

How much demand for money laundering services does drug selling create? Identifying the key parameters.*

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Abstract

The illegal drug trade is often, and plausibly, asserted to be the largest illegal market, globally and in many individual countries. It is also claimed that a large share of its revenues is laundered, though there are no estimates of that volume. This paper identifies some of the key parameters (particularly the price mark-up across distribution levels) and the economic logic that determine what share of drug trade revenues needs to be laundered, after taking account of internal business costs and living expenses. It presents a simple model using data based on one typical, well-studied case, namely British Columbia's market for illegal opioids. We show the sensitivity of the figure to the mark-up and the internal cost structure of the trade. We suggest that less than a half and perhaps no more than a quarter of revenues from established drug markets need professional laundering. That in turn suggests the limits of money laundering controls as a way of reducing drug supply – although money laundering investigations may still be an effective way to identify and investigate high-level drug traffickers.

1. Introduction

The global drug market is probably worth hundreds of billions in US dollars; whether it is \$200 billion or \$600 billion is hard to say (GFI 2017; UNODC, 2005). It is often asserted to be the largest illegal market, globally and in many individual countries. Estimates are necessarily imprecise, so figures should be treated as indicative only of the order of magnitudes, but even putting aside “mythical numbers” (figures pulled out of the air with no evidence of any systematic foundation; Singer, 1971), the literature contains at least twenty independent efforts to estimate the revenues from drug selling. A review can be found in Caulkins and Reuter (2020). Perhaps the most systematic estimates have been done in the United States where the markets for heroin, cocaine, marijuana, and methamphetamine may each exceed \$20 billion USD (Midgette et al., 2019)..

Clearly, some earnings from the drug trade are laundered. That is known from investigations as well as the occasional memoirs of drug dealers or their financial agents (e.g., Woolner, 1994; S. Schneider, 2004). Sometimes the laundering schemes are simple, such as smurfing, otherwise known as “structuring”—which involves making multiple deposits just under the limit at which the bank is required to report that cash transaction. Occasionally the schemes are sophisticated, with multiple layering across different institutions and countries. Nonetheless, we suggest here that it likely that only

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a relatively modest share of revenues from established drug markets need professional laundering. That in turn suggests the limits of money laundering controls as a way of reducing drug supply – although money laundering investigations may still be an effective way to identify and investigate high level drug traffickers.

The Dutch literature is perhaps the richest and suggests that most drug dealers launder money in quite simple ways such as via purchase of local real estate or transfer of currency to the dealer's home country (Kruisbergen et al, 2019; van Duyne, Soudijn and Kint 2016). For Canada, S. Schneider (2004) analyzed closed money laundering cases from 1993 to 1998, three quarters of which involved drug dealing. Schneider found that “deposit institutions, the insurance industry, motor vehicles, and real estate are the four most frequent destinations for the proceeds of crime in Canada,” but the general impression is of unsophisticated schemes. Seven out of eight cases involved self-laundering, though perhaps as many as 25% also involved use of a professional (p.15).

Despite the salience of the topic, few studies address seriously the share of drug market those revenues that is laundered. One widely cited study (F. Schneider, 2010) simply assumes that it is all “by definition” laundered, a legalistic but not particularly insightful approach. Recent estimation in the United States by economists attempting to incorporate illegal markets into National Income and Product Accounts have been more nuanced but hardly better informed. For example, Soloveichik (2019) assumes – without evidence – that the share of revenues laundered is constant over time for individual drugs and bases those shares on a 35-year old estimate (IRS, 1983), that is itself a dubious and unreviewed source. It is fair to say that to date there has been no serious effort to model the relationship between drug market revenues and the demand for money laundering services.

Notwithstanding the presence of drug selling on the internet or the obvious appeal of anonymous cryptocurrencies, at least until now cash has been king for drug dealers, much more so than for other kinds of criminal earnings such as fraud and embezzlement. Estimates of the share of drug transactions globally that occur on the dark web are less than 1% (UNODC, 2021). Even at the highest levels of the trade, transactions are almost exclusively in cash. For example, Soudijn and Reuter (2016) analyzed the accounts of six enterprises in the Netherlands whose sole line of business was to transport the sales proceeds of Colombian cocaine smugglers back to Colombia. Each enterprise handled tens of millions in Euro notes each year for customers who needed to transport millions of Euros from each cocaine shipment. The first task was to convert the small and medium-sized bills into 500 Euro notes, to allow for concealment in specially constructed backpacks; each courier carried between 200,000 and 400,000 Euros. That initial conversion cost 3% of the value, and the total cost, including payments to couriers (airfare plus a modest cash payment) and the occasional loss, was well over 10% of the revenues, perhaps as much as 15%. Likewise, when HSBC, a major international bank, was fined over \$1 billion for laundering drug market revenues through its recently acquired Mexican affiliate, it was again the handling of currency that was so striking; Mexican drug dealers had developed cash boxes that fit the specific shape of the teller's windows in the HSBC branches (Taibbi, 2012). Schneider (2004) found cash to be central in 94 of the 149 Canadian cases he investigated. Cash is the curse of the drug trade.

This paper identifies some of the key parameters and economic logic that determine what share of drug trade revenues needs to be laundered, after taking account of internal business costs and living expenses. The next section presents a simple model using data based on one typical, well-studied case, namely British Columbia's market for illegal opioids (once mostly heroin; now primarily fentanyl).

Section 3 varies two of the key parameters to illustrate how the qualitative conclusions may or may not vary for other such markets. That model is a numerical accounting exercise; Section 4 revisits the same questions with a conceptual model rooted in economists' understanding of what drives equilibrium prices in a competitive market and reaches similar conclusions. We then close by discussing some potential challenges to the external generalizability of these conclusions and some of their policy implications.

2. Framework and computational model for an illegal opioid market

This section works through numerical illustrations of the relationship between a drug markets' total retail sales and the resulting amount of money that criminals might wish to pay someone to launder. The central insights are that: (1) Only a minority – perhaps between one-quarter and one-half – of what drug users spend would even need to be laundered and (2) Key parameters governing that proportion are prices and price markups at each level of the drug distribution chain and the level of everyday cash expenditures by dealers.

