated with the observed data. A further assessment of the dependence of missingness on observed data can be predicted by the probability estimations of missingness as shown in Table 6. For example, missingness in the political stability variable and the tariff rate depend on the observed prohibition values as measured by U.S. international expenditures.

[33] Observed variables are understood to be those with no missing observations or less than 5 percent of missing data

Table 5. Pairwise correlation between variables with complete data and variables with missing data [a]

		Data Set 1 Cocaine-Coca Seizure Estimation			Data Set 2 Cocaine-Coca Producers Estimation	Data Set 3 Latin American Countries Estimation			
Variables -Complete Data	**Variables Missing Data**	Control-of-Corruption	Relative Minimum Wage	Tariff Rate	Control-of-Corruption	Political Stability	Control-of-Corruption	Relative Minimum Wage	Tariff Rate
Cocaine-Coca Seizures [b]		-0.12**	-0.084	-0.02	---	---	---	---	---
Coca Cultivation		---	---	---	0.016	---	---	---	---
Potential Cocaine Production		---	---	---	0.04	---	---	---	---
Coca Eradication		---	---	---	-0.13	---	---	---	---
Real GDP Growth		---	---	---	---	-0.16***	-0.16***	-0.082	0.019
U.S. Interdiction Expenditure		-0.31***	-0.11**	-0.27***	---	-0.31***	-0.31***	-0.11**	-0.28***
U.S. International Expenditure		---	---	---	-0.47***	-0.47***	-0.47***	-0.088	-0.34***
Unemployment Rate		0.13**	-0.051	0.0084	0.14	0.14***	0.14***	-0.058	0.0013
Relative Minimum Wage		---	---	---	-0.2	---	---	---	---
Human Capital Index		-0.13**	-0.0091	-0.13**	-0.28**	-0.17***	-0.17***	0.041	-0.12**
Openness		-0.083	0.055	0.11**	-0.27**	-0.087	-0.087	0.039	0.1*
Distance		---	---	---	---	-0.000000061	-0.000000061	-0.035	-0.12**
Economic Freedom		0.11**	-0.051	0.027	0.25*	0.13**	0.13**	-0.028	0.06
Internet Access		-0.34***	0.11**	-0.13**	---	-0.37***	-0.37***	0.16***	-0.12**
U.S. Cocaine Price		-0.27***	0.26***	-0.068	-0.27**	-0.27***	-0.27***	0.27***	-0.07

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. ---: not applicable (variable not used in the estimation).

[a] We investigate the correlation between variables with no missing data or with less than 5 percent of missing data, and variables with more than 5 percent missing data. A dummy variable was constructed for each variable with more than 5 percent missing data to estimate the pairwise correlation.

Table 6. Logistic regression (odds ratio) for missing data – Data Set 1 and Data Set 2

	Data Set 1 Used in Estimation of: Seizures			**Data Set 2 Used in Estimation of: Cultivation, Potential Cocaine Production, and Eradication**		
	Control-of-Corruption	Relative Minimum Wage	Tariff Rate	Control-of-Corruption	Control-of-Corruption	Control-of-Corruption
Cocaine-Coca Seizures	0.999** (0.0000012)	0.999** (0.000014)	1 (0.00000078)	---	---	---
Coca Cultivation	---	---	---	1 (0.000024)	---	---
Potential Cocaine Production	---	---	---	---	1.003 (0.0051)	---
Coca Eradication	---	---	---	---	---	1 (0.00002)
U.S. Interdiction Expenditure	1 (0.00039)	0.998*** (0.00057)	0.998*** (0.00047)	---	---	---
U.S. International Expenditure	---	---	---	0.998** (0.00099)	0.998* (0.001)	0.998* (0.0011)
Unemployment Rate	1.009 (0.048)	1.085 (0.095)	0.996 (0.062)	1.587** (0.35)	1.479* (0.33)	1.621** (0.34)
Relative Minimum Wage	---	---	---	0.587** (0.13)	0.572** (0.15)	0.58** (0.14)
Human Capital Index	3.559** (2.12)	14.08** (18.9)	0.278 (0.23)	1.102 (4.73)	0.656 (3.003)	1.179 (4.96)
Openness	0.986** (0.0067)	0.989 (0.0091)	1.017*** (0.0056)	0.86 (0.12)	0.842 (0.13)	0.857 (0.11)
Economic Freedom	1.07** (0.03)	0.999 (0.05)	1.02 (0.041)	1.916* (0.7)	2.006* (0.77)	1.892* (0.65)
Internet Access	0.86*** (0.042)	0.908*** (0.031)	1.011 (0.027)	---	---	---
U.S. Cocaine Price	1.006 (0.011)	1.152*** (0.029)	1.01 (0.017)	1.014 (0.061)	1.011 (0.06)	1.019 (0.053)

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Odds ratios reported. Robust standard errors of coefficients in parenthesis. ---: not applicable (variable not used in the estimation).

Table 6. Logistic regression (odds ratio) for missing data (continued) – Data Set 3

`	Political Stability		Control-of-Corruption		Relative Minimum Wage		Tariff Rate	
Real GDP Growth	0.913	0.856**	0.913	0.856**	0.873	0.852*	1.064	1.039
	(0.055)	(0.056)	(0.055)	(0.056)	(0.078)	(0.072)	(0.073)	(0.082)
U.S. Interdiction Expenditure	1.001	---	1.001	---	0.998***	---	0.998***	---
	(0.00045)		(0.00045)		(0.00049)		(0.00048)	
U.S. International Expenditure	---	0.998***	---	0.998***	---	0.997*	---	0.996***
		(0.00036)		(0.00036)		(0.0018)		(0.00095)
Unemployment Rate	1.019	0.995	1.019	0.995	1.034	1.024	1.005	0.997
	(0.05)	(0.053)	(0.05)	(0.053)	(0.061)	(0.063)	(0.062)	(0.073)
Human Capital Index	3.602	3.253	3.602	3.253	3.191	1.874	0.609	0.539
	(2.88)	(2.83)	(2.88)	(2.83)	(4.24)	(2.37)	(0.54)	(0.5)
Openness[b]	0.993	0.994	0.993	0.994	1.004	1.005	1.009	1.013*
	(0.0067)	(0.0073)	(0.0067)	(0.0073)	(0.0084)	(0.0084)	(0.0062)	(0.0073)
Distance	0.999	0.999	0.999	0.999	1	0.999	0.999*	0.999**
	(0.00021)	(0.00022)	(0.00021)	(0.00022)	(0.00027)	(0.00023)	(0.00021)	(0.00021)
Economic Freedom	1.057*	1.059*	1.057*	1.059*	1.029	1.029	1.031	1.03
	(0.033)	(0.036)	(0.033)	(0.036)	(0.041)	(0.028)	(0.042)	(0.041)
Internet Access	0.739***	0.81***	0.739***	0.81***	0.925**	0.955	1.009	1.045
	(0.066)	(0.047)	(0.066)	(0.047)	(0.031)	(0.029)	(0.029)	(0.033)
U.S. Cocaine Price	1.025*	1.054***	1.025*	1.054***	1.128***	1.112***	1.007	1.015
	(0.015)	(0.016)	(0.015)	(0.016)	(0.026)	(0.031)	(0.019)	(0.02)

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Odds ratios reported. Robust standard errors of coefficients in parenthesis. ---: not applicable (variable not used in the estimation).

