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Finding Answers in Gaps:
The Relationship between Drugs and Mexico's
Economy



Submitted to
Professor William Lincoln

By
Mariela Centeno

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Abstract

This paper sets out to understand the economic conditions that paved the way for the evolution and resilience of a powerful and resilient drug economy in Mexico. To do this, I examine the relationship between a proxy for drug movement from Mexico and large economic variables in the country. I use a dataset that incorporates the drug seizures from 1997 to 2022 to understand whether privatization and the resulting rising economic inequalities in Mexico paved the way for a growing drug economy. This paper builds on current literature regarding drug market estimates and drug economy interactions. Using an OLS regression model on drug seizure panel data and Mexican economic variables, the results reveal a significant relationship between economic variables and the expansion of drug seizures. In the end, this paper provides a wide-scale economic analysis of the underlying conditions behind the resilience of the drug economy in Mexico. In turn, it supplies important implications for policy makers and drug control administrations.

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1. Introduction

The North American drug market is a robust market, providing billions of dollars worth of liquidity to their respective countries every year. As such, in the last decade, studies exploring the estimation of drug market movement and complexities have emerged (Atkinson). In particular, smaller scale intra-industry or municipal studies have been conducted to understand how drugs interact with local economies in Mexico. In this paper, I will focus on larger economic variables and how they interact with Mexico's drug market. It is important to note that the Mexican drug market does not only refer to drug production, but also transportation, repackaging, and drug alterations. In the end, the paper finds that there is a significant relationship between wealth inequalities and the rapidly-changing drug economy in Mexico.

To understand and provide context to the growing complexity of the drug economy in Mexico and the underlying conditions that paved the way for its growth, this paper will begin by outlining the evolution of drug cartels in relation to the widening wealth gap in Mexico. Then, I will highlight current literature present on drug movement estimation through government sponsored reports. I will also explain the current literature on the growing complexity of drug operations and drug-funded towns in Mexico through empirical and ethnographic studies.

To understand the relationship between drug movement and the macroeconomic variables in Mexico, I use filtered drug seizures in the United States as a proxy of drug imports from Mexico to understand the relationship between drug movement and macroeconomic variables in Mexico. In the end, the results present a confirmation of the relationship between wealth inequality in Mexico and its corresponding resilient drug economy.

2. History

2.1 Historical Context - Mexico's Economic Policies and the Rise of Drug Trafficking

Since the 1980s, the development and fortification of the drug economy in Mexico has heavily interacted with economic policies and government failures. While cartels intricately organized their business, the Mexican government was attempting to recover from its major debt crisis. Refinancing in Mexico became a series of industry privatization and a large shift to the exportation of goods. These changes in the economy lead to an increase in poverty and stratification between the rich and the poor (Rodriguez). Hence, this refinancing and the growth of the illicit drug business occurred concurrently, indicating that there is an important relationship between Mexico's increased poverty and drug economy. To understand this, I will evaluate macroeconomic variables in Mexico and the shift in drug prices and volume over time.

The major economic crises in late 20th Century Mexico occurred at the same time that the drug trade began to expand. While cartels were building their operations and narco trafficking actors were beginning to create connections, the Mexican economy was experiencing political restructuring. After the Mexican debt crisis of 1982, Mexican politicians began advocating for privatization to curb a further deficit crisis. During the period between 1983 and 1988, Mexico began to divest from public enterprises. The divestment programs ultimately negatively impacted the Mexican production economy over the course of the 19780s, as small businesses and the subsidies that kept them afloat were shut down. For example, the operations of manufacturers outside of the oil sector were reduced by 31.5%. Additionally, the privatization process worsened income distribution as the proceeds of divestment were used to stabilize the economy and the smaller public firms involved were sold to major conglomerates (Rodriguez).

While the proceeds from the 1980s privatization propped up the Mexican balance sheet, the refinancing process carved a pathway to embed inequalities throughout the newly privatized economic system. By the 1990s, the Mexican government had a net income of 11.3 billion dollars from sales to private businesses. In total, it sold 8 commercial banks and Telmex, generating enough revenue to create surpluses for multiple years. Nonetheless, the sales of public companies were not a sustainable form of income for the government, leading to another debt crisis in 1994. While economic restructuring was occurring in Mexico, widening the gap between the upper and lower class, cartels were beginning to create a more intricate organization with resources and connections.

The infighting and control of cartels in 21st century Mexico represent the conjunction between two historical events within the country: the rise of neoliberalism and corruption. The illegal drug sector in 1970s Mexico was marked with innovation and relative diplomatic relationships between different cartels within the country. The fortification of cartels in the 1970s created a relative sense of peace between the newly formed drug trafficking organizations. However, in the 1980s, the Mexican sinaloa cartel lost its centralized control, leaving space open for new actors. Its collapse left space open for new motivated individuals to form new cartels and relationships. The relationships they sought were intersectoral, ranging from business owners to politicians. The entropy from this decade made cartels infiltrate and influence various powerful spaces.

2.2 Historical Context - Mexico's Complicated Web of Drug Exports

Cartels do not only have a strong hold over the domestic economy in Mexico, their grasp is international. There are two major areas outside of the domestic sale of illegal drugs that cartels hold power over. (1) In the last ten years, Mexican drug cartels began expanding their

operations and bases to other countries in Latin America. (2) Geographically, Mexico holds the key for most illicit drug imports into the United States which is the major consumer of Latin American drugs (Soloveichik). The drug trafficking web in the Americas is tangled and intricate. Like many other markets and sectors, drug trafficking expansion has undergone a series of transformations through globalization. Mexico's influence on drug imports into the United States is not one dimensional, making it difficult to pinpoint drug market estimates.