Consider a simplified model of the British Columbia heroin market before fentanyl became common with 10,000 frequent users buying 0.4 grams per day at \$160 per gram from a market with three layers: retail sellers, wholesale dealers, and importers. Sellers at any given market level supply ten customers and mark up the drugs' price by 100%. (That is at the upper end of the typical range, but round numbers make it easier to convey the key concepts, and we explore the implications of lower—60% -- markups below.) An Appendix contains sources for each of these parameters.

Price-markups are the flip side of discounts for buying in bulk, not for “manufacturing” or other value-added processing. What a dealer sells is more or less the same thing he or she buys, just packaged in smaller lot sizes. One reason that dealers get to buy in bulk is by supplying multiple customers; 10 each in this simplified example. The other is by purchasing less frequently. Users may buy one or more times per day; importers accept shipments far less frequently, perhaps only once per month. We describe those different “cycle times” to show that our simple model matches conventional understanding of how dealers at different levels operate, but the cycle time and lot size estimates are not in and of themselves essential to the estimates of money laundering demand.

A 10:1 distribution network branching factor implies there are $10,000 / 10 = 1,000$ retail sellers. They may purchase heroin an ounce at a time once a week for \$80 per gram. Likewise, there are 100 wholesale dealers who could buy one-half of a kilo every couple of weeks for \$20,000 (\$40 per gram). Ten “kingpins” import 10-15 kilograms at a time once a month from foreign suppliers who charge \$20,000 per kilogram. Table 1 summarizes these market parameters and the implied net revenue at each market level.

Of the \$234 million per year that users spend purchasing the roughly 1.5 MT of heroin they consume each year, 87.5% (\$204 M) becomes net revenues to drug dealers within Canada, and 12.5% (\$29 M per year) is used to pay for the drugs that are imported. What surprises some is that most of the net revenues (\$117M) are retained by retail sellers. That doesn't mean retail sellers are rich; dividing that \$117M over the 1,000 retail sellers means that each has net revenues of \$117,000. Furthermore, that figure would apply to people who work “full-time” selling drugs. As discussed below, many retail sellers work only “part-time” so their actual cash earnings per seller are even smaller

In one sense almost all of this money gets laundered. It is all “dirty” and apart from a modest share seized by police, all gets used somehow. But probably the largest share of the revenue of drug dealers and their associates goes to spending cash on everyday living expenses, such as food, clothes, and rent¹.

Table 1: Stylized Model of a Heroin Market
Loosely Based on the British Columbia Market, circa 2010

	Heavy Users	Retailers	Wholesalers	Importers	Foreign suppliers
Number of Individuals or Organizations at that Level	10,000	1,000	100	10	
Amount bought in each purchase (kgs)	0.0004	0.028	0.5	12.5	
Purchases per year per individual/organization	365	52	29	12	
Amount Bought per Year (kgs)	1460				
Purchase price per gram	\$160	\$80	\$40	\$20	
Spending on Drugs, i.e., Market Size (\$M)	\$234				Total (\$M)
Net Revenue at that Market Level (\$M)	NA	\$117	\$58	\$29	\$29
Adjustment for cash purchases by dealers					
Cash spending per org. on necessities & hired help	NA	\$100,000	\$250,000	\$500,000	
Total cash spending at that market level (\$M)		\$100	\$25	\$5	
Demand for Money Laundering at that Level (\$M)	NA	\$17	\$33	\$24	\$29
% of Money Spent on Drugs that might be Laundered		7%	14%	10%	12.5%
				\$ Millions	% of User Spending
				Total Potential ML Demand (\$M)	\$104
				Potential "Savings" by Canadian-based Dealers	\$74
				Potential "Savings" in Canada Above Retail Level	\$58
					44%
					32%
					25%

Note: Dark shading indicates parameters used in the calculations. Light shading indicates parameters that describe activities of dealers at each level but do not directly influence the results. Unshaded cells are computed from the dark-shaded parameters.

The lower portion of Table 1 explains how this could be. Suppose that these retailers can spend \$100,000 per year in (dirty) cash on living expenses. Although the 1,000 retail dealers collectively earn net revenues of \$117 million, if they can each spend \$100,000 per year, then they can spend \$100M (86%) of the \$117M they earn, leaving only \$17M that might need to be laundered. However, if half of the sales are by retailers who work only half-time, that would imply that half of the \$117 million would go to individuals who earn only \$58,500 per annum and have no need for money laundering services. The amount laundered would then be only \$8.5 million.

A portion of the net revenues of wholesalers and importers can also be spent on living expenses either directly by the wholesalers and importers or by employees whose wages they pay in cash. We know of no data that speak directly to this. We assume as a base case that this (dirty) cash spending amounts to \$250,000 per wholesaler and \$500,000 per importer, but vary those assumptions in sensitivity analysis below. Those figures would be consistent with wholesalers spending \$150,000 per year (modestly more lavish than a retail seller) and employing two assistants who are paid \$50,000 a year each, and importers spending \$250,000 per year on themselves and employing a crew of five. In such a scenario those 100

¹ A fair question is whether landlords accept cash payments for rent. However depositing enough of the retailing income to cover the rent is unlikely to generate questions about laundering.

wholesales and 10 importers can spend directly or via paying cash wages about one-third of their net cash revenues (\$30M out of \$87M).

So perhaps more than half (\$130M out of \$234M or 56% in this example) of the drug distribution network's gross revenues might be "laundered" just by dealers and employees spending it on living expenses.

Furthermore, for three reasons, retailers rarely need to launder as much as this example suggests. First, some retail transactions are barter not cash transactions. For example, drug users may pay for drugs with sexual services or stolen goods (Boyle and Anglin, 1993). The U.S. Office of National Drug Control Policy (ONDCP, 2001) estimated that the amount of drugs acquired in the United States was about one-eighth greater than the amount bought with cash. Thus, the retailers selling \$234,000 worth of drugs a year in this example, may have average cash revenue of more like \$208,000. After paying their suppliers \$117,000 (likely all in cash; wholesalers are less willing to take in-kind payments), their net cash proceeds may be less than \$100,000 per year.