7. Results

An instrumental variable (IV) was used to identify the impact of U.S. drug prohibition policy on the illicit drug supply indicators, real GDP growth, and political stability. For the instrument to be valid after controlling for other relevant factors, the IV needs to predict changes in the size of U.S. drug prohibition policy (i.e. relevance assumption), and be unrelated to changes in the illicit drug supply and impact indicators (i.e. exclusion assumption) while being uncorrelated to the error terms in equations 1, 2, and 3 (i.e. exogeneity assumption).[34]

We can explore the relevance of the IV to predict U.S. drug prohibition policy by referring to the estimation of factors affecting U.S. interdiction and international expenditure in Table 7. Data Set 1 (i.e. column 1 in Table 7 using data for all countries with seizure values) is used to assess the factors affecting prohibition when U.S. drug prohibition policy is measured as U.S. interdiction expenditure. Data Set 3 (i.e. column 4 in Table 7 using data for Latin American countries) is used to assess factors affecting prohibition when U.S. drug prohibition policy is measured as U.S. international expenditure. Results indicate that the IV significantly impacts U.S. drug prohibition policy after controlling for all other relevant factors making the U.S. political administration dummy a relevant instrument.

The IV also needs to have no direct effect on the illicit supply indicators, real GDP growth, and political stability (i.e. exclusion restriction). Table 8 presents the estimation of the illicit supply indicators, real GDP growth, and political stability. As shown in Table 8, the IV does not significantly impact seizures, cultivation, potential cocaine production, real GDP growth, and political stability; therefore the U.S. political administration dummy satisfies the exclusion restriction for all dependent variables, except eradication.[35] However, there is no reason to believe that the election of a Democratic or Republican administration in the U.S. has a direct impact on eradication, expect through the effect of the U.S. drug prohibition policy. The average of coca eradication (hectares) during a Democratic administration was not statistically different than the average of coca eradication during a Republican administration.[36]

In addition, the exogeneity of the IV might be called into question if the factors influencing the election of a Democratic or Republican administration also affect the dependent variables (i.e. illicit supply indicators, real GDP growth, and political stability), and are not accounted for in the estimation. Historical political attitudes in the United States have been shaped by family attitudes, gender, religion, race, ethnicity, and geographical region in the U.S. (Independence Hall Association, 2019). Those factors affecting political attitudes are different from those we theorized, in the context of Transnational Criminal Enterprises, affect illicit supply indicators. In addition, factors affecting historical political attitudes in the U.S. are different from the factors affecting economic growth and political stability in Latin American countries.

[34] Wooldridge (2016) defines the exogeneity and exclusion assumptions as the instrument exogeneity assumption. In here, we are more specific by defining exogeneity in terms of the correlation of the instrument with the error term, and the exclusion restriction as the instrumental variable not having a partial effect on the dependent variable after controlling for other relevant variables.

[35] The IV significantly impacts eradication at the 5 percent significance level.

[36] A t-test on the equality of means was not statistically significant at the standard significance levels.

Table 7. Factors affecting prohibition (lognormal estimates) [a; b]

Dependent Variable	Log(U.S. Interdiction Expenditure)	Log(U.S. International Expenditure)	Log(U.S. Interdiction Expenditure)	Log(U.S. International Expenditure)
	Data Set 1 Cocaine-Coca Seizures	Data Set 2 Cocaine-Coca Producers	Data Set 3 Latin American Countries	
	No. Obs. 360	No. Obs. 60	No. Obs. 340	
Independent Variables	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
IV	0.11***	0.25	0.084***	0.27***
	(0.026)	(0.16)	(0.026)	(0.062)
Control-of-Corruption Index	0.0046	0.48	0.101**	0.21**
	(0.027)	(0.38)	(0.046)	(0.1)
Unemployment Rate	-0.0019	0.071***	-0.0051	0.0047
	(0.005)	(0.025)	(0.0054)	(0.011)
Relative Minimum Wage	-0.0013	-0.00088	0.0017	0.0059**
	(0.00092)	(0.021)	(0.0018)	(0.0029)
Human Capital Index	-0.0025	1.22***	0.13*	0.32**
	(0.04)	(0.39)	(0.072)	(0.15)
Openness	0.00066*	0.014*	0.00013	-0.00058
	(0.00036)	(0.0079)	(0.00045)	(0.00094)
Log(Distance) [d]	---	---	-0.053	-0.13
			(0.035)	(0.079)
Economic Freedom	-0.0028	0.011	-0.0022	-0.0011
	(0.002)	(0.012)	(0.0019)	(0.004)
Tariff Rate [c]	-0.035***	---	-0.04***	-0.069***
	(0.0047)		(0.0049)	(0.011)
Internet Access [c]	0.0033**	---	0.00033	-0.0042
	(0.0016)		(0.0018)	(0.0032)
Log(U.S. Price Cocaine)	0.076	0.73**	0.071	0.61***
	(0.069)	(0.34)	(0.072)	(0.15)
Big Country	0.015	---	-0.0038	-0.028
	(0.027)		(0.029)	(0.063)
Observations	360	60	340	340
R-Squared	0.47	0.52	0.49	0.44

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis. ---: not applicable (variable not used in the estimation due to high correlation with other regressors).

[a] Data Set 1 includes the Latin American countries and the U.S., Data Set 2 includes main cocaine-coca producers (i.e. Colombia, Peru, and Bolivia), and Data Set 3 includes Latin American countries as listed in the data section.

[b] Implementation of the Correlated Random Effects (CRE) approach involves the control of covariates that statistically change over time (results not reported). Mean of variables that statistically change over time and have a correlation higher than 0.8 with other covariates used in the regression are excluded to avoid multicollinearity. Therefore, for each data set the following variables are included: Data Set 1 - mean of the unemployment rate and tariff rate; Data Set 2 - no additional means are included; Data Set 3 - mean of the unemployment rate, tariff rate, and internet access.