The rise of Mexican drug trafficking began in the 1970s with the production of marijuana in Guadalajara. In the 1980s, marijuana exports boomed, which gave way to the growth and reinforcement of major drug cartels in Mexico. At the same time, Mexico was cultivating and exporting an increasing amount of Opium, which is the precursor of heroin. Soon after Mexico's marijuana boom, Mexican cartels began transporting cocaine from Columbia into the United States, opening a window for the Latin American drug corridor (Fuentes).

With an increased global production and legalization, marijuana revenues began to decline for Mexican cartels in the 2010s. To adapt to the changing drug market, cartels began changing their business model to incorporate synthetic drugs. In 2014, Fentanyl demand began to increase and, as a result, Mexico began to increase its production of the drug. Fentanyl is a synthetic opioid that requires very little input production costs but is 50 to 100 times more potent than morphine. Because the drug is so cheap, demand for heroin has begun to decrease, reducing revenues for heroin farmers. Nonetheless, fentanyl and the rise of synthetic opioids have brought about a new dynamic between drug producers and the global drug market (De Haro Lopez).

Because fentanyl production requires a cheap set of input materials, more independent groups are able to produce synthetic opioids. The means of production are simpler than other drugs that have been widely produced in Mexico. For example, to produce marijuana, cartels

needed acres of land, water, and farmers. But, to produce synthetic opioids, producers simply need cheap precursor chemicals and simple materials. This increasingly decentralized drug economy has made it even more difficult to understand the specific origin of drug production. On the producer's end, these drugs are a favorable good to produce because they provide a large profit. In Mexico, the average licit salary is \$23USD but fentanyl cooks make around \$100USD daily (The Economist).

As the century progresses, the synthetic opioid market is becoming more popular and more complex. In 2021, synthetic drug seizures in the U.S. exceeded those of marijuana and heroin for the first time. Additionally, China declared to the U.S. to prohibit fentanyl production in May 2019, creating another drug pathway from China to Mexico for the eventual importation of drugs into the United States. In sum, the increased potency of the drug, the increased profits for producers, and China's relation to the drug are all topics contributing to the growth and complexity of the synthetic drug market. As seen in Table 1, synthetic drugs continue to be produced on an almost annual basis (DEA).

Table 1: The Evolution of Synthetic Opioid Production

New Synthetic Opioid	Subcategories	Year Introduced
CYCLOHEXYLPHENOLS	O-desmethyltramadol	2009
PHENYLPIPERIDINES	desmethylprodine	2011
CYCLOHEXYLBENZAMIDES	U-47700 AH-7921	2012
PHENETHYLPIPERIDINES	isobutyrfentanyl	2012
DIPHENETHYLPIPERZINES	MT-45	2013
NITROBENZIMIDAZOLES	isotonitazene	2019
THIAMBUTENES	piperidylthiambutene	2019
CINNAMYLPIPERAZINES	2-methyl AP-237 para-AP-237	2019

Given the complicated nature of Mexico’s drug exportation and importation, restricting data analysis to drug production within the Mexican state would not consider how China and the Latin American drug corridor contributes to Mexico’s drug economy. Therefore, the data assessed as a proxy for Mexico’s drug exports will pertain to the United States drug seizure reports. This is because the US is the largest importer of Mexican drugs and 82% of the wholesale value of drugs in the US comes from imports (Atkinson).

4. Current Literature

To understand the increasingly complicated evolution of drug trafficking organizations, Itzel De Haro Lopez’s paper “Avocados: Mexico’s Green Gold: The U.S. Opioid Crisis and its Impact on Mexico’s Drug Cartel,” uses the introduction of fentanyl as a proxy for the price decrease in heroin in Mexico. Then, the study addresses the relationship between the price drop

in heroin and an increase in homicides and cartel presence in avocado-cultivating municipalities (De Haro Lopez). The paper ultimately finds that a fall in demand for heroin in the United States does lead to a decrease in cartel presence in poppy-growing municipalities. Using municipal data, the paper finds that a decrease in price in heroin does lead to an increase in homicides in avocado-growing areas.

Over the last decade, efforts to estimate the illegal drug market have increased because of the large presence of the illicit drug market in the US economy. In 2017, Solocheivik published "Including Illegal Activity in the U.S. National Economic Accounts" for the US Bureau of Economic Analysis, which explores how tracking illegal drug imports in the United States might affect its GDP. Solocheivik used a media-based approach to create demand-side estimates of illegal drugs. In the end, the study found that GDP rises by over 1% when illegal drug tracking is considered and that drugs make up the largest share of illegal import activity in the United States, adding \$111 billion to US GDP in 2017. Overall, through the relationship between drug imports and US GDP, this study demonstrates that there is a clear and large interaction between US drug imports and macroeconomic variables (Solocheivik).

Two common approaches for estimating illegal drug imports have been employed in the past: the demand-side approach and the supply-side approach. The demand-side approach, also known as the bottom-up approach, reveals domestic drug expenditures by using the quantities consumed by drug users and the retail prices of the drugs. This demand-side drug estimation approach was originally created by Soloveichik in 2019. To build on Soloveichik's, original drug estimation analysis, Atkinson created a supply-side approach to illegal drug estimates in "Toward developing estimates of U.S. imports of illegal drugs." The supply-side approach, also

known as the top-down approach, estimates the supply of drugs in a country by considering drug seizure totals (Atkinson).