Second, this example was worked in terms of "full-time equivalent" individuals, but many low-level dealers work only part-time. Few studies attempt to estimate the total number of individuals who sell relative to the number of full-time equivalents, but it would only have to be six people per five full-time equivalents to let retail sellers spend all of their cash earnings in this example. One study of retail sellers in Washington D.C. placed the ratio at three to two (Reuter et al., 1990); there is no reason to believe that figure is constant but the study is indicative of the existence of many part-timers. A more recent study found that half of a sample of drug users in Vancouver who sold drugs spent fewer than 20 hours per week on the activity (DeBeck et al, 2011).

Finally, many retail sellers are themselves heavy drug users, in part because one of the perks of being a retail seller is the ability to purchase one's own drugs at wholesale not retail prices. (Johnson, 2003). That means many retail sellers can spend more cash on current non-drug consumables than can the non-drug using retailer.

Hence, it seems likely that little of the net revenues retained by retail sellers would need to be laundered in the formal sense of the word. If that is correct, then there remain three buckets of money that are candidates for laundering in the more formal sense.

First, wholesalers may have \$33M in net revenues above and beyond living expenses and cash-wages paid, accounting for about one-seventh (14%) of what users spend on drugs. Second, importers similarly have net revenues beyond living expenses and wages of \$24M, or 10% of what drug users spend. Third, the \$29M (12.5%) owed to foreign drug suppliers would be laundered.

The laundering by wholesale dealers might be relatively simple. In this example, they have net revenues of \$584,000 per year each, of which perhaps \$250,000 could go for living expenses and employees' wages, leaving \$334,000 per year to be disposed of. Inasmuch, as cash deposits of less than \$10,000 per day do not have to be reported by banks, regular weekly cash deposits might be all that is required.

By contrast, the 10 importers would each have almost \$3M per year to dispose of, and so may need more professional money laundering services.

In summary, although in some sense all money spent on drugs is "dirty":

- The largest share can be laundered just by paying cash for everyday living expenses, primarily of retail sellers but also by hired help of higher level dealers.
- First-level wholesalers may have to dispose of roughly \$330,000 per year in excess cash, quantities that they might be able to place without recourse to highly skilled specialists (e.g., by having a number of associates serve as “smurfs”)².
- The relatively small number of people atop drug distribution networks do earn amounts that require more formal approaches to money laundering, but that may not be much more than one-tenth of what users spend on drugs.
- A comparable amount needs to be paid to foreign suppliers. In some drug markets that is done by smuggling the cash out of the country (cf Soudijn and Reuter (2016)), in which case the placement step of laundering happens elsewhere. But inasmuch as these funds are due to foreign creditors, they are prime candidates for laundering through the “Vancouver Model” (described below) (German, 2018, 2019).

The numbers in this stylized example are fictional, but they illustrate the types of information one would need to estimate money laundering demand. In particular, it is extremely important to understand how prices increase from one market level to the next. Fortunately, undercover purchases, wire taps, court documents, and interviews with higher-level traffickers are viable sources of insight into prices along the drug distribution chain, and there is a substantial literature on how best to measure and interpret data on drug prices (e.g., Reuter and Kleiman, 1986; Caulkins and Reuter, 1996, 1998; Caulkins et al., 2004; Reuter and Caulkins, 2004; Caulkins, 2007).

Until the investment is made to improve the empirical basis for those parameter estimates, it is worth considering how variation in the key parameters’ values may or may not alter the basic conclusions. We take that up next.

3. Sensitivity analyses for key parameters in market model

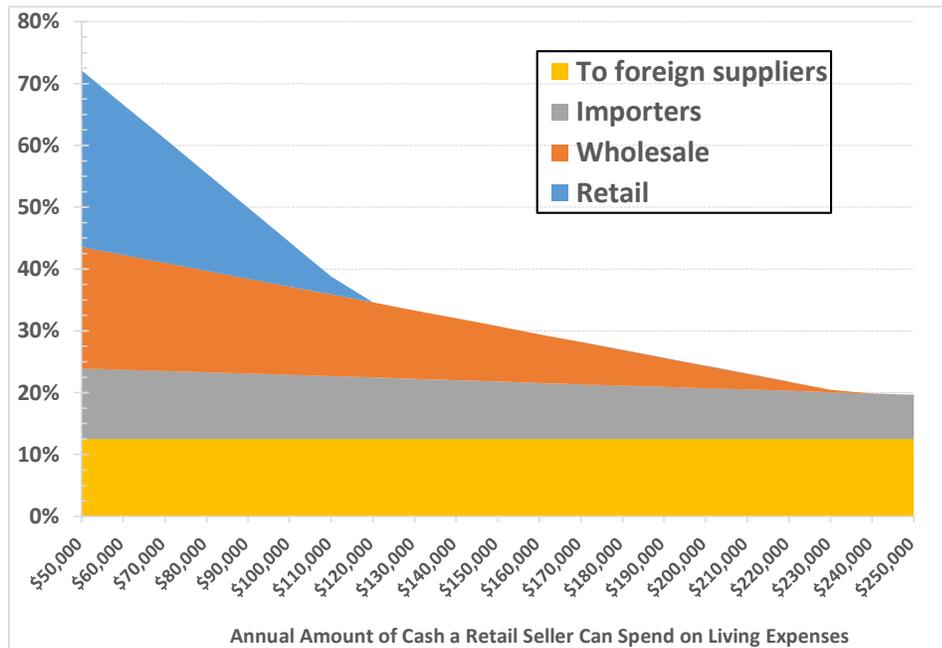
This section explores how sensitive the figures in the example above are to two key parameters: how much cash criminals can spend on everyday expenses and how much drug prices are marked up from one level to the next. Both are actually vectors of parameters, not single numbers, because one can distinguish cash spending by retailers, wholesalers and importers. Likewise, the markups between different pair of levels in the multi-level distribution chain need not be the same. Anyone having evidence or clear opinions about how each vector component might differ individually can do multivariate sensitivity analysis – e.g., via Monte Carlo simulation. Here we move all elements of the vector together in order to illustrate general relationships.

