TOWARD DEVELOPING ESTIMATES OF U.S. IMPORTS OF ILLEGAL DRUGS

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Abstract

This paper explores potential ways to develop experimental estimates of the value of U.S. imports of illegal drugs. It builds on the initial exploration of this topic by the Bureau of Economic Analysis (BEA) in Soloveichik (2019), which presents experimental estimates of U.S. domestic consumption of illegal drugs and of import of illegal drugs into the United States. In this paper, I extend Soloveichik's research by exploring the feasibility of developing estimates of imports of methamphetamines and marijuana using seizure data, and I evaluate the extent to which source data allow us to estimate heroin and cocaine imports by geography. International guidelines for national economic accounts (the System of National Accounts 2008, or SNA) and international economic accounts (the *Balance of Payments and International Investment Position Manual, sixth edition*) explicitly recommend that some illegal market activity should be included in measured output. Soloveichik suggests that illegal drugs comprise the largest share of imports of this activity for the United States and would have added $111 billion to U.S. GDP in 2017.

Preliminary calculations by BEA suggest that illegal imports account for 82 percent of the domestic wholesale value for illegal drugs. Roughly $29.9 billion in illegal drugs entered the United States in 2017. If these illegal imports were included in the U.S. International Transactions Accounts (balance of payments accounts, or ITAs), these transactions would raise imports of goods by 1.3 percent.

My extensions of Soloveichik's research provide additional detail and context. Developing supply-side estimates of the share of consumption that is imported provides a reference point for evaluating Soloveichik's demand-side estimates. Providing geographic detail could help data users understand where illegal drugs consumed in the United States originate and improve the accuracy of the ITAs. While the United Kingdom and Canada have already begun including estimates of illegal drugs in their national and international accounts (Abramsky and Drew 2014; Statistics Canada 2017) utilizing recommended compilation practices (Eurostat 2018; OECD 2002), no geographic detail for imports is provided because of source data limitations in those countries. My analysis suggests that the currently available source data for the United States can be used to provide detail by drug type and geography.

Keywords Informal Economy, International Trade, Illegal drug seizures, International accounts, U.S. imports, International transaction accounts

JEL Codes E2, E6, F1, F4

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1. Introduction: Why estimate trade in illegal drugs?

The System of National Accounts 2008 (SNA) and the sixth edition of the *Balance of Payments and International Investment Position Manual* recommend that statistical agencies treat illegal economic activities or actions the same as legal actions when the actors involved transact by mutual agreement. Even though illegal economic activities are an important component of consumption and production activities, detailed estimates typically are not provided by statistical agencies, partly because of source data limitations.

Much research has noted that failure to include these activities may result in significant discrepancies between national financial and external accounts and national production and income accounts (SNA 2008, sec. 6.45). Introducing estimates of these activities affects measures of production, total expenditures, employment, economic growth, and savings (for example, see Carson 1984 and Gyomai and van de Ven 2014). Also, inconsistent measurement of illegal activities can make it difficult to compare economic activity across time and countries (Gyomai and van de Ven 2014).

Cross-border trade in illegal drugs is potentially one of the largest sources of U.S. imports of goods related to illegal market activity. Preliminary calculations suggest that illegal imports account for 82 percent of the domestic wholesale value for illegal drugs.[1] Roughly $29.9 billion in illegal drugs entered the United States in 2017, an amount that, if included in the ITAs, would raise the official value of imports of goods by 1.3 percent.]

Another reason for focusing on illegal drug imports is that, in addition to their economic importance, the source data for this activity is more reliable than that of other potentially significant cross-border illegal market transactions, such as money laundering. Although information on illegal drug activity is incomplete, the United States has relatively well-developed data sources, and a literature that attempts to make sense of these fragmentary data. For example, research on the consumption and supply of illegal drugs in the United States sometimes uses data on drug seizures to determine the source location and data on the chemical characteristics of heroin and cocaine to determine the world region in which the drug was produced. Multiple U.S. government publications provide data on illegal drug production and trade routes.[2]

This paper explores potential ways to use these data sources to extend the experimental estimates of the value of U.S. imports of illegal drugs by Soloveichik. It evaluates the extent to which source data allow us to develop estimates by geography. While the United Kingdom and Canada have begun including estimates for illegal drugs in their national and international accounts (Abramsky and Drew 2014; Statistics Canada 2017) utilizing recommended compilation practices (Eurostat 2018; OECD 2002), no geographic detail for imports is provided because of source data limitations in those countries. After reviewing the currently available source data for the United States, my analysis suggests that it is feasible to provide a certain level of detail by geography for some types of drugs. This paper also evaluates alternative estimates of illegal drug imports using data on illegal drug seizures to complement the demand-side estimates in Soloveichik.

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1. See Soloveichik (2019) for a more detailed description of the data sources and methodology for estimating U.S. imports of illegal drugs.

2. These include, but are not limited to, the National Drug Control Strategy Report and associated data supplement released annually by the Office of National Drug Control Policy, the National Drug Threat Assessment released annually by the U.S. Department of Justice Drug Enforcement Agency (DEA), and the annual International Narcotics Control Strategy Report released annually by the U.S. Department of State, Bureau for International Narcotics and Law Enforcement Affairs.

2. Prior work on estimating imports of illegal drugs

2.1 Estimation approaches: demand-side versus supply-side

Two common approaches for estimating illegal drug imports are demand-side approaches and supply-side approaches. The demand-side approach is commonly referred to as the bottom-up approach and the supply-side approach as the top-down approach.

Demand-side approaches begin by estimating domestic drug expenditures by multiplying quantities consumed by drug users by retail prices or with estimates of drug user expenditure levels. From these totals the different components, such as input costs, imports, and other breakdowns, are estimated. Demand-side methods often utilize surveys of illegal drug users. Some countries, such as Canada (Statistics Canada 2019), have developed direct surveys of users specifically to measure drug usage and prices. Other countries, such as Finland (Eurostat 2018, 84), Luxembourg (Eurostat 2018, 84), and Ukraine (Eurostat 2018, 93) draw on micro studies, administrative data, international studies and reports, and expert opinions not originally intended for statistical purposes (IMF 2018).