The use of media reports helped Solocheivik create assumptions to inform the data and origins of imports for specific drug groups within the timeframe of the analysis. In other words, the media reports are used to help predict whether or not the drug was imported into the US. For example, Solocheicik assumed that the imported share of methamphetamines increased after 2010 when the sale of some key precursor chemicals used to produce it were banned in the US. On the other hand, Atkinson used border seizure data to inform their supply-side analysis of illegal drug imports.

In this study, I will be using a hybrid of Soloveichik's and Atkinson's import estimation approach: Media-based supply-side approach using drug seizures in the U.S. and a categorization of Mexican drug exports. Then, using De Haro Lopez's analysis technique, I will use the supply side proxy to understand the relationship between Mexican drug imports in the U.S. and economic variables in Mexico.

In the end, the reasoning behind this study lies in the gaps created by failed economic policy: Gaps in wealth, gaps in reported income, and the gap in understanding the rationale behind a resilient illicit market in an economically stratified country. In "The Narcoeconomy and Small Town, Rural Mexico," McDonald uses ethnographies to depict the economic asymmetry in a rural town with a failing dairy economy and \$300,000 USD houses. Buenavista is a small rural town with a booming Narcoeconomy. McDonald explains the reality that small rural towns had to face after the implementation of NAFTA and how some have turned to a Narcoeconomy for an "exit option." The study describes Buenavista as a "Narcoeconomy" because the term refers to an economy that relies upon the revenues created from drug production and trafficking. As

McDonald observed in Buenavista, the drug economy “has a huge multiplier effect in the vast array of other jobs it generates both directly and indirectly” in a small town.

The empirical analysis of this study attempts to understand how and to what extent economic variables push some towns and individuals into this “exit option” on a larger aggregate level. As implied by McDonald, in Buenavista, the reality of the failing rural economy led towards the execution of a Narcoeconomy after the implementation of NAFTA. Because of the U.S.’s agricultural comparative advantage, NAFTA has strongly negatively affected the amount of agricultural jobs in Mexico. The implementation of NAFTA ripped away the protection of tariffs and production subsidies that the Mexican government used to provide them. After NAFTA, millions of rural jobs were eradicated, displacing Mexican farmers, leading them to the drug market. Farmers are only some of the individuals that have been displaced by Mexican policies that have led to increased economic policies. Therefore, this study strives to assess, on a large scale, how Mexican economic conditions relate and give way to a growth in the drug supply of Mexico’s largest drug importer, the United States.

3. Data

To understand the interaction of the drug market and the Mexican economy, I used a database containing drug seizure information in the United States and a variety of variables related to Mexico’s economy. As shown in Table 2 below, the annual rate of change for each variable was examined.

Table 2: Variables Explanation

Variable	Explanation
Total Drug Seizures	Natural log of the change in drug seizures
Monetary Base	Annual growth in the monetary base
Public Expenditures	Annual growth in public expenditures
Net Flow of International Currency	Growth in the flow of international money
DEA Budget	Annual growth in the DEA's budget
PEMEX Subsidies	Natural log of PEMEX subsidies
GDP	Annual growth of GDP
Unemployment	Annual change in rate of unemployment

3.1 Drug Supply Proxy: Drug Seizures in the United States

The drug seizure data set used was retrieved from the NFLIS, which is the data repository for DEA drug seizures under the Diversion Control Division. The division collects drug seizure data systematically at the federal, state, and local level through chemical forensic labs. In total, the data set included over 10,000 rows of data, distinguished by the amount of times the drug was confiscated in a year. To pinpoint the specific drugs most exported from Mexico into the US, a media-based analysis informed the data filtering process.

The dataset originally contained a set of broad drug categories and their corresponding drugs. The drug categories included Analgesics, Antidepressants, Benzodiazepines, Fentanyl, Hallucinogens, Narcotics, Phenethylamines, Psychedelics, Steroids, Stimulants, Synthetic Cannabinoids, Synthetic Cathinones, and Tryptamines. As seen in Table 3 below, some of the broader categories were completely filtered out based on media reports. If they were not completely filtered out, either the entire category remained in the dataset or some of the drugs

were granularly filtered out. In appendix A, a table with specific details on the drugs-specific filter is presented.

Table 3: Mexican Drug Export Analysis

Drug Category	Relationship to Mexican Imports
Narcotic Analgesics	Strong relationship
Antidepressants	No Relationship
Benzodiazepines	No Relationship
Fentanyl	Strong relationship.
Hallucinogens	Strong relationship
Narcotics	Relationship
Phenethylamines	Relationship
Psychedelics	Strong relationship
Stimulants	Strong relationship
Synthetic Cannabinoids	Uncertain
Synthetic Cathinones	Weak relationship
Tryptamines	Strong relationship

The more specific drug analysis involved a word analysis that considered the components of the drug name. For example, any observations in the data with Lysergic Acid in the name was not a viable drug for the analysis because LSD is widely produced in California labs, not Mexico. Drug categories such as Narcotics, Phenethylamines, Analgesics, and Psychedelics required a deeper drug analysis because of the varied drug types within the category.

The analysis was performed on any drugs with major connections to Mexico, not only drugs that were produced in Mexico. As mentioned earlier in the study, Mexico serves as a gate for one of the largest illegal drug consumers in the world, the United States. At this point, Mexico plays a major role in the Latin American drug corridor and it supports Chinese synthetic

drug production. If they are not already produced in Mexico, drugs from major producers in the world are delivered to Mexico, then imported into the United States. While they are in Mexico, they are adjusted, repackaged, or enhanced by cartels. Most importantly, through whatever service Mexican cartels provide for other drug producing countries, Mexican cartels are creating revenue and profit. Therefore, the analysis had to include a wider scope of drugs that incorporated the drugs produced in Mexico *and* the drugs transported through Mexico.