Table 8: Testing exclusion restriction of IV

	Log(Cocaine-Coca Seizures)	Log(Coca Cultivation)	Log(Potential Cocaine Production)	Log(Coca Eradication)	Real GDP Growth	Political Stability
	Data Set 1 No. Obs. 360	Data Set 2 - No. Obs. 60			Data Set 3 No. Obs. 340	
Independent Variables						
IV	0.046 (0.25)	-0.084 (0.091)	-0.059 (0.13)	0.5** (0.22)	-0.37 (0.47)	-0.11 (0.068)
Control-of-Corruption Index	-0.32 (0.26)	0.43* (0.23)	0.27 (0.29)	-0.7 (0.68)	1.05 (0.88)	0.17* (0.092)
Unemployment Rate	-0.02 (0.043)	-0.016 (0.015)	0.019 (0.019)	-0.029 (0.036)	-0.38*** (0.11)	-0.022** (0.0098)
Relative Minimum Wage	0.026*** (0.0071)	0.057*** (0.013)	0.045*** (0.013)	0.13*** (0.031)	-0.0093 (0.028)	-0.016*** (0.0032)
Human Capital Index	1.91*** (0.34)	-1.90*** (0.29)	-0.29 (0.33)	-4.03*** (0.69)	0.59 (1.04)	-0.048 (0.13)
Openness	-0.0027 (0.0029)	-0.0049 (0.005)	-0.0022 (0.0060)	0.0037 (0.014)	0.032*** (0.0067)	0.0048*** (0.00079)
Log(Distance)	---	---	---	---	-0.12 (0.71)	0.49*** (0.074)
Economic Freedom	-0.033* (0.017)	-0.017** (0.0077)	-0.015 (0.0095)	-0.016 (0.024)	-0.073** (0.032)	-0.011*** (0.0035)
Tariff Rate	-0.047 (0.05)	---	---	---	-0.13 (0.088)	0.0046 (0.01)
Internet Access	0.0024 (0.01)	---	---	---	0.028 (0.025)	0.0074** (0.0032)
Log(U.S. Cocaine Price)	-0.069 (0.58)	0.39* (0.21)	-0.049 (0.28)	1.37*** (0.5)	-5.32*** (1.01)	-0.24 (0.15)
Big Country	3.89*** (0.24)	---	---	---	1.43*** (0.44)	-0.73*** (0.06)
R-Squared	0.62	0.89	0.63	0.83	0.84	

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis. ---: not applicable (variable not used in the estimation). The MLMV approach is used in the estimation of coca cultivation, potential cocaine production, and coca eradication. For the MLMV estimation, we fail to reject the Jarque-Bera test of normality at all standard significance levels for the coca eradication and potential cocaine production estimations. We fail to reject the Jarque-Bera test of normality at the 1 percent significance level for the coca eradication estimation. Multiple Imputation analysis was used in the estimation of cocaine-coca seizures, real GDP growth, and political stability.

Table 7 also reveals the factors that significantly affect U.S. prohibition in Latin America (i.e. columns 3 and 4). Results indicate Latin American countries that have less corrupted governments, a more educated population, and fewer restrictions on international trade are associated with greater U.S. expenditures for illicit drug interdiction and international drug control efforts. U.S. drug prohibition policy in Latin American countries appears to be driven by the government's ability to manage those resources allocated for illicit drug supply control and the restrictions imposed to international trade. In addition, higher retail prices for cocaine in the U.S. are associated with greater U.S. expenditures on international drug control efforts.

Tables 9-14 show results for the illicit drug supply indicators estimation. For brevity, Table 13 reports only the significant estimates from the regression run for each i^{th} illicit drug supply indicator before including any interaction of U.S. drug prohibition policy with the *Ownership*, *Location*, and *Internalization* variables. Table 14 reports the estimates for significant joint hypothesis of the prohibition and its corresponding interaction effect.

Table 13 results indicate that U.S. drug prohibition policy significantly impacts cocaine-coca supply at the source but not in transit. Table 13 reveals that a 10 percent increase in U.S. drug prohibition policy spending, measured as international expenditure, reduces potential cocaine production by 3.5 percent and increases on-site coca eradications by approximately 26 percent. Caulkins and Reuter (2010) report that significant cocaine-coca supply control efforts at the source country are viewed as inefficient, since the cost of cultivating and refining the drug is less than 1 percent of the U.S. cocaine retail price. However, Caulkins and Reuter (2010) point that illegality and enforcement can keep U.S. cocaine retail prices higher and availability to the consumer much lower that would be case if there were no prohibition or enforcement.

Table 13 results are consistent with other authors' argument that U.S. drug prohibition policy has not significantly disrupted the cocaine-coca supply in transit. Seizures insignificantly affect the Transnational Criminal Enterprise financially because smuggling costs are a small percentage of the final U.S. cocaine retail price and because Transnational Criminal Enterprises change smuggling routes thereby hedging against the risk of seizures (Andreas, 2000; Caulkins and Reuter, 2010; Keck and Correa-Cabrera, 2015; Moore, 1990). Successful interdiction policies in one country have only displaced operations to other locations, without reducing the amount of drugs transacted. Mejia and Restrepo (2014) reveal that successful interdiction policies in Colombia in 2007, resulted with the displacement of cocaine-coca production and trafficking organizations.[37] Similarly, Giommoni et al., (2017) found that greater seizures failed to prevent the formation of heroin trafficking flows in Europe.

Our results reveal that the *Ownership* variable, control-of-corruption index, significantly affects Transnational Criminal Enterprises when it comes to on-site cocaine-coca supply. Greater control- of-corruption advantages Transnational Criminal Enterprises by significantly increasing coca cultivation, potential cocaine production, and reducing coca eradication. Our results support Mudambi and Paul (2003) assertion that less corruption decreases production costs for Transnational Criminal Enterprises thereby facilitating their expansion. This study's results also point out that the monetary cost of brides are higher than other monetary/non-monetary costs associated with the production of cocaine-coca.

Location variables, such as the state of the labor market (i.e. unemployment rate and relative minimum wage), human capital levels, and openness, significantly affect Transnational Criminal Enterprises locational decisions in Latin America. As unemployment rates increase, Transnational Criminal Enterprises gain advantages due to increases in potential cocaine production and reductions in coca eradication. Unemployment rates have been found to have a positive association with the size of the shadow economy as economic downturns drive unemployed individuals into the shadow economy (Dell'Anno and Solomon, 2008). Transnational Criminal

[37] Coca cultivation was displaced to Peru and Bolivia, cocaine processing to Venezuela, and trafficking organizations to Mexico and Central America.