Supply-side methods start by estimating the quantity of drugs that enter the country based on global production data and domestic seizure rates. These base quantities are multiplied by prices to develop estimates for domestic drug consumption, imports, and trading margins. To compile these estimates, countries often apply econometric modeling techniques to available data sources (IMF 2018). Data sources include global crop yields, conversion factors to expand crop yields and illegal drug seizures to estimates of total supply, estimates of wholesale prices, and partner country data (IMF 2018).

2.2 Application by other statistical agencies

International guidelines recommend that statistical agencies use the demand-side approach to estimate the import of illegal drugs when possible because it is considered to be more reliable than the supply-side approach (Eurostat 2018). Singleton, Murray, and Tinsley (2006, 53), for example, conclude that "in the present state of knowledge, supply-side estimates are unlikely to be reliable. This is because the trade in illicit drugs and the organization of supply within the UK [and within other countries with large imported illegal drug markets] are very difficult to observe in a systematic way." Following the international guidelines, the majority of countries that estimate illegal drugs as official or experimental statistics use a demand-side method; these countries include Australia, Canada, Denmark, Italy, Luxembourg, the Netherlands, Serbia, Ukraine, and the United Kingdom.

While there are weaknesses in using supply-side estimates, including unresolved discrepancies between estimates based on different indirect data series and other comparisons that suggest that the estimates are implausible (Reuter and Greenfield 2001), some statistical agencies may use a supply-side approach either because they do not have the source data for a demand-side approach, or because they have developed a supply-side approach that they believe to be reasonable. Finland, for example, has developed a novel approach in which they measure concentrations of narcotic substances in domestic wastewater (Eurostat 2018, 84).

In practice, the choice of whether to use a demand-side approach or a supply-side approach often depends on the available source data. Often countries choose to use a combination of these two approaches to estimate illegal drug activities to incorporate as much relevant information as possible into the estimates. When possible, statistical compilers should compare estimates using both approaches. Canada and Colombia reported using both methods to arrive at illegal drug estimates (see country profiles in Eurostat 2018, 81; Statistics Canada 2017). Using this combined approach, Canada reported marijuana imports of $0.3 billion and exports of $1.1 billion in 2018 (Statistics Canada 2019). Most countries that estimate imports of illegal drugs follow the guidelines outlined in official Eurostat and Organisation for Economic Co-operation and Development (OECD) recommendations (Eurostat 2018; OECD 2002). Often the estimates are included within a larger set of estimates covering multiple categories of illegal and informal economy activities. The degree to which these estimates are separately identified varies by country (IMF 2018). See the 2018 Preliminary Report of the Task Force on Informal Economy (IMF 2018) for further information on individual country practices.

2.3 The United States

For the United States, the availability of survey data sources and official publications that estimate prices, usage, and expenditures using multiple data sources and econometric modeling techniques make a demand-side approach feasible and attractive. Soloveichik (2019) takes this approach to estimate illegal U.S. drug imports for 1929–2017. She focuses her estimates on the four major drugs consumed in the United States: cocaine, heroin,[3] methamphetamines, and marijuana. She also estimates a residual category for miscellaneous drugs. Soloveichik uses her estimate of U.S. consumption at retail prices for each of these drugs to develop a measure of U.S. consumption at wholesale or import prices using an estimate of the wholesale-to-retail-price ratio. To arrive at an estimate of imports, she then applies assumptions about the share of this supply that is imported. For cocaine and heroin, she assumes that consumption is 100 percent imported because the inputs cannot be grown in the United States. Her estimates of the import shares of consumption for marijuana and methamphetamines for 2006–2017 are based on media reports. She finds that accounting for imports of illegal drugs increases imports of goods by $29.9 billion, or 1.3 percent in 2017.

Outside of the national accounting statistical community, research on illegal drug flows also uses various combinations of indirect and direct supply methods. Some provide only global trade (May 2017), and some estimate trade for smaller regions or by country (Organization of American States 2003; Reuter and Greenfield 2001; Kilmer and Pacua 2009; Perl 2006). Some provide meta-analyses, which gather and compare estimates generated across different sources (Poso 1996; National Research Council 2010; Thourmi 2005). Most of these studies emphasize the inherent uncertainty of the topic by highlighting the discrepancies across estimates and data sources.

The most common quantitative exercise of U.S. researchers is to generate price, quantity, and expenditure series over time for different categories of illegal drugs and levels of drug use within the United States. Researchers typically use microdata from different sources including surveys, drug seizure records, arrestee

3. The data sources used to obtain estimates of U.S. domestic illegal drug consumption and retail prices include fentanyl in the heroin category.

records, and hospital admittance records and construct measures using econometric modeling and other statistical methods. Kilmer et al. (2014) construct expenditure, quantity, and price estimates for illegal drugs for 2000–2010; Fries et al. (2008) construct a price series for illegal drugs from 1981–2007. Focusing on a smaller region, Arkes (2008) constructs a price time series by user type (e.g. infrequent user versus heavy user) and drug type for Washington D.C.

Many studies of illegal drug consumption and trafficking in the United States focus more on modeling behavior than on providing estimates of imports, and typically examine one or a few specific illegal drugs. Rydell and Everingham (1994) model the supply and demand factors for cocaine. Other studies estimate specific price levels and/or elasticities to evaluate the impact of changes in policy on drug prices, demand, and consumption. For example, Miron (2003) estimates price markups for heroin and cocaine at various points along the global supply chain and compares these to other legal commodity price mark-ups. Caulkins (2014) estimates elasticities of demand and price mark-ups for cocaine, cannabis, and heroin as these travel from their sources of production to the point of final consumption. Among the few studies that estimate import values, the Federal Research Division of the Library of Congress (2003) estimates U.S. imports of marijuana in 2002 using a supply-side model.[4]

4. These estimates are not directly comparable to the estimates presented here because they are measured by weight rather than market value.

3. Feasibility of developing estimates based on U.S. drug seizure data

I begin with the preliminary exploratory estimates of the value of illegal drug imports prepared by Soloveichik for the time period covering 2006–2017. Imports are calculated by estimating the import share of Soloveichik's estimate of personal consumption expenditures for illegal drugs valued at wholesale prices. These calculations are performed separately by year and across five drug types: cocaine, heroin, methamphetamines, marijuana, and other miscellaneous drugs.[5]

This paper offers two extensions to the estimates of U.S. imports of drugs by Soloveichik. The first extension is an alternative estimate for the imports of illegal drugs that is constructed by assuming that imports as a share of domestic consumption for illegal marijuana and methamphetamines is equal to U.S. border seizures as a share of all U.S. illegal drugs seizures. The second extension distributes imports of heroin and cocaine by country or world region using the share of U.S. seizures identified through laboratory testing by the DEA as coming from that country or region.