To create a more accurate list of drugs imported into the US from Mexico, a categorical filter was applied to the location of the drug seizures. Any drug that was confiscated in a major Mexican cartel exportation state was left in the dataset, but those that were not were filtered out of the dataset. The major Mexican drug exportation states were determined through specific cartel's connection with states in the US. Table 4 below demonstrates the major cities that Mexican cartels export their products to.

Table 4: Mexican Drug Export Location

Cartel	Exportation City
Sinaloa Cartel	California, Arizona, New Mexico, Texas
Jalisco Nueva Generación Cartel	Los Angeles, New York, Chicago, Atlanta
Juarez Cartel	El Paso, Denver, Chicago, Oklahoma City
Gulf Cartel	Texas, Atlanta, Houston, Detroit
Los Zetas Cartel	Laredo, Dallas, New Orleans, Atlanta
Beltran-Leyva Organización	Phoenix, Los Angeles, Chicago, Atlanta

The information on Table 4 assisted in the process of creating a location-specific filter on drug seizure observations. The remaining observations in the dataset after the filter were those with drug seizures from specific states: California, Arizona, New Mexico, Texas, Los Angeles,

New York, Illinois, Georgia, Colorado, Oklahoma, Michigan, and Louisiana (Knierim).

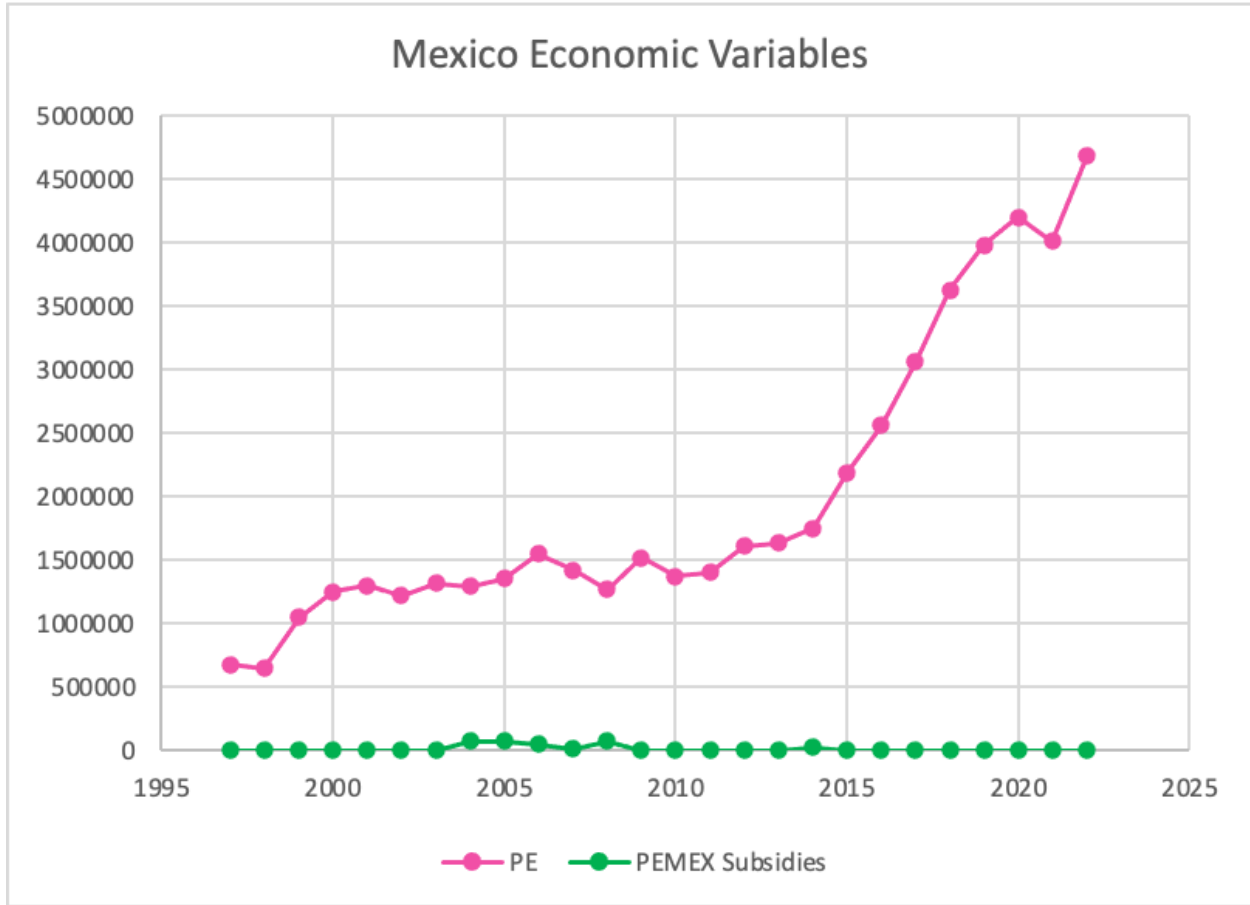
Nonetheless, some limitations regarding the incongruence between seizure data and importation data made the location filter less reliable than a broader drug category filter.