Enterprises benefit from individuals driven to the shadow economy due to lost employment. In the case of relative minimum wages, Transnational Criminal Enterprises gain advantages with higher local wages as those are associated with higher coca cultivation and potential cocaine production, but those advantages are diminished as higher local wages increase the expected seizures and eradication efforts. According to Reuter (1992), crop eradication efforts increase the risks and costs to farmers which should be reflected on the income they receive in order for them to stay in the market. Thus, higher wages[38] become an incentive for farmers to increase cocaine-coca production in order to cover the risks farmers face as result of prohibition. On the other hand, higher minimum wages have also been found to spur productivity and increase output (Booth and Frank, 1999). Results showed in Table 13 also indicate that reduced human capital increases coca cultivation. Reduced human capital levels lower the opportunity cost of crime (Lochner, 2004), and also provides a cheaper labor force. Greater globalization (i.e. greater openness) also benefits Transnational Criminal Enterprises by reducing on-site eradications. The effect of openness on Transnational Criminal Enterprises does not support Enderwick (2009)'s discussion on how globalization generates income inequality and provides an opportunity for Translational Criminal Enterprises to target marginalized segments of the population, as globalization does not significantly impact on-site cocaine-coca production.

Table 13 also reveals that the *Internalization* variable, economic freedom, has a significant impact on the locational decisions of Transnational Criminal Enterprises. Greater economic freedom becomes disadvantageous to Transnational Criminal Enterprises by reducing coca cultivation. This result potentially signals changes in the producers' behavior by giving them incentives to engage in the legal economy. Our results support Muñoz-Mora et al. (2018) and Felbab-Brown (2014) discussion on the importance of property rights, and access to productive resources and markets in decreasing the size of illicit drug cultivation. Results also indicate that increased levels of economic freedom lead to less seizures and on-site eradications.

[38] We assume illegal wages reflect changes in legal wages. If legal wages increase, illegal wages will also have to increase to induce farmers to engage in illegal drug production since those activities involve higher risk.

Table 9. Cocaine-Coca seizures estimation (lognormal estimates) [a]

Independent Variable	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Log(Prohibition)	0.66 (0.48)	0.76 (0.50)	1.11 (0.98)	0.84 (0.7)	-0.26 (1.81)	-0.36 (0.82)	-1.58 (2.42)	1.12 (0.84)	0.55 (0.64)
Log(Prohibition) by Control-of-Corruption Index		0.38 (0.56)							
Log(Prohibition) by Unemployment Rate			-0.059 (0.11)						
Log(Prohibition) by Relative Minimum Wage				-0.0065 (0.014)					
Log(Prohibition) by Human Capital Index					0.38 (0.71)				
Log(Prohibition) by Openness						0.016 (0.011)			
Log(Prohibition) by Economic Freedom							0.036 (0.039)		
Log(Prohibition) by Tariff Rate								-0.07 (0.11)	
Log(Prohibition) by Internet Access									0.006 (0.018)
Control-of-Corruption Index	-0.32 (0.26)	-3.33 (4.43)	-0.32 (0.26)	-0.34 (0.26)	-0.31 (0.26)	-0.34 (0.26)	-0.32 (0.26)	-0.33 (0.26)	-0.32 (0.26)
Unemployment Rate	-0.019 (0.043)	-0.027 (0.046)	0.44 (0.88)	-0.016 (0.044)	-0.021 (0.044)	-0.011 (0.044)	-0.026 (0.045)	-0.021 (0.044)	-0.019 (0.043)
Relative Minimum Wage	0.027*** (0.0071)	0.027*** (0.0074)	0.027*** (0.0071)	0.078 (0.11)	0.027*** (0.0074)	0.027*** (0.007)	0.027*** (0.0072)	0.027*** (0.0072)	0.027*** (0.0071)
Human Capital Index	1.92*** (0.34)	1.99*** (0.34)	1.9*** (0.33)	1.9*** (0.34)	-1.1 (5.65)	1.87*** (0.33)	1.99*** (0.35)	1.92*** (0.34)	1.92*** (0.34)
Openness	-0.0032 (0.0029)	-0.0034 (0.0029)	-0.0033 (0.003)	-0.0032 (0.0029)	-0.0033 (0.0029)	-0.13 (0.085)	-0.0033 (0.003)	-0.003 (0.003)	-0.0032 (0.0029)
Economic Freedom	-0.031* (0.017)	-0.033** (0.017)	-0.031* (0.017)	-0.03* (0.017)	-0.031* (0.017)	-0.029* (0.016)	-0.31 (0.31)	-0.031* (0.016)	-0.031* (0.017)
Tariff Rate	-0.023 (0.052)	-0.027 (0.052)	-0.021 (0.052)	-0.018 (0.057)	-0.026 (0.053)	-0.029 (0.053)	-0.026 (0.052)	0.53 (0.87)	-0.026 (0.054)
Internet Access	-0.000015 (0.01)	-0.0043 (0.012)	0.00055 (0.01)	0.0015 (0.012)	-0.002 (0.011)	0.0024 (0.01)	-0.0031 (0.011)	0.0001 (0.01)	-0.047 (0.15)
Log(U.S. Cocaine Price)	-0.08 (0.41)	0.022 (0.44)	-0.12 (0.41)	-0.12 (0.43)	-0.028 (0.43)	-0.16 (0.42)	-0.017 (0.42)	-0.11 (0.42)	-0.092 (0.41)
Big Country	3.88*** (0.24)	3.87*** (0.24)	3.88*** (0.24)	3.87*** (0.24)	3.87*** (0.24)	3.88*** (0.24)	3.87*** (0.24)	3.88*** (0.24)	3.88*** (0.24)

[a] ***, **, * indicates 1%, 5%, and 10% significance levels, respectively. Robust standard errors in parenthesis. R-squared statistics for all regressions are 0.62. Prohibition is measured as U.S. interdiction expenditure. Results reported lognormal estimates after dropping not statistically significant residuals from the estimation of prohibition. Mean of the unemployment rate and tariff rate are included as regressors (estimates not reported). We fail to reject the joint hypotheses that the prohibition and corresponding interaction effect are equal to zero at all significance levels.