Using border seizure data to estimate marijuana and methamphetamine imports

There are no precise estimates of the share of illegal drugs imported into the United States. The estimates used by Soloveichik are based on an analysis of the demand for, and the implied supply of, illegal drugs in the United States. She assumes that all U.S. consumption of cocaine and heroin is imported, which is quite plausible since it is difficult or impossible to grow coca and opium in most parts of the United States and because U.S. penalties for cultivating these crops are so severe (Pappas 2017). Soloveichik estimates the import shares of consumption for marijuana, methamphetamines, and other miscellaneous illegal drugs based on media reports. For example, she assumes that the imported share of methamphetamines increased after 2010, when the sale of some of the key precursor chemicals used to produce it were banned in the United States.[6]

I obtained data on illegal drug seizures from the White House Office of National Drug Control Policy (ONDCP). ONDCP extracted data from the El Paso Intelligence Center (EPIC) seizure system records in March 2018. EPIC seizure records include drug seizure statistics collected from federal, state, and local law enforcement offices. The data are broken out by seizures: 1) on the U.S. border with Mexico, 2) on the U.S. border with Canada, and 3) in inland cities, in coastal cities, and at other international entry points, such as maritime ports and airports.[7]

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5. National statistics compilers are advised to prepare estimates separately by drug type and to apply purity adjustment factors to illegal drug prices or quantities (OECD 2012). Purity adjustment factors address the fact that illegal drugs are generally diluted as they move through the supply chain so that the quantity imported often differs from the end quantity consumed (Eurostat 2018; OECD 2012). To address the latter point, I use a purity-adjusted price series.

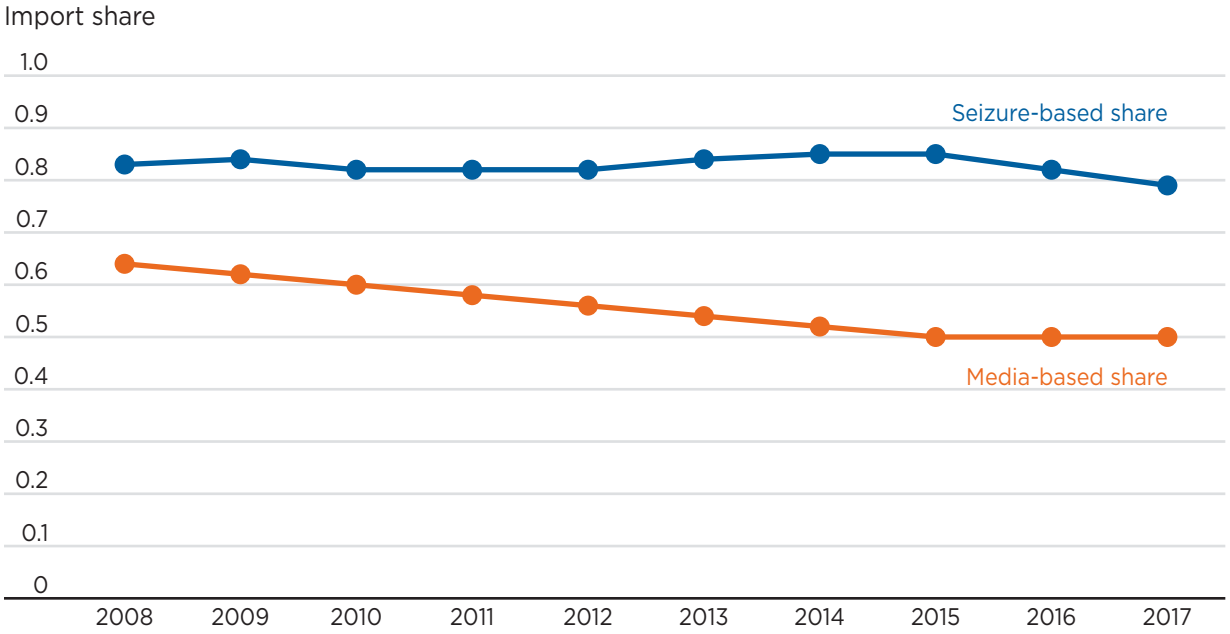
6. The Combat Methamphetamine Epidemic Act was enacted in 2006 to regulate the sale of key precursor chemicals used to produce methamphetamine. The United Nations 2010 World Drug report noted that the production of methamphetamines in the United States decreased since this enactment but that also noted an increase in the number of Mexican meth labs since 2005 (Graham 2011).

7. This measure does not include illegal drugs seized at international entry points and should be considered a lower bound estimate of total illegal drug imports seized at the U.S. border. Official statistics indicate that seizures at international ports are a small share of total seizures of illegal drugs. Maritime ports and airport seizures accounted for 2.3 percent of total seizures in the United States in 2009 (DEA 2010).

I measure the volume of seizures occurring along the borders with Mexico and Canada as a share of the volume of all U.S. seizures and use this share as a proxy for the import share of U.S. consumption of methamphetamines and marijuana. I estimate a 3-year moving average of these shares separately for marijuana and methamphetamines by year. My alternative import estimates for marijuana and methamphetamines are calculated by applying these alternative import shares to the corresponding measure of domestic consumption valued at wholesale prices used by Soloveichik.