3.2 Macroeconomic Variables

The macroeconomic variables chosen for the analysis were Mexico's monetary base, public expenditures, net flow of international currency, PEMEX subsidies, GDP, and unemployment. The Net flow of international currency was introduced to try to understand how globalization and the rapid movement of business can contribute towards the growth of a drug economy. The monetary base growth and GDP were both included to highlight two distinct components of wealth in the country. The monetary base only explains the amount of money in circulation and the amount of reserves in an economy. While GDP points to the topic of production and income. The difference between these two variables could be explained by a difference in wealth: there are some that generationally have more wealth, while others earn income through contributing to the production of the economy.

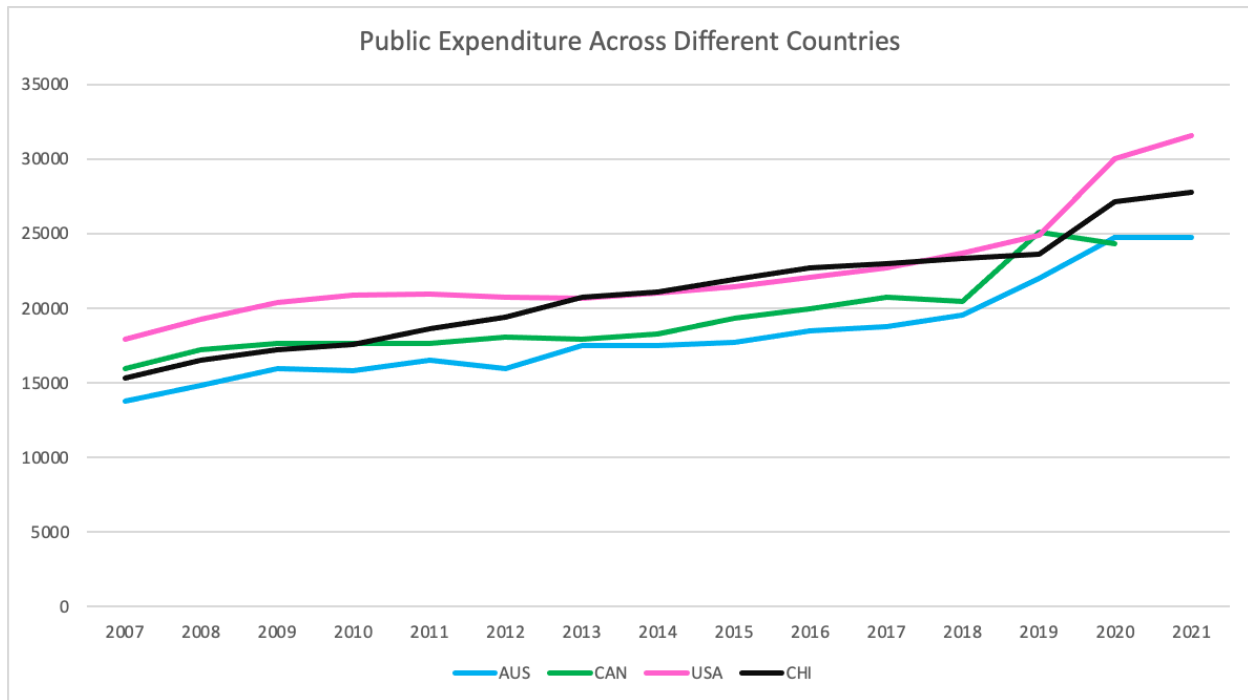
Both annual pemex subsidies and government public expenditures were used as a proxy to understand how public government spending interacts with the growth of the illegal drug market. Pemex subsidies were included along with public spending because, as seen on Graph 1, they provide a more nuanced analysis of the specific nature of Mexico's recent fiscal policies.

Graph 1: The Evolution of Mexican Public Expenditures and Pemex Subsidies



Public expenditures could not be relied upon individually to understand the relationship because the growth rate in government spending has been increasing across a lot of different types of countries. This increase in government spending can be seen in Graph 2 below. Additionally, too many exogenous shocks are incorporated within a government spending variable. For example, as it can also be seen in table x, 2020 marked a period of a rapid increase in government spending because of the COVID-19 pandemic.