Table 10. Coca cultivation estimation (lognormal estimates)

Independent Variable	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Residual					0.88**		
					(0.36)		
Log(Prohibition)	-0.15	-0.89***	-0.58***	-0.78***	1.82*	0.18	-0.95
	(0.11)	(0.27)	(0.16)	(0.21)	(0.97)	(0.39)	(1.42)
Log(Prohibition) by Control-of-Corruption Index		-2.28***					
		(0.73)					
Log(Prohibition) by Unemployment Rate			0.048***				
			(0.017)				
Log(Prohibition) by Relative Minimum Wage				0.039***			
				(0.013)			
Log(Prohibition) by Human Capital Index					-1.18***		
					(0.42)		
Log(Prohibition) by Openness						-0.0081	
						(0.0084)	
Log(Prohibition) by Economic Freedom							0.012
							(0.022)
Control-of-Corruption Index	0.51***	16.8***	0.53***	0.43***	0.79***	0.58***	0.49**
	(0.19)	(5.12)	(0.18)	(0.16)	(0.22)	(0.21)	(0.22)
Unemployment Rate	-0.0043	-0.018	-0.35***	0.012	0.051**	-0.0019	-0.0034
	(0.017)	(0.016)	(0.12)	(0.013)	(0.022)	(0.017)	(0.017)
Relative Minimum Wage	0.054***	0.077***	0.057***	-0.23**	0.068***	0.051***	0.053***
	(0.0099)	(0.011)	(0.0083)	(0.099)	(0.011)	(0.011)	(0.012)
Human Capital Index	-1.74***	-2.01***	-1.73***	-1.61***	7.73**	-1.71***	-1.77***
	(0.32)	(0.22)	(0.27)	(0.25)	(3.13)	(0.34)	(0.33)
Openness	-0.0037	0.0013	-0.00067	-0.00081	0.015**	0.055	-0.0032
	(0.0041)	(0.0036)	(0.0036)	(0.0032)	(0.007)	(0.061)	(0.0037)
Economic Freedom	-0.015**	-0.0098	-0.014*	-0.015**	-0.0018	-0.017**	-0.11
	(0.0071)	(0.0061)	(0.007)	(0.0067)	(0.0082)	(0.0074)	(0.16)
Log(U.S. Cocaine Price)	0.58***	0.38***	0.58***	0.59***	0.84***	0.61***	0.58***
	(0.11)	(0.12)	(0.1)	(0.11)	(0.14)	(0.11)	(0.12)
R-Squared	0.9	0.93	0.91	0.92	0.91	0.9	0.9

[a] ***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis. Prohibition is measured as U.S. international expenditure. Results reported lognormal estimates obtained after dropping not statistically significant residuals from the estimation of prohibition. P-values for the joint hypotheses that the prohibition and m^{th} interaction effect equal to zero are: 0.004 (m= control-of-corruption index interaction); 0.001 (m = unemployment rate interaction); 0.0003 (m = relative minimum wage interaction); 0.0008 (m = human capital index interaction); 0.104 (m = openness interaction); and 0.38 (m = economic freedom interaction). We fail to reject the Jarque-Bera test of normality at all standard significance levels for all regressions.

Table 11. Potential cocaine production estimation (lognormal estimates) [a]

Independent Variable	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Log(Prohibition)	-0.35***	-0.55*	-0.54**	-0.5*	-0.11	0.0091	-0.24
	(0.099)	(0.3)	(0.21)	(0.29)	(1.12)	(0.34)	(1.42)
Log(Prohibition) by Control-of-Corruption Index		-0.75					
		(0.74)					
Log(Prohibition) by Unemployment Rate			0.021				
			(0.021)				
Log(Prohibition) by Relative Minimum Wage				0.009			
				(0.018)			
Log(Prohibition) by Human Capital Index					-0.1		
					(0.47)		
Log(Prohibition) by Openness						-0.0087	
						(0.0082)	
Log(Prohibition) by Economic Freedom							-0.0016
							(0.022)
Control-of-Corruption Index	0.41*	5.89	0.41*	0.39*	0.41*	0.48**	0.38
	(0.22)	(5.14)	(0.21)	(0.22)	(0.22)	(0.2)	(0.25)
Unemployment Rate	0.044**	0.04*	-0.11	0.049**	0.044**	0.047**	0.044**
	(0.022)	(0.023)	(0.16)	(0.021)	(0.021)	(0.021)	(0.022)
Relative Minimum Wage	0.046***	0.05***	0.047***	-0.019	0.046***	0.044***	0.047***
	(0.01)	(0.015)	(0.0099)	(0.13)	(0.01)	(0.011)	(0.012)
Human Capital Index	0.17	0.11	0.18	0.21	0.89	0.21	0.16
	(0.31)	(0.31)	(0.29)	(0.29)	(3.34)	(0.3)	(0.32)
Openness	0.0027	0.0031	0.0041	0.0035	0.0032	0.066	0.0026
	(0.005)	(0.0052)	(0.0051)	(0.0051)	(0.005)	(0.06)	(0.0053)
Economic Freedom	-0.011	-0.011	-0.01	-0.011	-0.011	-0.014	-0.00021
	(0.0088)	(0.0086)	(0.009)	(0.0089)	(0.0088)	(0.0095)	(0.16)
Log(U.S. Cocaine Price)	0.16	0.13	0.16	0.16	0.16	0.19	0.15
	(0.15)	(0.17)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
R-Squared	0.69	0.71	0.69	0.69	0.69	0.7	0.69

[a] ***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis. Prohibition is measured as U.S. international expenditure. Results reported lognormal estimates obtained after dropping not statistically significant residuals from the estimation of prohibition. P-values for the joint hypotheses that the prohibition and m^{th} interaction effect equal to zero are: 0.004 (m= control-of-corruption index interaction); 0.0005 (m = unemployment rate interaction); 0.0005 (m = relative minimum wage interaction); 0.0015 (m = human capital index interaction); 0.0008 (m = openness interaction); and 0.0016 (m = economic freedom interaction). We fail to reject the Jarque-Bera test of normality at all standard significance levels for all regressions.

Table 12. Coca eradication estimation (lognormal estimates) [a]

Independent Variable	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Residual	-2*	-1.96*	-1.92*	-1.99**		-1.93*	-1.83**
	(1.03)	(1.13)	(1.03)	(1.003)		(0.99)	(0.87)
Log(Prohibition)	2.66***	1.93	2.04*	2.10**	5.81***	4.51***	11.5***
	(0.95)	(1.32)	(1.06)	(1.05)	(1.88)	(1.06)	(3.36)
Log(Prohibition) by Control-of-Corruption Index		-2.15*					
		(1.25)					
Log(Prohibition) by Unemployment Rate			0.06				
			(0.047)				
Log(Prohibition) by Relative Minimum Wage				0.034			
				(0.034)			
Log(Prohibition) by Human Capital Index					-2.11***		
					(0.8)		
Log(Prohibition) by Openness						-0.049***	
						(0.017)	
Log(Prohibition) by Economic Freedom							-0.14***
							(0.053)
Control-of-Corruption Index	-1.62**	13.9	-1.63***	-1.69***	-0.995**	-1.06*	-1.92***
	(0.66)	(9.29)	(0.56)	(0.54)	(0.49)	(0.55)	(0.48)
Unemployment Rate	-0.21***	-0.22***	-0.64*	-0.2***	-0.088**	-0.18**	-0.22***
	(0.069)	(0.077)	(0.33)	(0.075)	(0.039)	(0.08)	(0.059)
Relative Minimum Wage	0.12***	0.14***	0.13***	-0.13	0.15***	0.10***	0.14***
	(0.023)	(0.02)	(0.021)	(0.26)	(0.021)	(0.02)	(0.023)
Human Capital Index	-7.33***	-7.49***	-7.21***	-7.22***	10.1*	-6.86***	-6.94***
	(1.35)	(1.45)	(1.43)	(1.37)	(5.64)	(1.41)	(1.16)
Openness	-0.034*	-0.029	-0.029	-0.031	0.0077	0.32**	-0.038**
	(0.02)	(0.021)	(0.02)	(0.019)	(0.011)	(0.13)	(0.016)
Economic Freedom	-0.044*	-0.04	-0.041*	-0.044*	-0.015	-0.056***	0.98**
	(0.025)	(0.025)	(0.024)	(0.025)	(0.019)	(0.018)	(0.39)
Log(U.S. Cocaine Price)	-0.24	-0.37	-0.23	-0.23	0.33	-0.03	-0.3
	(0.37)	(0.36)	(0.39)	(0.37)	(0.25)	(0.38)	(0.33)
R-Squared	0.87	0.87	0.87	0.87	0.88	0.89	0.89