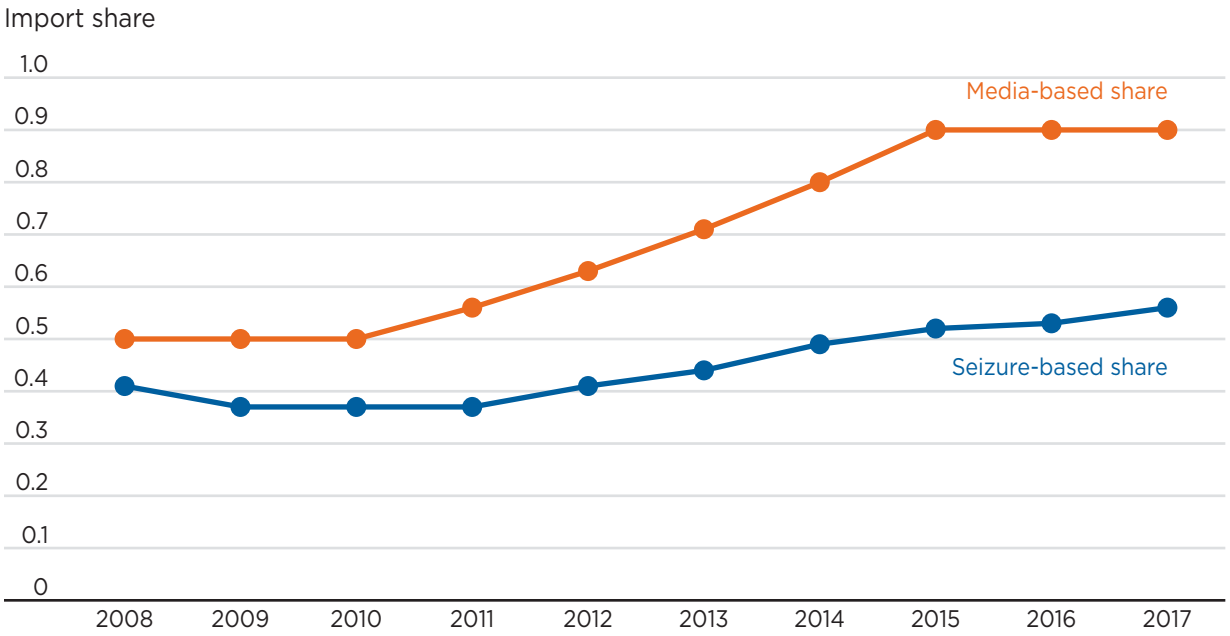
Charts 1 and 2 compare the Soloveichik media-based import shares and the alternative import shares calculated using DEA border seizure data.

Chart 1. Comparison of Media-Based and Seizure-Based Marijuana U.S. Import Shares, 2008–2017



Sources: Soloveichik (2019) and data on illegal marijuana seizures by U.S. region from EPIC seizure system records.

Chart 2. Comparison of Media-Based and 3-year Moving Average of Seizure-Based Methamphetamine U.S. Import Shares, 2008–2017



Sources: Soloveichik (2019) and data on illegal methamphetamine seizures by U.S. region from EPIC seizure system records.

Import shares for marijuana using border seizure rates are much higher than Soloveichik's estimates. Using border seizure rates results in an import share estimate of 83 percent in 2008, which is higher than the media-based estimate of 64 percent (chart 1). By 2017 the estimated import share using border seizure rates falls to 79 percent while the media-based estimate falls to 50 percent (chart 1).

The seizure-based shares for methamphetamines are smaller than media-based shares for all years. While both series generally increase over time, the media-based share grows faster than the seizure-based share after 2010. Soloveichik assumes that the import share for methamphetamines increases after 2010 because the chemicals used to produce it were banned in the United States. By 2017 the 56 percent share calculated using border seizure rates is significantly lower than the media-based share of 90 percent (chart 2).

The National Drug Threat Assessment (NDTA) and Drug Enforcement Agency (DEA) seizure statistics suggest that the vast majority of marijuana and methamphetamines imports are smuggled on overland routes and enter the United States at the borders with Mexico or Canada.[8] Using import shares calculated using data on seizures along the borders with Mexico and Canada is an alternative way to distinguish the portion of domestic illegal drug consumption that is produced in other countries and imported into the United States from the portion that is produced domestically. This approach relies on certain assumptions that may or may not be true. For instance, the border seizure rates for marijuana and methamphetamines may be biased down-

8. In 2018, 97 percent of methamphetamines seizures by Customs and Border Patrol occurred at or near the U.S. borders with Mexico or Canada (NDTA 2018). The majority of illegal marijuana imports consumed in the United States are smuggled in by land through Mexico or Canada (NDTA 2018).

wards if some portion of imports make it through the supply chain and are seized inland or if illegal drugs are seized at international ports. This approach also assumes that the share of imports seized crossing the border is the same as the share seized from domestic production. If these shares are different, the border seizure rates may not reflect the actual import shares. Finally, this approach assumes that the purity level of illegal drugs seized at the border are the same as those seized inland and the purity levels of each are the same across time. The purity level, or the amount of illicit substance present in the sample compared to other diluents, solvents, and adulterants, typically decreases as imported illegal drugs travel from border entry points to retail distribution points. By diluting the samples, traffickers are able to expand their inventory and increase their profits (NDTA 2018). This assumption may further result in these shares representing an upper bound of actual import shares.[9]

My alternative seizure-based estimates of drug imports are hybrids of the demand-side and supply-side approaches. They use a supply-side approach to estimate import shares, which are then applied to total domestic consumption estimated using a demand-side approach. Demand-side measures are generally preferred to estimate most illegal drug activity since producers and importers tend to be more successful at hiding their illegal activity from law enforcement than drug users. For example, Eurostat (2018) specifically cites supply-side drug seizure data as being potentially too unstable for use in official estimates. I choose to use a partial supply-side approach because international guidelines encourage using multiple approaches and comparing the results. This approach serves as a robustness check against the media-based demand-side estimates used by Soloveichik. My estimates of seizure-based import shares are exploratory. Going forward I will look at further ways to refine these shares by incorporating other available data sources or statistical methods. In this manner I may be able to use the information provided in the seizure statistics while removing the inherent instability in illegal drug seizure levels.