Graph 2: Public Expenditures Across Different Countries



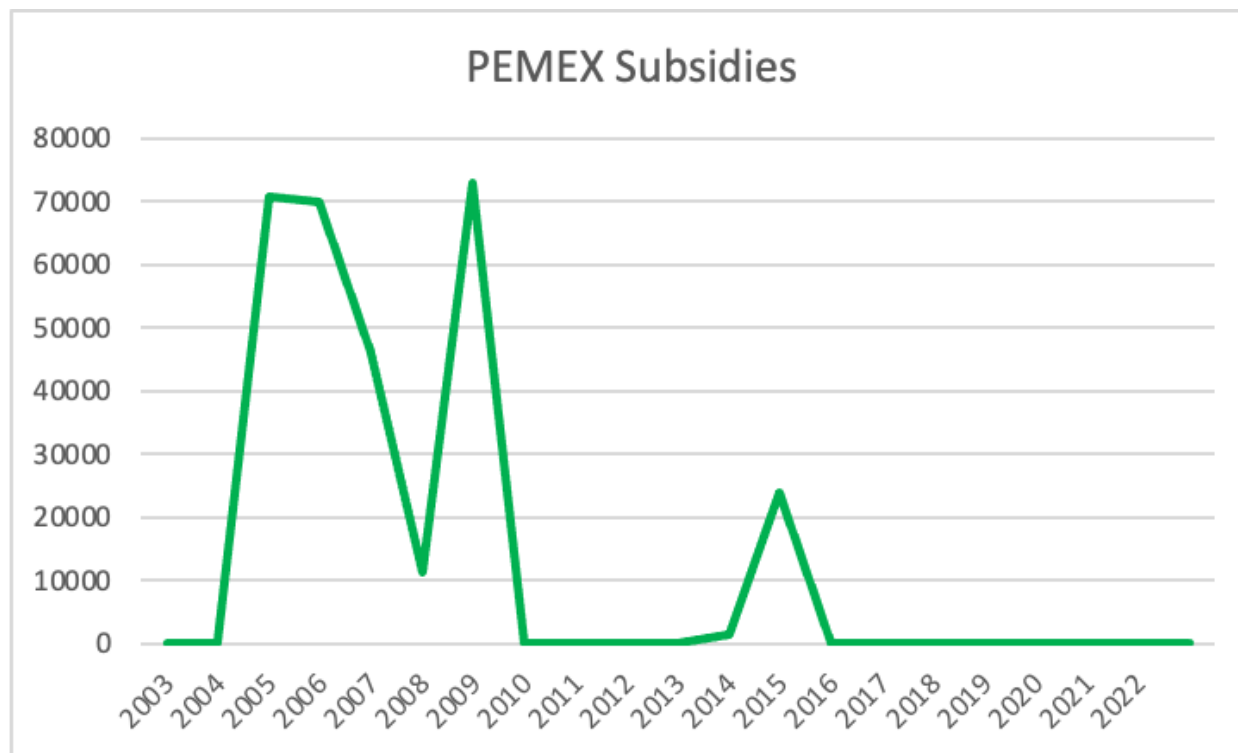
On the other hand, the change in PEMEX subsidies is specifically related to the topic of privatization and the issue of increased wealth inequalities in Mexico. Pemex subsidies vs public expenditures - pemex subsidies created more nuance in the regression... raw public expenditure has been growing for a lot of countries (especially after 2020) but pemex subsidies create a different story behind the occurrences.

PEMEX, also known as Petróleos Mexicanos, is Mexico's nationalized oil company. Mexico is one of the largest oil producers in the world; therefore, the Mexican government's balance sheet heavily relies on its revenues. In the early 2000s, the reality behind the management of the company began surfacing. The gaps in its profit strategy resulted in major economic inefficiencies for the company, which began affecting government revenues in the 2010s. As mentioned before, a major movement towards privatization in Mexico occurred in the 1980s and 1990s but the oil industry remained nationalized. In the 1990s, this resulted in a

positive effect for the government revenues as it sold major shares of sectors to private companies. This resulted in a robust balance sheet in the 90s and the semblance of strong economic mobility for the Mexican state. Nonetheless, the billions of dollars in payments generated from privatization were not recurring or sustainable. In the early 2000s, this reality began affecting the government deficit because of the lessened revenue streams. To fill this gap, the government began relying on quick income maximization from PEMEX, eradicating the Pemex management team's ability to shift its revenue strategy. Instead of reinvesting its profits, Pemex was forced to give those profits to the government. During this time, Pemex began losing billions of dollars while it began experiencing a decline in oil production. The lack of reinvestment in new oil rigging locations and the heavy expropriation of its resources led to annual recurring losses for Pemex in the early 2000s (Victor).

The strain that the Mexican government was placing on Pemex's revenues led to calls for privatization and changes within the Pemex revenue model. As such, in 2013, a reform to open the oil industry to private competitors was proposed by the senate and passed. The reform intended to maintain Pemex as a public company with private investors. Nonetheless, the effects of the reform were gradually seen in oil prices. Before the reform, the Mexican government had subsidized "end-user" prices of gas. But, after 2013, the tranches of subsidies that were given to consumers gradually began to decline (G20). Banco de Mexico reports these subsidies annually in large portions instead of individual levels. Graph 3 demonstrates the oscillating nature of these subsidies until after 2013, when the subsidies begin to diminish.

Graph 3: Annual Count of Pemex Subsidies



Therefore, since 1938, Pemex has been a state-owned oil company; meaning that the government has controlled the means of oil production and provided subsidies for the retail consumer of gas. Nonetheless, after the reform in 2013, Pemex began signing profit-sharing and production-sharing contracts with international private companies. Through these contracts, private companies pay royalties to Mexico’s central bank for full control of their allocated portion of the oil at the wellhead. In 2016, Exxonmobil and Chevron made an unprecedented bid to own rights on Mexican gas exploration. In 2017, the government executed a reform that decreased subsidies for Mexican retail gas consumers, increasing the price of gas by 14% to 20% all over the country. This led to the outrage and protests known as the “Gasolinazo.” The reason behind the outrage further informs the analysis of this study. Not only would this affect the disposable income of working class families, it would also affect the income of many major

service employees in Mexico, such as Taxi and Uber drivers (Evergreen). In a country with a low regulated minimum wage, price increases in public transportation and gasoline have a negative impact on an individual's ability to survive. A necessity good such as gas has a big impact on labor markets and standards of living. Therefore, to understand a problem as intricate and complex as wealth inequality, a more granular analysis with a specific variable, such as oil prices, provides clarity on the dynamics within the country.

3.4 Control variable - DEA Budget Growth

Because the drug seizures were executed and reported by the DEA, a growth in the amount of employees or budget within the administration could have had a relationship with an increase in the total amount of annual drug seizures. Therefore, to ensure that the DEA budget growth did not affect the results of the study, the growth rate of the DEA's budget was implemented as a control variable. As seen in Appendix B, the changes in the DEA budget had no relationship with the annual amount of drug seizures in the United states.