² An associate can deposit up to \$10,000 within a 24-hour period without prompting a large cash transaction report (LCTR), and if they are otherwise-law abiding, there may be no reason for suspicious transaction report (STR). However repeated deposits between, say, \$7,000 and \$9,500 risk attracting attention. Finding a credible cover for this pattern is not difficult, as revealed in the S.Schneider description of money laundering in Canada. See *Update on U.S. Currency Restrictions in Mexico: Funnel Accounts and Trade-Based Money Laundering* (FinCEN, 2014) <https://www.fincen.gov/sites/default/files/shared/FIN-2014-A005.pdf>

The proportion of money that users spend on illegal drugs that needs to be laundered depends on drug distributors' ability to spend cash on goods and services that they consume. The more cash that drug distributors can spend, the less they need to launder.

Figure 1 explores how the proportions change if the amount dealers and employees at each level can spend in cash each year varies, while maintaining that 1:2.5:5 ratio across market levels used in the stylized example above. The horizontal axis is labeled as the amounts retail dealers can spend each year in cash. At the far left-hand side of the graph, when retailers can only spend \$50,000 per year, then wholesalers are assumed to be able to spend 2.5 times that much (namely, \$125,000 per year), and importers 5 times as much (namely, \$250,000 per year). At the far right, where retailers can spend \$250,000 per year, then wholesalers are assumed to be able to spend \$625,000 and \$1.25 million per year, respectively.

Figure 1: Proportion of Money Users Spend on Drugs that Remains as Dirty Cash in the Hands of Various Parties as a Function of the Amount of Cash Criminals Can Spend on Living Expenses



That the blue wedge (corresponding to retailers) starts out so large but tapers away quickly means this: If drug dealers can't spend much cash on the things they consume, then retailers (collectively) will have the greatest excess of cash to deal with, because the escalation of prices at each market level means the most money stays in the lower distribution levels. However, there are so many retail sellers, that if they

can each spend more, that spending can quickly provide an outlet for all of the “hot cash” made by retailers.

At the other extreme, the share of drug users’ spending that must be shipped abroad to pay overseas suppliers (the orange layer that is 12.5% in the example above) is not affected at all by domestic dealers’ ability or desire to spend cash.

The grey wedge for the high-level domestic dealers who import drugs is not affected by cash spending abilities much more than is the orange layer for importers. Even when the ten importers can spend \$1.25 million in cash per year, that \$12.5 million in spending only takes care of about one-third of the \$29 million in net revenues earned by those ten importers.

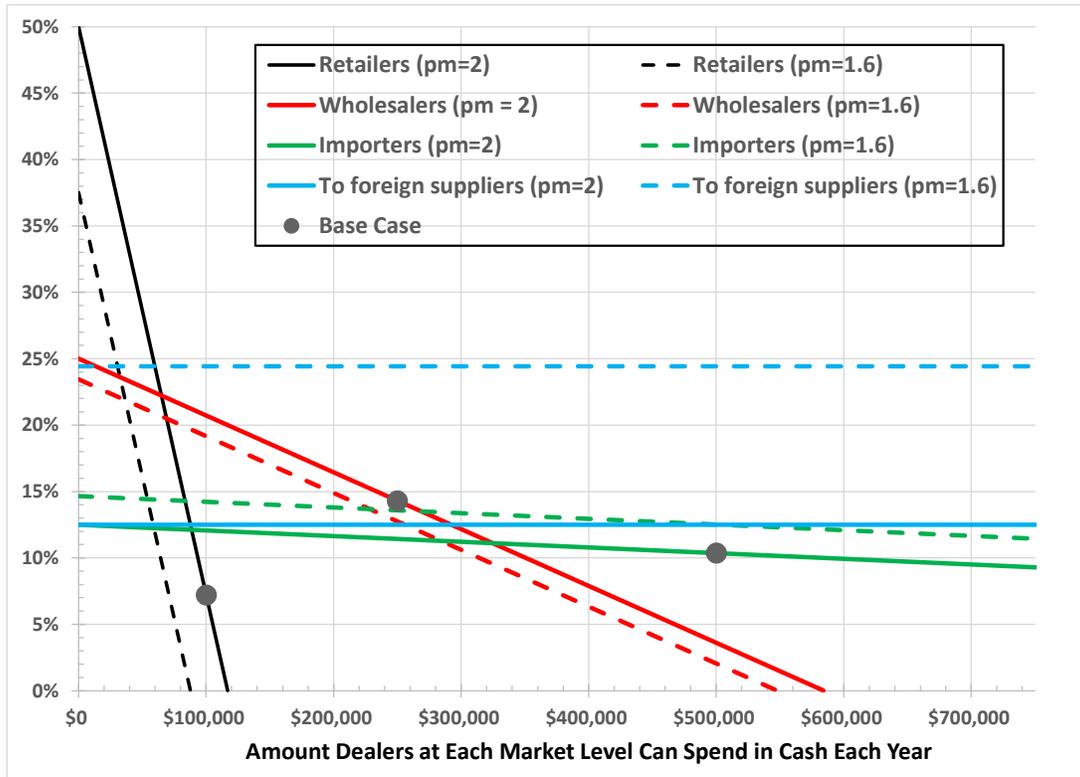
The situation for the red wedge corresponding to first-level wholesale dealers lies somewhere in between. Over the range shown in the graph (i.e., \$50,000 to \$250,000 per retail dealers, which translates to \$125,000 to \$625,000 per wholesale dealer), the proportion of all spending on drugs which wholesale dealers must launder with falls from 19.6% to 0%. So wholesale dealers’ capacities to spend cash can greatly affect the demand for money laundering, and it is only at quite large spending rates that they can dispose of all of their net revenues via spending.