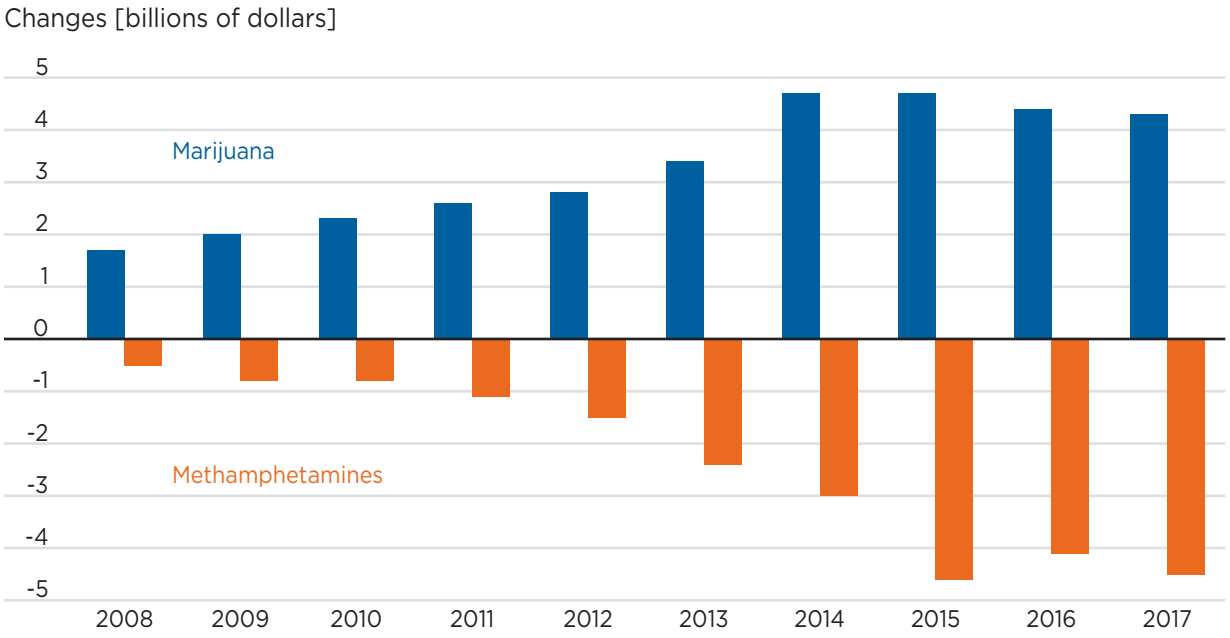
Table 1 provides a summary of how my alternative seizure-based import estimates compare with Soloveichik's media-based import estimates for marijuana and methamphetamines. Between 2008 and 2017, estimates of imports of marijuana using the alternative seizure-based approach are about one and a half times as large, on average, as Soloveichik's media-based estimates, while the alternative seizure-based estimates of imports of methamphetamines are about one-third smaller than the media-based estimates. Chart 3 shows the annual differences between the two methods in import estimates for methamphetamines and marijuana. On average, the alternative seizure-based estimates for the combination of the two drug types are $1.0 billion higher than the media-based estimates, representing average annual imports of $14.4 billion.

9. According to officials at the Office of Drug Policy, drug seizure data used in estimating drug use is not typically adjusted for purity levels. For example, Chandra et al. (2014) assumed uniform purity of cocaine seized in 112 U.S. cities in modelling cocaine consumption within the United States.

Table 1. Average Annual U.S. Estimated Illegal Drug Imports, 2008–2017
[Billions of dollars]

	Marijuana	Meth-amphetamines	Total marijuana and methamphetamine imports
Soloveichik (media-based) estimate	6.4	6.3	12.7
Alternative (seizure-based) estimate	9.7	4.0	13.7
Difference	3.3	–2.3	1.0

Chart 3. Difference in U.S. Import Estimates: Alternative Seizure-Based Rates Minus Media-Based Estimates, 2008–2017.



Sources: Soloveichik (2019) and data on illegal methamphetamine seizures by U.S. region from EPIC seizure system records.

Using the alternative import shares, imports of marijuana are larger than Soloveichik's media-based estimates each year. The difference ranges from about $1.7 billion higher in 2008 to $4.7 billion higher in 2014 (chart 3). In contrast, import shares of methamphetamines are smaller each year using the alternative import shares. The difference ranges from $0.5 billion lower in 2008 and 2010 to $4.6 billion lower in 2015 (chart 3).

Using DEA signature data to identify the country of origin for heroin and cocaine imports

I use data from the DEA's Heroin Signature Program and Heroin Domestic Monitoring Program (HDMP) to assign a country (or region) of origin to heroin imports and data from the Cocaine Signature Program (CSP) to assign a country (or region) of origin to cocaine imports.

The Heroin Domestic Monitoring Program provides data on the price, purity, and geographic source of heroin at the retail street level in 27 U.S. cities. This information is obtained through laboratory testing of samples of seized drugs at DEA labs. The chemical analysis allows the lab to identify the production process or "signature" of the drug, which is specific to a particular geographic area and processing method. Seizure data are reported only for four countries/regions of origin: Mexico, South America, Southwest Asia, and Southeast Asia (DEA 2016).

I obtained regional signature data for heroin drug seizures for 2006 through 2014 from the Heroin Domestic Monitoring Program's annual reports for these years. To cover subsequent years, I assume the shares for 2015–2017 are the same as those in 2014. I calculate the share of illegal heroin drug seizures (at the border or inland) from each of the four countries/geographical regions, based on drug signatures for each year. These regional shares are then multiplied by the total demand-side import value of heroin to obtain an estimate of imports for each geographical region.

The Cocaine Signature Program provides data on the geographic source and processing method used for samples of cocaine seized by law enforcement. These data are obtained by performing in-depth chemical analysis of cocaine samples obtained from U.S. seizures as well as on cocaine samples, solvents, and other diluents seized from cocaine laboratories in South America. Seizure data are reported for only three countries/regions of origin: Columbia, Peru, and "of unknown origin." I was able to indirectly obtain the imports by country of origin from the Cocaine Signature Program for 2009, 2013, 2015, 2016, and 2017 from several sources.[10] I constructed a time series for imports of cocaine by country over the period 2009–2017 using the same methodology used for heroin and using linear interpolation to estimate data for the years that I was not able to obtain.

The United States is fortunate to have country-of-origin estimates based on drug signatures for certain types of drugs, but some countries do not have this kind of data. In this case, many countries instead use data on the global production of illegal drugs. These are based on reported information in official government sources and United Nations (UN) estimates. They are compiled and disseminated in various UN reports as well as in U.S. government documents.