4. Methodology

Two different estimation models were constructed to demonstrate a relationship between the growth in the drug supply and Mexican economic variables. Within the two models, Ordinary Least Squares (OLS) is run across panel data containing annual information on different categories of drugs. The first panel regression detailed the effects of drug seizures based on a categorization of drug types only:

(1)

$$TDS_{it} = \beta_0 + \beta_1 MB_{it} + \beta_2 PE_{it} + \beta_3 IC_{it} + \beta_4 DB_{it} + \beta_5 PS_{it} + \beta_6 GDP_{it} + \beta_7 UNP_{it} + \varepsilon_{it}.$$

CDS_{it} (which stands for Categorized Drug Seizures) is the outcome variable for drug movement growth and is denoted with subscripts i for drug type and t for year. MB_{it} (Monetary Base), PE_{it} (public government expenditures), GDP_{it} , and UNP_{it} (unemployment) represent larger scale macroeconomic variables in Mexico. PS_{it} addresses the change in consumer petroleum gas subsidies. The variable, IC_{it} , demonstrates the flow of international currency in Mexico. This variable was used to account for international currency inflow from drug markets. Finally, DB_{it} , the control variable corresponding to the DEA budget growth over time. This variable was included to ensure that a growth in DEA budget and employees would not affect the regression's results.

The second regression model contains the same variables with a different categorization:

(2)

$$CDS_{it} = \beta_0 + \beta_1 MB_{it} + \beta_2 PE_{it} + \beta_3 IC_{it} + \beta_4 DB_{it} + \beta_5 PS_{it} + \beta_6 GDP_{it} + \beta_7 UNP_{it} + \varepsilon_{it}$$

The outcome variable in regression 2 also still represents drug movement growth. Nonetheless, the panel data was further sorted to include information on drug seizure location to further inform the Mexican import proxy for the supply-side analysis.

5. Results

Table 5 highlights the results from two of the major polynomial regressions of the analysis. The first regression represents a filtered analysis of the drug types that circulate through Mexico. The second regression represents the drug filtered data along with a seizure location analysis. The first regression captures the relationship between Mexico and US drug seizures more appropriately because it contains a broader categorization. While the location-specific variables are important, it is important to note that the location data reported by the NFLIS captures the location of where the drug was seized, not where it was imported. Additionally, the location selections that informed the filter were based on the major Mexican exportation cities of cartels only in 2022. The location selection cannot take into consideration how Mexican drug exportation hubs have changed from 1997 through 2022. Therefore, the location-specific regression has more limitations than the broader Drug Category regression. In this analysis, the Location Regression is used as a more granular confirmation of the existing relationship between drug seizures and Mexican economic variables. Because drug imports are transported domestically throughout the entire US, the Drug Category regression will be the focus of this analysis.

Table 5: Drug Supply and Economic Variables regression 1997-2022

Total Drug Seizures Growth Rate	Drug Category	Location Drug Category
Monetary Base Growth	0.287**	0.815*
Public Expenditures Growth	0.320	0.661**
International Currency Growth	- 0.004	- 0.057***
DEA Budget Growth	1.962	- 1.300
PEMEX Subsidies	- 0.00004**	- 0.00002**
GDP Growth	- 0.049**	0.014
Unemployment Growth	- 2.327*	- 1.726*

* implies significance at the 1% level, **implies significance at the 5% level, ***implied significance at the 10% level

As displayed above in Table 5, four of the Mexican macroeconomic variables had a relationship with drug seizures in the United States. Mexico’s monetary base, PEMEX subsidies, GDP, and unemployment have a relationship with drug seizure amounts in the United States. Mexico’s monetary base and public expenditures have a positive relationship with the annual drug seizures in the United States. On the other hand, Pemex subsidies, GDP, and unemployment have a negative relationship with drug seizures in the US.

5.1 Discussion

The difference between the results regarding monetary base and GDP highlights an important aspect of wealth inequality present in Mexico. The monetary base pertains to the total money in circulation and reserves present in banks. Whereas, GDP refers to the total amount of production in a country. In a way, GDP is more representative of the amount of income from work, while the monetary base is representative of the amount of money held in the economy. As seen in the figure above, GDP has an inverse relationship with the drug supply proxy, while the monetary base growth has a positive relationship with the drug supply. Within the context of this analysis, one additional unit of GDP growth implies a decrease in drug seizures; meanwhile, a

positive growth in the monetary base implies an increase in drug seizure rates. The interaction between these two variables and drug seizures indicates a gap in the licit and illicit production markets. As more revenues flow in and out of the illegal drug market, the monetary base will continue to grow but reported GDP will remain unaffected. Additionally, the monetary base is more associated with wealth and the possession of monetary value, while GDP refers to the growth of the economy through labor. Therefore, the gap in relationship with drug seizures between these two variables can be seen as a ridge partially defining wealth inequalities in Mexico.

In a way the interaction between these two variables helps address the question of Drug Trafficking Organization resiliency. When there is less production growth within an economy, individuals will turn to other forms of employment and production, such as illicit drug markets. As the study “The Narcoeconomy...” mentions, wealth inequality is a persistent and growing problem in Mexico, pushing actors and communities into the illicit drug market production. The difference in the relationship between drug seizures and GDP and drug seizures and the monetary base reinforces this idea. It highlights that Mexico as a whole has the money to have a simple and linear relationship with drug seizure growth rates because this study demonstrated that the monetary base grows annually along with drug seizures. This relationship could be explained by the growing nature of Mexico’s economy and population growth rate in the U.S. It could also be explained by increased funds coming into the country from drug exports. Nonetheless, the difference between the monetary base and GDP relationship could be explained by wealth inequalities. While Mexico has the monetary value to have a linear relationship with drug seizures, it maintains an inverse relationship between income production (GDP) and drug seizures.