[a] ***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis. Prohibition is measured as U.S. international expenditure. Results reported lognormal estimates obtained after dropping not statistically significant residuals from the estimation of prohibition. P-values for the joint hypotheses that the prohibition and m^{th} interaction effect equal to zero are: 0.0001 (m = control-of-corruption index interaction); 0.008 (m = unemployment rate interaction); 0.009 (m = relative minimum wage interaction); <0.0001 (m = human capital index interaction); 0.0001 (m = openness interaction); and 0.0001 (m = economic freedom interaction). We fail to reject the Jarque-Bera test of normality at all standard significance levels for all regressions, except for the regression including the log(prohibition) by control-of-corruption index interaction for which we fail to reject the joint hypothesis at the 5% significance level.

Table 13. Summary of significant factors affecting illicit drug availability indicators (lognormal estimates) [a]

Dependent Variable	Log(Cocaine-Coca Seizures)	Log(Coca Cultivation)	Log(Potential Cocaine Production)	Log(Coca Eradication)
	No. Obs. 360	No. Obs. 60 (cultivation, potential production, eradication)		
Independent Variables	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
Log(Prohibition)			-0.35*** (0.099)	2.66*** (0.95)
Ownership Variable				
Control-of-Corruption Index		0.51*** (0.19)	0.41* (0.22)	-1.62** (0.66)
Location Variables				
Unemployment Rate			0.044** (0.022)	-0.21*** (0.069)
Relative Minimum Wage	0.027*** (0.0071)	0.054*** (0.0099)	0.046*** (0.01)	0.12*** (0.023)
Human Capital Index	1.92*** (0.34)	-1.74*** (0.32)		-7.33*** (1.35)
Openness				-0.034* (0.02)
Internalization Variables				
Economic Freedom	-0.031* (0.017)	-0.015** (0.0071)		-0.044* (0.025)
Demand Proxy				
Log(U.S. Cocaine Price)		0.58*** (0.11)		
Large Producer Proxy				
Big Country	3.88*** (0.24)			

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis.

[a] Summary of results reported excluding interaction effects (i.e. first column of Table 9, Table 10, Table 11, and Table 12)

Table 14 reports interaction-effect estimates from the significant joint hypothesis, obtained from each i^{th} illicit drug supply indicator regression.[39] The interaction variables are used to assess whether prohibition gives *Ownership*, *Location* or *Internalization* advantages to Transnational Criminal Enterprises, while a reduction of on-site production and an increase in transport seizures implies effective U.S. drug prohibition policy.[40]

[39] Null hypothesis: the prohibition and interaction effect are jointly equal to zero. Each regression analysis includes one interaction effect at a time.

[40] *Ownership*, *Location*, or *Internalization* variables result in locational advantages to Transnational Criminal Enterprises if they reduce expected seizures and increase expected on-site production.

Table 14. Summary of interaction effects (estimates reported for significant joint hypothesis of prohibition and interaction effect) [a]

Dependent Variable	Log (Coca Cultivation)[b]	Log (Potential Cocaine Production)[c]	Log (Coca Eradication)[d]
	Coefficient	Coefficient	Coefficient
Log(Prohibition) by Control-of-Corruption Index	-2.28***	-0.75	-2.15*
	(0.73)	(0.74)	(1.25)
Log(Prohibition) by Unemployment Rate	0.048***	0.021	0.06
	(0.017)	(0.021)	(0.047)
Log(Prohibition) by Relative Minimum Wage	0.039***	0.009	0.034
	(0.013)	(0.018)	(0.034)
Log(Prohibition) by Human Capital Index	-1.18***	-0.1	-2.11***
	(0.42)	(0.47)	(0.8)
Log(Prohibition) by Openness		-0.0087	-0.049***
		(0.0082)	(0.017)
Log(Prohibition) by Economic Freedom		-0.0016	-0.14***
		(0.022)	(0.053)

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis.

[a] Summary of results reported for significant joint hypotheses (Ho: prohibition = m^{th} interaction=0) from Table 10, Table 11, and Table 12). Joint hypothesis for the coca seizures estimation are not significant at all standard significance levels (see Table 9). Joint hypothesis for the coca cultivation, potential cocaine production, and coca eradication regressions are significant at the 1% significance level (see Table 10, Table 11, and Table 12).

Results in Table 14 indicate that U.S. drug prohibition policy is more effective at reducing coca cultivation and potential cocaine production in main cocaine-coca producer countries with less corruption and higher human capital. However, the policy's effectiveness is limited by the impact that higher unemployment rates and higher local minimum wages have on on-site illicit drug production. Additionally, greater economic freedom and globalization strengthen the effect of U.S. drug prohibition policy on reducing potential cocaine production. In terms of eradication efforts, the lower the corruption, human capital, economic freedom, and openness the more effective U.S. drug prohibition policy is at increasing on-site eradications. Furthermore, higher unemployment rates and local minimum wages, also make U.S. drug prohibition policy more effective by strengthening on-site eradication efforts.

Unfortunately, U.S. drug prohibition policy can potentially benefit Transnational Criminal Enterprises. Our results indicate that the tougher the U.S. drug prohibition policy is, the larger the effect of unemployment and local minimum wages have on increasing cocaine-coca on-site production. In addition, tougher U.S. drug prohibition policy limits the impact that the control-of-corruption index, human capital, economic freedom, and openness have when dealing with on-site eradications.