Because the United States does not have signature data for all drug types, I compute geographic estimates based on global production data as a point of comparison for other estimates. I utilize data on the level of potential heroin and cocaine imports by country provided in ONDCP's *2019 NDCS Data Supplement*. For the

10. Estimated imports by country of origin for 2013, 2015, and 2016 were mentioned in descriptions of the sources of cocaine in DEA publications (NDTA 2015; NDTA 2016; and DEA 2017). Estimated imports for 2009 are from United Nations Office on Drugs and Crime (2011), and estimated imports for 2017 are from the Congressional Research Service (2019).

global production-based estimates, the global country production data are aggregated to produce a similar geographical classification as provided in the HDMP data, and the geographic shares are applied to the demand-side import value.

The average annual estimates of heroin imports between 2006–2017 and of cocaine imports between 2009–2017, allocated by geographic region based on DEA seizure data, are shown in tables 2 and 3 below. These data are shown by year and geographic region in charts 4 and 6. For comparison and discussion, the global production-based estimates prepared using global heroin and cocaine production data are shown in charts 5 and 7.

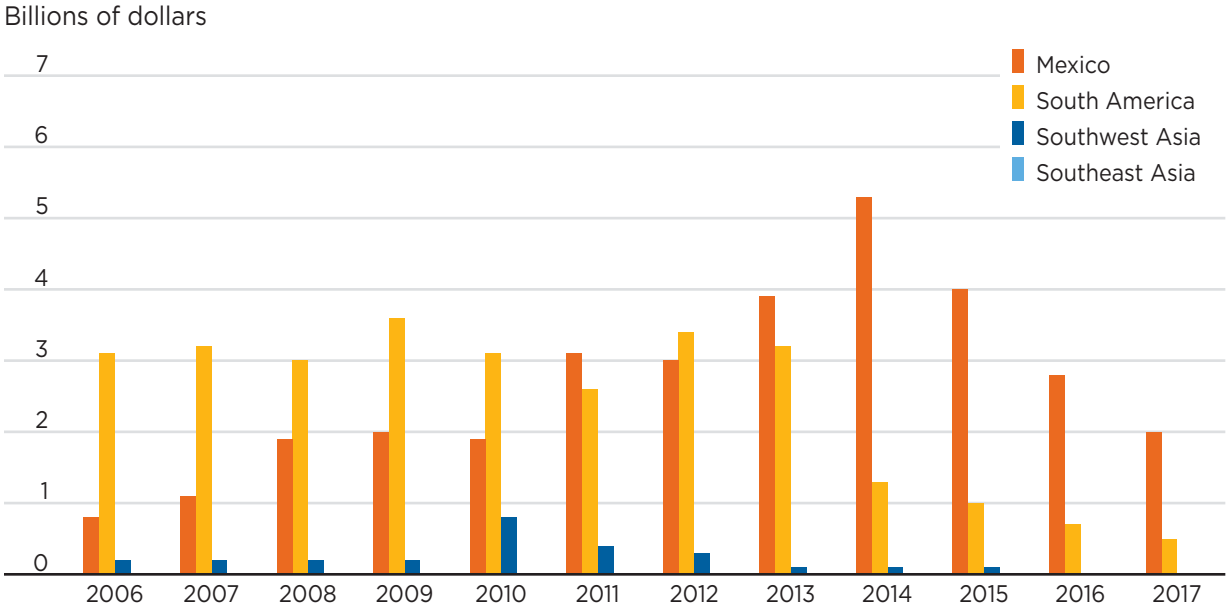
Table 2. Estimates of U.S. Heroin Imports by Country or Region of Origin, 2006–2017
[Billions of dollars]

	Annual average heroin imports, 2006–2017 [Billions of dollars]				
	Mexico	South America	Southwest Asia	Southeast Asia	Total heroin imports
Seizure-based estimates	2.6	2.4	0.2	0.0	5.3
Global production-based estimates	0.3	0.0	4.7	0.2	5.3

Table 3. Estimates of U.S. Cocaine Imports by Country or Region of Origin, 2009–2017
[Billions of dollars]

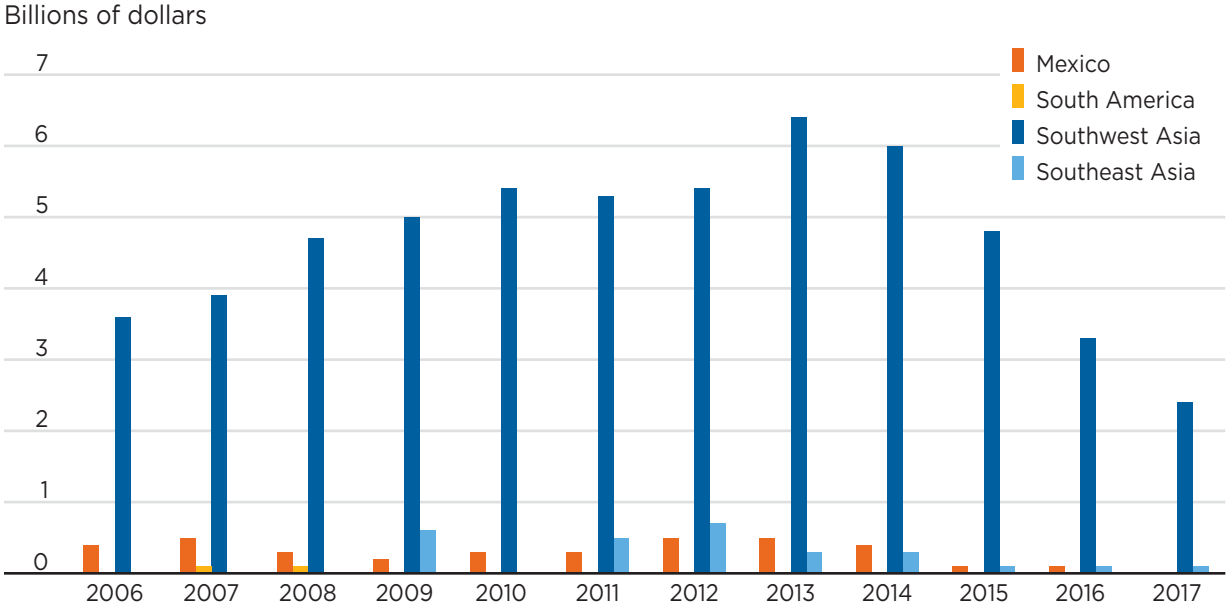
	Annual average cocaine imports, 2009–2017 [Billions of dollars]			
	Columbia	Peru	Unknown	Total cocaine imports
Seizure-based estimates	8.5	0.6	0.2	9.2
Global production-based estimates	3.5	3.5	2.2	9.2

Chart 4. Seizure-Based Estimates of U.S. Heroin Imports by Country or Region of Origin, 2006–2017



Sources: Soloveichik (2019) and the share of illegal drugs seized by region or origin from the DEA's annual Heroin Domestic Monitoring Program reports for years 2006-2014. None of the heroin seized between 2006-2014 was reported to be of Southeast Asian origin.