Another notable result is that of Pemex subsidies and total drug seizures. In the years that Pemex subsidies went up, total drug seizures decreased, suggesting an inverse relationship between the two of them. As discussed in the data selection section of this paper, the removal of Pemex subsidies and the increase in retail gas prices brought about outrage and negative effects on the working class in Mexico. Therefore, this economic variable, although nuanced and seemingly small-scope, explains a lot about wealth inequality in Mexico and how it interacts with the drug market. As mentioned above, the Pemex reforms brought about a 14%-20% increase in retail gas prices. For the working class, this gas price surge affected their standard of living and strongly affected those whose jobs require gas as a service production input, such as Taxi and Uber drivers.

5.2. Considerations

Two major limitations reside in the supply side analysis of the drug market. For one, there is not sufficient data to understand the exact proportion of the drug seizures that come from Mexico. A rough estimation was created based on media, DEA, and UN reports. On the other hand, a supply side analysis is less precise because the movement of drugs is typically being traced through the interactions between drug trafficker or dealer and drug enforcement. Drug trafficking professionals can vary in their discreteness based on region or the type of drug that they specialize in. Therefore, measuring supply based on astute drug professionals that are well-versed in hiding their merchandise can affect the data outcomes of the analysis.

A potential extension of this research would involve assessing the relationship between longer time lagged economic variables and drug seizures to see later effects of economic conditions on drug supply. Because the NFLIS did not begin reporting drug seizures until 1997, there was not enough data to create regressions with a lag larger than one year. Nonetheless, in

the coming years, as more annual drug data becomes available, a study of this nature could strongly illuminate the current results.

7. Conclusion

In the end, this study concludes that economic variables in Mexico and drug movement into the United states did have a significant relationship. As has been suggested before by other studies, to curb and diminish drug trade, governments should focus on the reduction of wealth inequalities within a country. One possible avenue for the reduction in wealth inequality would be subsidizing goods categorized as necessity goods in countries with a large working class. The subsidization and lowering in prices of these goods would have a much larger impact on the working class because it would free up a larger proportion of their income than it would to wealthier individuals. This, in turn, would gradually begin to shrink the wealth gap and reduce the appeal for profitable illicit drug market operations.

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Appendix

Appendix A: Specific drugs and their relationship to Mexican imports

Drug	Drug Category	Mexican Import	Explanation
DMT	Tryptamines	Yes	Mexico is one of the top two suppliers of this drug to the US (CPB)
2-METHYL AP-237	Narcotic Analgesic	No	Can be produced in the U.S. (World Health Organization)
2-NAPHTHYL U-47700	Narcotic analgesic - Synthetic Opioid	Yes	Primarily sourced from China and Mexico (DEA)
Acetylmethadol	Narcotic analgesic	No	Mostly prescribed and in clinical trials (PubChem)
1-(2-PHENYLETHYL)-4-PHENYL-4-ACETYLOXYPIPERIDINE	Narcotic Analgesic	Yes	Synthetic heroin
Benzoylcegonine	Narcotic	No	Metabolized form of cocaine
Apomorphine	Narcotic	No	Not widely considered an illicit drug. Used to treat Parkinson's Disease (LeWitt)
Destrorphan	Narcotic	No	Cough suppressant
Dihydronormorphinone	Narcotic	No	Produced and distributed in the united states (DEA)
Diphenoxylate	Narcotic	No	Produced in the united states
Meconin	Narcotic	Yes	Found in heroin use (Jones)
Naloxone	Narcotic	No	Produced in the United States (NIH)
Noracymethadol	Narcotic	No	Highly available in the US (NDIC)
Noscapine	Narcotic	No	No known addictive effects (Rahmanian)

Papaverine	Narcotic	Yes	Often mixed with heroin (Wolf)
Poppy Straw	Narcotic	No	Precursor to morphine - most likely confiscated in US during production process (UNODC)
Benzphetamine	Phenethylamines	No	Weight loss drug (MD)
Cathine	Phenethylamines	No	Appetite suppressant
Chlorphentermine	Phenethylamines	No	Mostly imported from India (MD)
D-ephedrine	Phenethylamines	No	Dietary Supplement (Kim)
Diethylpropion	Phenethylamines	No	Dietary supplement/appetite suppressant (Merative)
Ephedrine	Phenethylamines	No	Dietary Supplement (NIH)
Propylhexedrine	Phenethylamines	No	Available in the US (FDA)
Racephedrine Hydrochloride	Phenethylamines	No	Available in the US (DB)
ALD-52 (1-Acetyl Lysergic Acid Diethylamide)	Psychedelic	No	LSD is mostly produced in California Labs (DOJ)
Salvinorin A	Psychedelic	Yes	Highly produced in Mexico (Nichols)
Ibogaine	Psychedelic	Yes	Production legal in Mexico and it is a very popular drug there (Davis)
Psilocin	Psychedelic	Yes	Base plant is cultivated in Mexico (Wasson)

Appendix B: Relationship between DEA and Drug Seizures

Total Drug Seizures	Coefficient	Std error	t	P > t
DEA Budget Growth	-4.648	3.296	-1.41	0.159