The punchline of Figure 1 is that if criminals have trouble spending cash, then most of the demand from money laundering services will come from the large number of lower-level dealers. However, if it is easy to spend cash, then only the relatively small number of higher-level dealers will make so much money that they need to purchase money laundering services.

All of that discussion maintained the 1 to 2.5 and 5 ratios of cash spending by dealers at the three market levels. Those ratios strike us as being plausible, but to the best of our knowledge there are no serious estimates of them in the scientific literature. So the solid lines in Figure 2 display a similar sensitivity analysis, but in a way that invites the reader to supply independent judgments of cash spending capacities at each market level. It is a complicated figure to read, even leaving aside the dotted lines, which we will describe shortly.

The shares for each market level are depicted in different colors: retail (black), wholesale (red), importer (green), and foreign suppliers (blue). The horizontal axis indicates the amount of cash each “firm” can spend. Firm is in quotes because retailers are mostly sole proprietors (Bucerius, 2007; Chomczynski and Guy, 2019; Harocopos and Hough, 2005) or self-employed consignment sellers (Caulkins et al., 1999). But wholesalers and importers are typically the leaders of small crews of people, and the cash spending of the principal (“owner”) of those operations includes cash wages paid to workers.

Figure 2: Proportion of Drug Money that Dealers at Each Market Level Retain as Dirty Cash as a Function of How Much They Can Spend on Living Expenses



The (black) line for retailers slopes down steeply because there are 1,000 retailers. So for every \$1,000 in additional spending per “firm”, that reduces by \$1 million the amount of excess cash that would need to be laundered. The (red) line for wholesalers is the next steepest because there are 100 firms at that market level. The (green) line for importers barely slopes down because there are only 10 importers, and the (blue) line for foreign suppliers is flat because payments to them are not affected by cash spending within British Columbia.

The three dots correspond to the base case assumptions above, namely spending of \$100,000, \$250,000, and \$500,000 per firm at the retail, wholesale, and importer level. With those values, each domestic distribution level has excess cash that amounts to 7-14% of what users spend on drugs.

The solid lines are calculated with the assumption that prices double each time drugs move one step down the distribution chain, but in many U.S. drug markets the price increase is a bit shy of a true doubling. The dotted lines show the outcomes when prices only increase by 60% from one market level to the next: That is, retail prices of \$160 per gram correspond to wholesalers selling at \$100 per gram, importers selling at \$63 per gram, and importers buying from foreign sources at \$39 per gram (\$39,000 per kilogram). Naturally if the price increases are smaller, then less money remains at lower market levels. In particular, if the wholesale to retail price markup is only 60%, then retail sellers only earn revenue net of the cost of goods sold (COGS) of \$88,000 per year, not \$117,000.

The situation with wholesale dealers is broadly similar, just with somewhat larger numbers. Each wholesale dealer earns about \$550,000 net of COGS. (If prices double at each market level, it is \$584,000; if prices increase by 60% at each market level, then it is \$547,500.) Some of that goes to pay employees. Some may go to living the high life. Retail dealers may spend most of their cash on food, rent, and perhaps drugs for their own use. It's not so easy to spend \$550,000 per year on basic necessities, but it's easy enough to spend considerably more if one throws large parties, or buys expensive jewelry and sports cars; Desroches (2005) provides details of the earnings and consumption patterns of 70 Canadian dealers. Their annual profits ranged from 480,000 CAD to 2 million CAD. They spent most of their earnings on their extravagant lifestyles. Older, married dealers spent their earnings on houses, cars, jewelry, and investments; younger dealers partied extensively and spent freely on clothing, dining out, and expensive toys such as boats and motorcycles.

The green lines in Figure 2 for importers are quite flat. Whether importers can spend \$500,000 or \$1,000,000 per year in cash matters relatively little to their demand for money laundering services, because each has revenues net of COGS of about \$3 million per year.

The 10 importers could be prime customers for more sophisticated schemes, such as buying houses with cash, and/or buying them with clean money but sinking \$500,000 into renovations whose labor and materials can be paid in cash. Those activities are complicated enough to warrant retaining the services of (crooked) lawyers, accountants, and other professionals.

The blue lines for payments to foreign suppliers are completely flat, but their levels depend sharply on assumptions about price multipliers. If prices double at each market level, then most of the money remains within Canada. However, if prices only increase by 60% at each market level, then heroin that retails for \$160 per gram is imported for just under \$40,000 per kilogram, and foreign suppliers' share doubles to just shy of 25%.

Figure 3 looks further at how the share of net revenues retained at each market level depends on the price multiplier (assuming cash spending per firm of \$100,000, \$250,000, and \$500,000 at each of the three market levels). The shares for high-level domestic dealers vary a bit as the price multiplier increases (up for wholesalers and down for importers), but the big changes are for retailers and foreign suppliers.