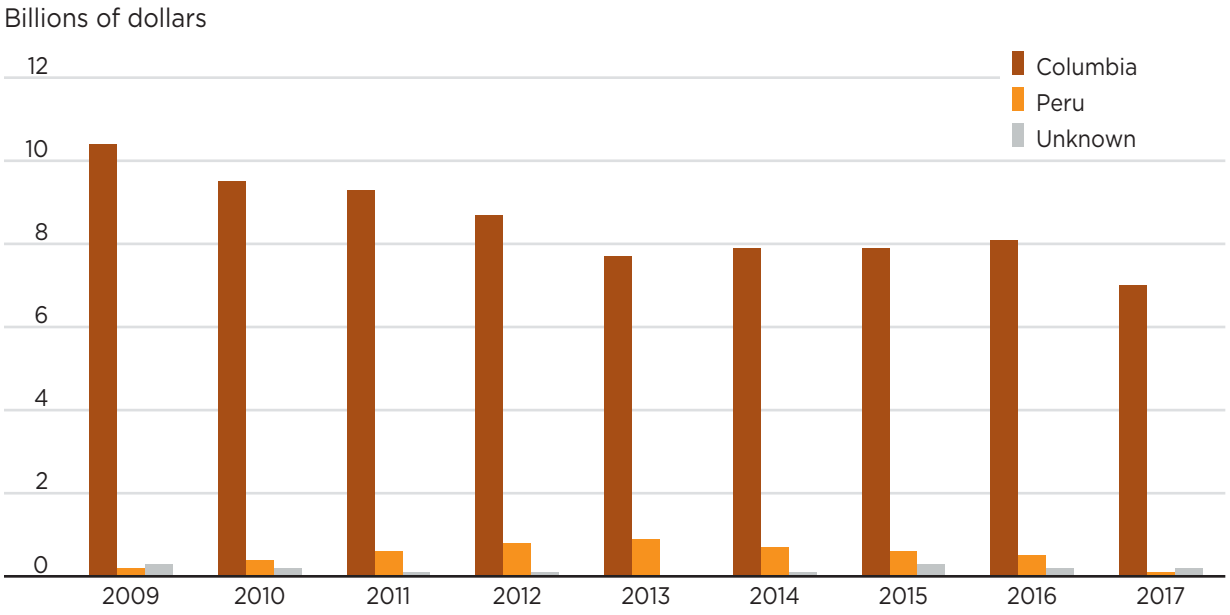
Chart 5. Global Production-Based Estimates of U.S. Heroin Imports by Country or Region of Origin, 2006–2017[11]



Sources: Soloveichik (2019) and illegal heroin production by country from ONDCP's 2019 NDCS Data Supplement.

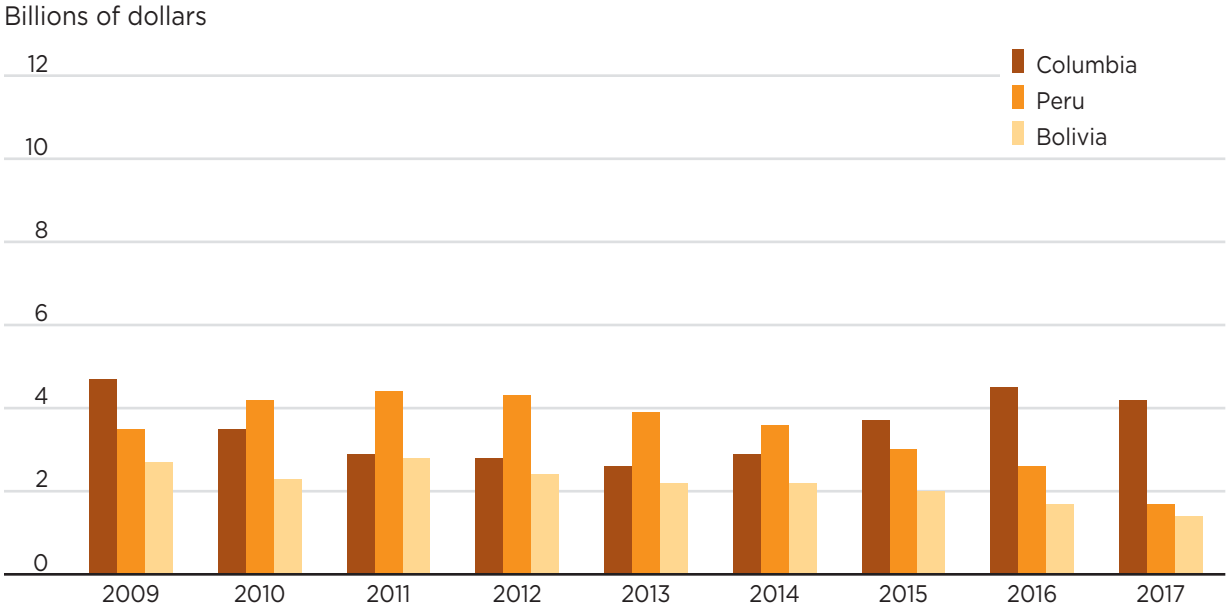
11. In keeping with geographical conventions and to correspond to the level of geographical detail provided by the DEA Heroin Domestic Monitoring Program data, Southeast Asia includes Burma and Laos, Southwest Asia includes Afghanistan and Pakistan, and South America includes Colombia and Guatemala.

Chart 6. Seizure-Based Estimates of U.S. Cocaine Imports by Country or Region of Origin, 2009–2017



Sources: Soloveichik (2019) and the share of illegal drugs seized by region or origin from: DEA's annual Cocaine Signature Program reports for 2009, 2013, 2015, 2016, and 2017, as well as NDTA (2015), NDTA (2016), DEA (2017), UNODC (2011), and CRS (2019).