Table 15. Impact of prohibition on Latin American countries' GDP growth and political stability [a]

	Real GDP Growth	Political Stability	Real GDP Growth	Political Stability
	System 1		System 2	
Independent Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
Log(Prohibition) – U.S. Interdiction Expenditure	-0.89 (0.89)	-0.27** (0.11)		
Log(Prohibition) – U.S. International Expenditure			-0.27 (0.42)	-0.023 (0.056)
Control-of-Corruption Index	1.08 (0.88)	0.18** (0.091)	1.04 (0.88)	0.15* (0.093)
Unemployment Rate	-0.39*** (0.12)	-0.025** (0.0098)	-0.39*** (0.11)	-0.024** (0.0098)
Relative Minimum Wage	-0.011 (0.027)	-0.017*** (0.0031)	-0.01 (0.028)	-0.017*** (0.0033)
Human Capital Index	0.57 (1.03)	-0.053 (0.13)	0.54 (1.05)	-0.087 (0.14)
Openness	0.032*** (0.0066)	0.0049*** (0.00077)	0.032*** (0.0067)	0.0048*** (0.00081)
Log(Distance)	-0.12 (0.71)	0.49*** (0.073)	-0.1 (0.71)	0.51*** (0.076)
Economic Freedom	-0.075** (0.032)	-0.011*** (0.0035)	-0.073** (0.032)	-0.011*** (0.0035)
Tariff Rate	-0.15* (0.088)	-0.00074 (0.01)	-0.13 (0.087)	0.0095 (0.01)
Internet Access	0.028 (0.026)	0.0072** (0.0032)	0.026 (0.026)	0.007** (0.0032)
Log(U.S. Cocaine Price)	-4.81*** (0.87)	-0.087 (0.1)	-4.7*** (0.86)	-0.066 (0.11)
Big Country	1.44*** (0.44)	-0.73*** (0.059)	1.43*** (0.45)	-0.73*** (0.06)
R-Squared	0.84		0.83	

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis.

[a] System 1 and System 2 indicate the simultaneous regression of real GDP growth and political stability on prohibition, *Ownership*, *Location*, and *Internalization* characteristics. System 1 measures prohibition as U.S interdiction expenditure. System 2 measures prohibition as U.S. international expenditure. Both System 1 and System 2 account for the correlation between real GDP growth and political stability. Results reported lognormal estimates obtained after dropping not statistically significant residuals from the estimation of prohibition. Mean of the unemployment rate, tariff rate, and internet access are included as regressors (estimates not reported).

Table 15 reports the economic and political impact of U.S. drug prohibition policy on real GDP growth and political stability in Latin America.[41] Prohibition spending does not impact Latin American countries' economic growth, but it does create political instability for the region. When prohibition cuts off entrepreneurs from an importance source of income the intuitive belief is that individuals are incentivized to move legal transactions into the shadow economy. Unfortunately, that means they cannot use the legal court and judicial system, and violence is used as a form of

[41] Estimates reported in Table 15 were obtained from simultaneously estimating Real GDP growth and political stability, considering the correlation between the two dependent variables**.**

enforcement. The inability to use the legal court and judicial system means that brides are used as an incentive for cooperation of government officials, and threat of violence is used to induce cooperation, eroding the role of the government as enforcer of law and order (Nadelmann, 1988). In the Americas, most countries have a direct relationship between the cocaine market and violence (United National Office of Drugs and Crime (UNODC), 2008, 2010a). In Colombia, approximately 40 percent of the homicides have resulted from drug production activities (Organization of American States (OAS), 2013b) and in Guatemala, Honduras, El Salvador, and Mexico murder rates are consistently higher in areas related to cocaine drug trafficking (United National Office of Drugs and Crime (UNODC), 2008, 2010b). Unfortunately, successful prohibition policies in one country have been found to increase violence and drug trafficking in other countries (Mejia and Restrepo, 2014).

7.1 Robustness Checks

A sensitivity analysis is provided as support of the superiority of the MLMV and Multiple Imputation analysis as econometric techniques when estimating the impact of U.S. drug prohibition policy on illicit supply indicators, real GDP growth, and political stability in comparison to a complete case analysis. Under the assumption that data is MAR, complete case analysis leads to biased estimators and large standard errors (Newman, 2014). Newman (2014) points that using Maximum Likelihood and Multiple Imputation techniques to deal with missing values when data is MAR, produces unbiased estimators and accurate standard errors.

Table 16 provides the estimation of illicit drug supply indicators, real GDP growth, and political stability using complete cased analysis. As shown in Table 16, the standard errors of the parameters estimators are larger than those produced by the MLMV and Multiple Imputation.[42] The MLMV and Multiple Imputation analysis produce more efficient estimators when data is MAR. In addition, the imputed data sets, in the Multiple Imputation analysis, showed the mean and standard deviation for the variables with missing observations to be approximately the same as their mean and standard deviation in the original data set.[43]

[42] As presented in Table 9 through Table 15

[43] Tables can be provided upon request. These tables were omitted for brevity.

Table 16. Estimation using complete case analysis

	Log(Seizures)	Log(Coca Cultivation)	Log(Potential Cocaine Production)	Log(Coca Eradication)
		Coeff.	Coeff.	Coeff.
Residual	---	---	---	-1.61 (1.11)
Log(Prohibition) – U.S. Interdiction Expenditure	1.3* (0.68)	---	---	---
Log(Prohibition) - U.S. International Expenditure	---	-0.11 (0.14)	-0.23** (0.11)	2.23** (1.05)
Control-of-Corruption Index	-0.24 (0.27)	0.55*** (0.21)	0.48** (0.19)	-1.5** (0.62)
Unemployment Rate	-0.019 (0.054)	-0.006 (0.021)	0.034 (0.03)	-0.17** (0.084)
Relative Minimum Wage	0.025*** (0.0082)	0.052*** (0.011)	0.042*** (0.011)	0.13*** (0.025)
Human Capital Index	1.92*** (0.37)	-1.7*** (0.37)	0.24 (0.32)	-6.56*** (1.45)
Openness	-0.0034 (0.0034)	-0.0049 (0.0052)	-0.0029 (0.0056)	-0.025 (0.022)
Economic Freedom	-0.025 (0.02)	-0.015* (0.0078)	-0.016* (0.0095)	-0.044* (0.025)
Tariff Rate	0.017 (0.061)	---	---	---
Internet Access	-0.0035 (0.013)	---	---	---
Log(U.S. Cocaine Price)	-0.0088 (0.46)	0.58*** (0.12)	0.14 (0.15)	-0.13 (0.38)
Big Country	4.001*** (0.25)	---	---	---
Observations	268	50	50	50

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively. Robust standard errors in parenthesis.