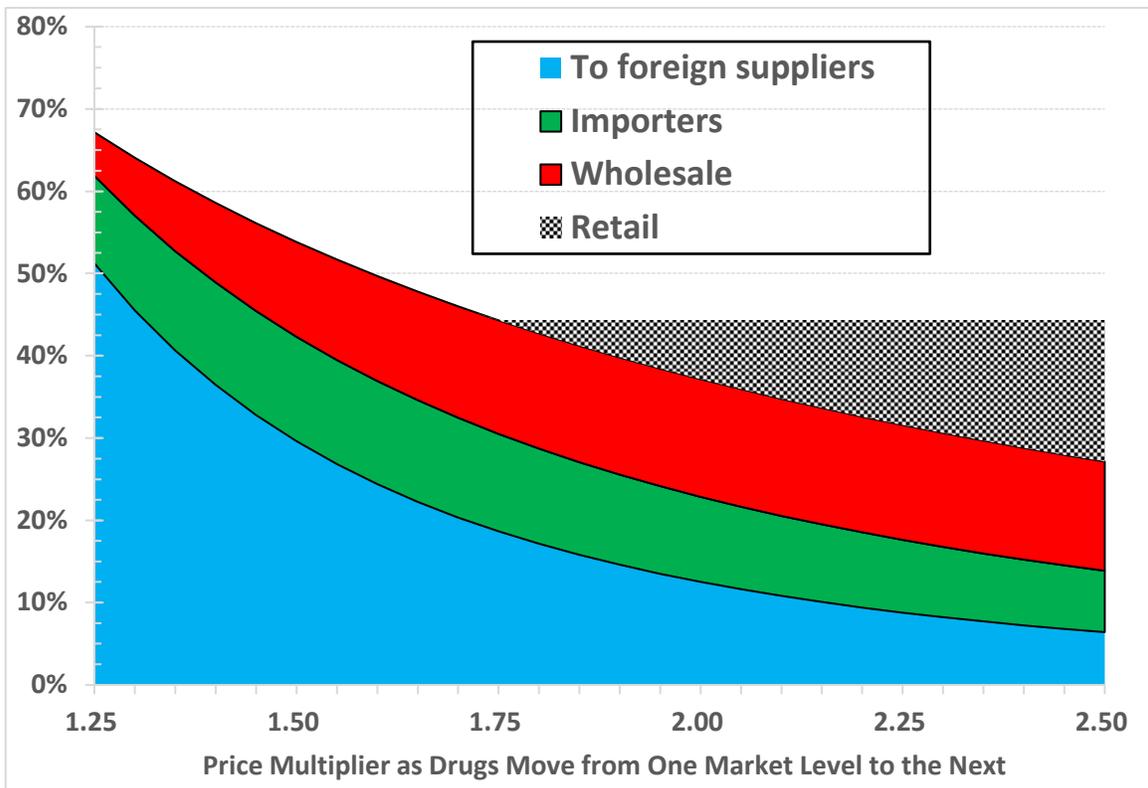
The range of multipliers depicted on the horizontal axis goes from 1.25 to 2.5. For reference, 1.35 matches price markups for the Italian cocaine market (Caulkins et al., 2016), 1.5 makes the wholesale heroin price be \$70,000 per kilogram which is what Bouchard et al., (2020) report for British Columbia, 2.0 is a common rough rule of thumb ("dealers try to 'double their money'"), and 2.5 is the average ratio of U.S. prices for heroin purchases of 10-100 grams relative to those of 10 grams or less (ONDCP, 2016).

The money that importers pay foreign suppliers is a prime candidate for professional money laundering. It is possible to carry backpacks of cash back to the drugs' source countries. Colombian smugglers of cocaine into the Netherlands shipped large quantities of 500 euro bills back to Colombia (Soudijn and Reuter, 2016). However, German (2018, 2019) identifies multiple ways in which cash in British Columbia could be exchanged for deposits into bank accounts in China without requiring the cash to be moved physically. For instance, Chinese gambling "whales" who want to move capital out of China were happy to accept big bags of cash outside casinos in exchange for payments from their Chinese bank accounts

via informal banking systems. The casinos were equally happy to let them cash-in with those highly suspicious wads of cash and cash-out a few hours later with a bank check from the casino.

If out of the \$234 million that users spent on heroin, somewhere in the vicinity of \$30 - \$70 million needed to be credited to Chinese bank accounts via such laundering, that is probably a small amount relative to the sums that Chinese nationals wanted to move out of China. Global Financial Integrity estimates that illicit financial flows are in the order of hundreds of billions of dollars annually (Kar and Freitas, 2013). Though Nitsch (2016) provides a stinging critique of the methodology of these estimates, reports from the Chinese government on how much it has been able to repatriate from illegal overseas transfer are consistent with the GFI estimates³.

Figure 3: Proportion of Drug Money that Dealers at Each Market Level Retain as Dirty Cash as a Function of How Much Prices Increase from One Market Level to the Next



4. The economic logic for who needs to purchase money launder services

³ See for example a 2015 Bloomberg news item about \$125 billion illegally exiting China in the previous 12 months: <https://www.ft.com/content/83387282-8f60-11e5-8be4-3506bf20cc2b>

The previous section used an algebraic model to explore how much money needs to be laundered by drug dealers at different market levels. Here we consider the same question at a conceptual level with a theoretical model of what determines equilibrium prices in drug markets.

That model, known as the “risks and prices” (Reuter and Kleiman, 1986) model of drug prices, rests on a few economic principles.

- Prices in mature drug markets are reasonably stable (they do not bounce around wildly from year to year) and uniform (meaning that all dealers at any given market level pay roughly the same amount).
- Those prices are “justified” in the sense that the increments in prices when drugs are moved from one level to the next represents fair compensation for the effort and risks involved in that activity.
- Since the time and materials costs of moving drugs are modest, an important part of that justification for big price markups is monetary compensation for non-monetary costs such as the risks of arrest and violence.
- That means drug dealers enjoy high “accounting profits” (dollar revenues that greatly exceed dollar costs) but their “economic profits” are “normal” (justified); otherwise, other people (“wannabees”) would enter the market and bid down prices.

The concept of “free entry” bidding down prices runs contrary to journalistic accounts of drug “cartels”. And indeed, markets for niche drugs may not be competitive in this sense, and importation, in particular, may require specialized skills or contacts, but domestic drug distribution really doesn’t take much in the way of specialized skills. It basically involves buying a big bag of powder, repackaging that into smaller bags and selling those smaller bags. So there are always people waiting in the wings ready to try their hand at drug dealing if the price markups become greater than is justified by the (considerable) risks involved in drug selling.

Not everyone believes in this model of drug markets (e.g. Cunliffe, Decary-Hatu and Aldridge, 2017; Childs, Coomber and Wall, 2020), and like all models, it is a simplification. However, as the British statistician George Box observed, “All models are wrong, but some are useful” and this model is useful for providing fresh insights on how to think about the demand for money laundering services.