Chart 7. Global Production-Based Estimates of U.S. Cocaine Imports by Country or Region of Origin, 2009–2017



Sources: Soloveichik (2019) and illegal cocaine production by country from ONDCP's 2019 NDCS Data Supplement.

According to the estimates applying DEA seizure data, most heroin imported to the United States over the 2006–2017 period was produced in Mexico (50 percent) or South America (46 percent). As seen in chart 4, the geographic origin of heroin imports into the United States has changed considerably over time. The share of heroin imports coming from South America decreased from 76 percent in 2006 to 20 percent in 2014. The share coming from Mexico increased from 20 percent in 2006 to 79 percent in 2014. This pattern is consistent with the increase in Mexican heroin production and increasing prevalence of Mexican-originating heroin in the U.S. market starting in the 2010s reported in the 2018 National Drug Threat Assessment and other U.S. government data sources. Prior to the mid-2010s, Colombia was reported to be the main producer of U.S.-consumed heroin.

Comparing charts 4 and 5 illustrates that the country and regional distribution of DEA seizures of heroin are different from those of global production. Globally, most of the heroin opium is produced in Southwest Asia (mainly Afghanistan), whereas Mexican and South American heroin comprise a small share of total global production. Most of the Southwest Asian grown opium is consumed in Asia or imported into Europe while the United States relies on Mexican and South American heroin imports. Therefore, while the distribution of global production might provide a realistic geographic distribution of heroin imports for Asian and European countries, it does not provide a suitable geographic distribution for U.S. imports.

The global production patterns for cocaine differ from the country and regional distribution of DEA seizures, as shown in charts 6 and 7. According to the estimates using DEA signature seizure data, most cocaine imported to the United States over the 2009–2017 period was produced in Columbia (92 percent) or Peru (6 percent). The geographic origin of cocaine imports into the United States has remained constant over time, with Columbia producing the majority of imports—between 90 and 96 percent of total imports.

The steady share of U.S. illegal cocaine imports from Columbia over this time period is in contrast with a short-term decrease in Columbia's share of global cocaine production due to a temporary increase in Columbian coca plant eradication efforts in early 2010s (DEA 2017; UNODC 2018). Between 2009 and 2012, Columbia's share of global cocaine production fell from 43 percent of global production in 2009 to 29 percent in 2012. While Peru and Bolivia increased their share of cocaine production, most of this was consumed in South American markets (UNODC 2011). Columbia's share of global coca plant production began increasing in 2012, reaching 58 percent of global production in 2017. The result has been increases in flows of Columbian cocaine into Asia and Africa (UNODC 2018), falling U.S. cocaine prices, and rising U.S. retail sale purity levels (DEA 2017). As was the case with the estimates for heroin, applying global cocaine production data to determine geographical distribution shares is not suitable for U.S. import estimates.

One limitation with using the heroin and cocaine signature data are that imputing shares from years not covered means the distribution will not reflect any changes in illegal drug transportation routes and import supply patterns that occurred during these time periods. Another limitation is that these data are not available for other drug types such as methamphetamines or marijuana. While there are programs that test seized

samples for imports of methamphetamines, marijuana, and fentanyl,[12] the DEA currently is not able to ascertain the country of origin from these samples.

Another limitation of these country of origin estimates is that international guidelines recommend that imports be attributed to the country of the seller, which may not be the same as the country of origin if ownership has changed while the drugs are in transit. Although illegal drugs originate in a variety of countries, they can be transported across multiple countries and often enter the United States via Mexico or Canada or other countries located close to the United States. For example, most heroin grown in South American countries is trafficked into the United States through Mexico (NDTA 2018). Applying a country of seller classification to heroin would result in allocating many of these imports to Mexico to the extent that these imports are repackaged, further processed, or change ownership in Mexico. For example, the addition of fentanyl to heroin and cocaine is becoming more common (DEA 2018). While much of the fentanyl added to heroin is shipped from China, it is often obtained and added to heroin by Mexican heroin producers. The processing of the heroin in Mexico would be considered a substantial transformation and Mexico would be identified as the counterparty for these imports. In such cases, where major inputs for a drug come from multiple sources, there may need to be additional decisions and adjustments made to apply geographic signature data. In addition, we may need to distinguish and explore reporting on both a country of seller and country of origin basis, both of which may be of interest to data users.

12. For additional information on the Methamphetamine Profiling Program and the Fentanyl Signature Profiling Program see the July 3, 2019 Congressional Research Service Report, *Illicit Drug Flows and Seizures in the United States: What Do We [Not] Know?*

4. Conclusions and steps moving forward

My analysis suggests that using data on seizures of illegal drugs can provide insights about the import share and the country of origin of imports of illegal drugs.

Following international guidelines and methods used by other researchers, I use multiple data sources and modeling techniques to estimate illegal drug imports. The use of these multiple data sources addresses the fact that often no single survey or set of records can provide a reliable picture of illegal drug imports.

Future research using border seizure rates could benefit from the inclusion of additional information that could indicate whether the shares are reliable. Another possible direction for this research is to adjust the import share to control for factors that cause the border seizure rate to be different than the import share. For example, Underwood, Burn, and Milliken (2013) use Bayesian statistical modeling to analyze global illegal trade in ivory, based on seizures of illegal ivory.

The use of drug signature data for seized heroin and cocaine may provide useful insight as to the country of origin. However, it is limited by the availability of the signature data over time. Moreover, this kind of information is not available for other illegal drugs. Although the distribution of global production of illegal drugs does not provide a suitable geographic distribution for U.S. imports of heroin and cocaine, it might provide a realistic geographic distribution for imports of other types of illegal drugs where imports can be validated from other data sources as coming from the largest global producers. However, both data sources may be less useful in assigning a country of seller for the balance of payments accounts.

BEA will use the findings in this paper and the findings in Soloveichik (2019) as it considers whether and how to develop estimates of U.S. illegal drug imports. BEA also plans to explore whether the United States exports significant amounts of illegal drugs such as methamphetamines, and if so, whether estimates of exports can be developed to complement the estimates of imports.

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