Table 16. Estimation using complete case analysis (continued)

	Real GDP Growth	Political Stability	Real GDP Growth	Political Stability
	System 1		System 2	
Independent Variable	**Coeff.**	**Coeff.**	**Coeff.**	**Coeff.**
Log(Prohibition) – U.S. Interdiction Expenditure	0.12	-0.44***	---	---
	(1.26)	(0.14)		
Log(Prohibition) – U.S. International Expenditure	---	---	0.37	-0.034
			(0.62)	(0.073)
Control-of-Corruption Index	1.01	0.24**	0.93	0.18*
	(0.95)	(0.1)	(0.93)	(0.11)
Unemployment Rate	-0.36**	-0.02*	-0.36**	-0.02*
	(0.16)	(0.012)	(0.16)	(0.012)
Relative Minimum Wage	-0.0082	-0.016***	-0.011	-0.017***
	(0.03)	(0.0033)	(0.031)	(0.0038)
Human Capital Index	-0.33	-0.009	-0.43	-0.06
	(1.07)	(0.14)	(1.1)	(0.15)
Openness	0.04***	0.0042***	0.04***	0.004***
	(0.007)	(0.00076)	(0.0071)	(0.00082)
Log(Distance)	0.28	0.46***	0.34	0.5***
	(0.84)	(0.078)	(0.84)	(0.083)
Economic Freedom	-0.07*	-0.012***	-0.07*	-0.0098***
	(0.036)	(0.0035)	(0.036)	(0.0036)
Tariff Rate	-0.13	-0.0045	-0.11	0.01
	(0.1)	(0.01)	(0.099)	(0.0099)
Internet Access	0.031	0.0081**	0.034	0.0067*
	(0.032)	(0.0039)	(0.032)	(0.0039)
Log(U.S. Cocaine Price)	-4.71***	-0.094	-4.86***	-0.047
	(1.02)	(0.12)	(1.0001)	(0.12)
Big Country	1.72***	-0.74***	1.73***	-0.73***
	(0.48)	(0.063)	(0.49)	(0.065)
No. Obs.	252		252	

***, **, * indicates significant effects at the 1%, 5%, and 10% significance level, respectively.
Robust standard errors in parenthesis

8. Conclusions

U.S. drug prohibition policy in the Americas is examined in conjunction with the factors driving Transnational Criminal Enterprises locational decisions in the cocaine-coca market using *Dunning's Eclectic Paradigm* for international business. Drug prohibition programs yield ambiguous results for both local governments and Transnational Criminal Enterprises. Understanding the site/situational specific characteristics can lead to more efficient prohibition programs by successfully limiting cocaine supply as well as restricting profitable business opportunities for Transnational Criminal Enterprises.

Our results indicate that tougher U.S. drug prohibition policy significantly decreases cocaine-coca at the source by decreasing potential cocaine production and increasing coca eradication. However, successful on-site efforts to decrease cocaine-coca supply can also be hindered by tougher U.S. drug prohibition policy. Tougher U.S. drug prohibition policy generates advantages for Transnational Criminal Enterprises, by amplifying the impact of the *Location* variables (unemployment and local wages) on cocaine-coca production increases. More aggressive U.S. drug prohibition policy also generates advantages to Transnational Criminal Enterprises by limiting the impact of *Ownership* (control-of-corruption index) and *Internalization* (economic freedom) variables at increasing eradication efforts.

Successful drug prohibition policies must be also designed in conjunction with the *Ownership, Location* and *Internalization* variables, and be directed towards outcomes that prove to be disadvantageous to Transnational Criminal Enterprises. Specifically, our results indicate that it is disadvantageous for Transnational Criminal Enterprises when local unemployment rate decreases, human capital increases, and there is greater economic freedom as these *Location* and *Internalization* variables reduce cocaine-coca production. Furthermore, drug prohibition policies should go in hand with policies aimed at demand reduction, thus lowering U.S. retail price of cocaine and reducing coca cultivation.

Since unlimited prohibition spending does not exist, the model's results signal a site-specific approach to prohibition policy. For example, U.S. drug prohibition policy should focus on reducing cocaine-coca on-site production while at the same time allocating resources designed to disincentivize farmers' participation in illicit economies. Our results indicate that developing rural farming communities through reducing unemployment and improving economic freedom, is expected to reduce cocaine-coca production on-site. Greater economic freedom results from improving the formalization of land and greater business, labor, and monetary freedom. In addition, U.S. drug prohibition policy should be combined with risk minimization policies for farmers. Stability and access to market resources are important determinants of the farmer's decision to participate in an illicit economy (Felbab-Brown, 2014). As evidenced by the success of Thailand in 2012, a well-managed and well-funded comprehensive rural development program accompanied with the generation of employment opportunities reduced poppy cultivation (Felbab-Brown, 2014).

U.S. drug prohibition policy is also shown to have negative externalities, by increasing the political instability for Latin America. The benefit to consumer countries through the diminished accessibility of the illicit drugs is derived from the transfer of prohibition costs to producer and

transit countries (Collins, 2014). The negative impact that U.S. drug prohibition policy has had on the political stability for Latin America, means alternative approaches need to be considered.

One potential approach would be to legalize cocaine while designing programs that deal with drug consumption strictly from the consumer perspective. These programs need to provide information on all the effects of drug use. Niskanen (1992) indicates that consumption reduction is possible under legalization by making information of the effects of drug use broadly available. Niskanen (1992) reported that beginning in 1885 cocaine was sold in a variety of products. In 1906, the Pure Food and Drug Act began requiring the identification of specific drugs on the label of patent medicines. This approach successfully decreased the use of cocaine before its use was prohibited (Niskanen, 1992). Another alternative approach to prohibition policy would be to treat drug use as a public-health problem, instead of focusing on enforcement. During the Nixon Administration, the only time in the U.S. history of its war on drugs, most of the funding for drug policy went towards treatment, rather than law enforcement. The program quickly reverted funding back to prohibition before any significant results were uncovered (WGBH Educational Foundation, 2014). Niskanen (1992) points out that the Netherlands provides drug users with treatment and counseling, and users are not prosecuted for possession of small amounts of illicit drugs, while criminal prosecution is directed to major suppliers. The results of this program have been smaller usage rates of illicit drugs among teenagers compared to the U.S. and lower violent crime rates. Despite discussing the likely effects of cocaine legalization from indirect inference, Niskanen (1992) concludes that illicit drug legalization will significantly reduce the price and increase demand. There is no one-size-fits-all approach that policy makers can use that always results in reducing cocaine supply. U.S. drug prohibition policy becomes a balancing act between *Ownership, Location* and *Internalization* variables, eradication efforts, and pursuing programs that reduce either current or potential cocaine production.

9. References

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