Participants in drug distribution incur three primary kinds of costs: (1) monetary costs, notably the cost of buying the drugs that are resold, (2) the opportunity cost of time spent dealing, and (3) compensation for risks. When dealers face monetary costs – including the cost of buying drugs from suppliers and paying workers for their time – they almost always pay with cash. So net cash revenues are explained, or caused by, the third kind of cost, namely compensation for dealers’ own time and risks.

A simple calculation suggests that compensation for dealers’ own time is the smaller share. In our model above, there were about 1,100 full-time equivalent workers supplying the \$234 million in heroin: 1,000 retail sellers, 100 wholesalers, and 10 importers. Few are highly educated or skilled in ways that would command high incomes in the legal labor market. Suppose we generously assumed that they, together with their 250 assistants, could, on average, make \$40,000 per year in legal employment. Then compensation for their time would sum to $1,350 * \$40,000 = \54 million out of the \$234 million, barely 23% of value added.

As discussed, another \$30 to \$60 million is sent abroad to pay for the imported drugs. Other monetary costs incurred by dealers tend to be quite small (Caulkins et al., 1999; Babor et al., 2018). Guns can be expensive, but they are durable goods. Packaging, diluents and adulterants are quite cheap.

That means that according to the risks and prices model, the majority of the excess cash that dealers receive, above and beyond what goes to cover their normal business expenses and labor, represents compensation for risks.

This perspective helps explain why so much of the money remains at retail levels. Contrast the risk of violence for retailers and importers. Importing drugs is certainly a risky business, but the life of a drug kingpin who arranges electronically for one large drug delivery every week or month, with the actual transfer handled by couriers, may involve less personal risk than is incurred by a retail seller who meets daily – or even multiple times per day – with dependent drug users who may be desperate for drugs and short of cash. And there is a certain honor among (high-level drug trafficking) thieves. Rip-offs occur, but often the maintenance of good business relations with a valued connection is more important than the one-time windfall that could come from ripping them off (Bouchard, Soudijn and Reuter, 2020). By contrast, rip-offs are common in lower levels of the drug market, e.g., when drug-dependent retailers use drugs they have been fronted by their wholesale supplier. That leaves the supplier in the awkward situation of “needing” to exercise some violence in order to preserve “cred” and avoiding becoming a “target” for swindles by other customers (Jacques and Wright, 2011; Jacques, Allen and Wright, 2014). Low-level dealers can also be attractive targets for robbers, since they often carry cash and cannot call the police when attacked. Retailers are also more likely to be involved in violent competition for specific locations than are higher level dealers. Thus, risky, violent interactions are commonplace at lower market levels.

Even if one believes that the death risk per year is higher for an individual importer than it is for a single retailer, there may be nearly 100 times more retail sellers than importers (in our simple model, 1,000 vs. 10). Almost certainly the aggregate risk of violence summing across all 1,000 retailers is vastly greater than the aggregate summing across the 10 importers.

Likewise, even though the risk of arrest and incarceration may be higher for drug importers than for retailers, it is surely not 100 times greater. In prisons, one finds more low-level dealers than kingpins, even though enforcement targets higher-level dealers, just because there are so many more lower-level dealers, and they are easier to catch.

So thinking of excess cash as risk compensation explains why the previous section concluded that so much remains at lower market levels. It also explains why most of that cash does not require professional money laundering services. Namely, the thousands of low-level dealers and hired hands working for high-level dealers tend to have few lucrative alternatives in legal employment. So their “wages” get bid down by competition from “wannabes”; so even if their risks are high, the market clearing amount of cash compensation paid for incurring those risks is not large enough to produce cash compensation that requires professional money laundering services.

Rather it is the smaller number of wealthier high-level dealers with specialized access to international suppliers who can demand levels of individual compensation that create a need for formal money laundering, but the total sums accruing at those market levels are limited because the aggregate amount of risk is not as great as it is at lower market levels.

5. Discussion

We have argued that of all the money users spend buying illegal drugs, relatively little produces demand for money laundering services purchased from others. Mechanically, because prices increase so much as drugs move down each step of the multi-tiered distribution chain, most drug money remains with lower-level dealers. Conceptually, that is because when an illegal drug market is in equilibrium, most of the net cash earnings represent compensation for risks, notably of arrest, incarceration, and violence, and most of those risks fall on lower-level dealers. Yet that considerable net cash income is spread over a very large number of individuals, making each individual's net cash incomes modest enough that most can be spent on daily living. Higher-level dealers may make more than they can easily spend, creating a need for money laundering, but the share of drug users' spending that reaches and remains at those market levels is more modest.

Limitations

Specific quantitative statements about proportions of drug money that generate demand for money laundering services of course depend on the specific values assumed for the parameters. That is why we state the conclusions in broad terms. Our sense is that the conclusions, when stated in those general ways, are robust with respect to parameter uncertainty, and we sought to convey that via the sensitivity analyses.

Also, the framework introduced could complement better monitoring of prices at each market level to greatly improve understanding of how much money is retained and laundered at each market level (cf., e.g., Caulkins et al., 2016). Routinely monitoring prices not easy, but price quotes can be obtained from undercover purchases or when drug enforcement operations tap phones; more could be gathered by questioning convicted traffickers and/or seizing phone system files, including text messages.⁴ Furthermore, high precision is not needed, and in important respects, monitoring market prices is actually easier than is monitoring demand or quantities consumed (Caulkins and Reuter, 1996; Caulkins, 2007).

We analyzed the heroin market in British Columbia (prior to the arrival of fentanyl) for illustrative purposes, because it has been researched more intensively than most drug markets. Do the results generalize? We suspect that the general propositions hold broadly for any of the traditional "expensive" drugs, meaning cocaine, heroin and methamphetamine. It is not clear whether synthetic opioids like fentanyl will fundamentally alter the equation; their wholesale prices are much lower – after adjusting for potency – but ultimate effects on retail prices are not known, in part because not enough is invested in monitoring drug market prices. Cannabis distribution networks were quite different even before legalization. They were flatter (larger branching factor, fewer layers), involved more domestic production, and had more retail distribution happened with social networks rather than an arm's length

⁴ There have been at least four seizures of whole systems. For example ANOM was a communications service set up by the FBI and other investigative agencies in Australia and Europe that marketed itself to drug dealers, leading to a large number of arrests and seizures in 2021 (see for example <https://www.bbc.com/news/world-57394831>). For a description of the Encrochat data, the most analyzed so far, see <https://cyfor.co.uk/encrochat-what-is-it-and-why-did-criminals-use-it/>

supplier relationships (Caulkins and Pacula, 2006). Furthermore, prices were an order of magnitude lower, so conventional production and distribution costs accounted for a larger share of retail price. It could be that those differences reinforce the basic finding as much as they undermine it, but the question merits a separate analysis (Caulkins and Reuter, 2020).

The discussion above was just a snapshot of current money flows expressed as annual rates; it ignores career duration. Conceivably, dealers' ability to spend cash might rise with experience as they cultivate willing recipients or decline once they have bought as many luxury cars and condos as they care to own. A richer model might consider how drug-enforcement driven "churn" within the ranks of dealers could interact with such nonstationary trends in ability to usefully dispose of cash without hiring money laundering services.

Simple and conjectural though it is, the preceding model may be useful for both policy and analytical purposes.

Policy Implications

Money laundering controls are often high on lists of innovative methods for controlling the drug trade (European Commission, 2021; Western Hemisphere Drug Policy Commission, 2020). Certainly AML enables the state to pursue high-level traffickers who can separate themselves from the drugs but cannot avoid coming into contact with the financial system. Inasmuch as AML facilitates seizure of financial assets, it may also deter interest in drug dealing careers. It is one thing to spend ten years in prison if upon release one still possesses numbered bank accounts overflowing with ill-gotten gains, and another if that release is into poverty. However, the very structure of prices that we discussed here, with little of the final retail price accounted for by value added high up in the system, means that chasing high-level traffickers may do little to raise retail prices.

Conversely, the great bulk of drug law enforcement that is directed at retailers and low-level wholesalers may produce little to no benefit in terms of protecting the integrity of financial institutions, one of the primary goals of money laundering controls (FATF, 2012). While we have little direct data on their expenditures, it is difficult to see that they have much demand for money laundering services beyond elementary smurfing and perhaps not even much of that.

An alternative interpretation is that AML efforts should be expanded so that even the simple expenditure of drug revenues on everyday items can be prosecuted. Melvin Soudijn (personal communication) suggests that in the context of the Netherlands where sentences for drug dealing are relatively short, *retailers who have a lavish lifestyle can be charged with laundering what they spend and be required to repay the government the money they no longer have over a period of years. "Moreover, if he bought a car with criminal money, it is very likely that the car would be confiscated and sold. His friends and neighbors are thus meant to be reassured that crime doesn't pay."* In the United States, where the average sentence for drug dealing in state courts is 26 months and 136 months in federal courts (Bureau of Justice Statistics, 2018), it is hard to believe that prosecutions of low-level dealers that added money laundering charges would result in very different plea bargains, which are the way in which more than 90% of felony charges are disposed of.

That is not a blanket condemnation of money laundering investigations of the drug trade. It simply points to its likely limits as a method of reducing drug use. Catching high level traffickers is a matter of

simple justice and may be useful for other reasons, and financial investigations may at times be a tactic for reaching dealers rich and powerful enough to hire others to physically handle the drugs.⁵

Appendix: Sources for British Columbia parameter estimates

Number of users. There are not many estimates in the literature of numbers of *heroin* users in British Columbia, but modeling studies have made various assumptions about numbers of *injection* drug users. Milloy et al. (2008) work with a figure of 4,700 people who inject drugs (PWID) in Vancouver's downtown eastside (DTES) neighborhood; Pinkerton (2011) uses 5,000. Pinkerton (2010) uses 13,500 in all of greater Vancouver. Irvine et al.'s modeling of British Columbia's opioid overdose epidemic had posterior estimates of 27,000 active PWUD and 13,000 in treatment (Irvine et al. 2019). Bouchard et al. (2020) estimate based on data for 2017-2018 that there were 15,000 – 23,000 people in the province who used or were otherwise exposed to fentanyl, a figure which is consistent with demand equivalent to 10,000 "heavy" users of illegal opioids if we recognize that it takes multiple light users to produce demand equivalent to one heavy user.

Purchase quantities and prices. Stockwell et al. (2010) interviewed 1,606 recreational and street users in Vancouver and Victoria. The median quantity of heroin used "yesterday" was 0.4 grams, and they paid between \$8 and \$20 per 0.1 gram "point", but the median amount paid was \$20. That suggests that the average amount paid was higher than that range's midpoint of \$14, so we make the average price \$16 per gram.

High level prices. There are few published studies of the upper levels of drug markets that include systematic data on the quantities transacted at different market levels above retail and none for British Columbia. A price multiplier of 1.5 makes the highest level domestic wholesale price be \$C70,000, which matches what Bouchard et al. (2020) report.

Drug sellers as users. The literature on drug use and selling at the individual level extends over more than 50 years (Preble and Casey, 1969), covers a number of countries (including Canada), and is consistent in its findings of overlap between retail sellers and heavy users (e.g., Sherman and Latkin, 2002; Moyle and Coomber, 2015). In particular, two British Columbia studies (Kerr et al, 2008 and Werb et al., 2011) report high levels of drug selling among the drug using cohorts that they have followed.

⁵ See for example the Department of Justice announcement: 6 Individuals charged with participating in a conspiracy of money laundering for foreign drug cartels.
<https://www.justice.gov/opa/pr/united-states-unseals-superseding-indictment-charging-nationwide-money-laundering-network>

Bianca Acedo-Ojeda, Sinaloa cartel money launderer, sentenced to 10 years in prison.
<https://www.justice.gov/opa/pr/sinaloa-cartel-money-launderer-sentenced-10-years-prison>

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