

3: Purity of Drugs When Seizures Are Included

In the previous section drug-specific expected purity trends were discussed alongside the corresponding price trends because price and purity often move in tandem, as was illustrated explicitly for d-methamphetamine in Figure 31, and expected purity is a very important component of price. The purity analysis presented previously, however, is limited in that it considers the purity only of observations that were obtained through purchases (so price information was available), not of those obtained through seizures and other enforcement activities.

In this section we explore in more detail how the average purity of powder cocaine, heroin, and d-methamphetamine varies across different quantity levels by examining both purchase and seizure data from STRIDE. Actual purities, instead of predicted purities, for each of these drugs are evaluated, although observations with zero purity are not included in these analyses. Analyses are not conducted for marijuana or crack cocaine for different reasons. Information on marijuana purity is not available in STRIDE, which precludes conducting such an analysis. STRIDE does contain purity information on crack cocaine, or more accurately, cocaine base, but purity series are not examined because of the possibility that a heterogeneous mix of different drugs is included in the cocaine-base seizure data. Unlike the cocaine-base purchase data, which apparently predominantly reflect crack cocaine, the seizure data may contain a sizable number of observations of other forms of cocaine base.¹⁸ For example, cocaine base may be imported from South America and converted into powder cocaine in the United States. Thus, although it is reasonable to presume that virtually all of the purchase observations involving cocaine base reflect crack cocaine, this may not be the case for cocaine-base seizure observations.

The inclusion of the seizure data dramatically increases the number of observations available for each drug, making it possible to identify four quantity levels for each drug. Again, these quantity levels were identified based on the distribution of the data, and we attempted to spread the number of observations evenly across levels. However, once the quartiles of the data were determined, quantity boundaries were rounded off to make the levels easier to interpret. Table 10 defines the quantity levels used for this analysis and indicates the number of observations falling into each level for each drug over the entire 1981–2003 time period. Note that, for all three drugs, the quantity levels defined in Table 10 differ from those analyzed previously in the purchase data. For example, the third quantity levels in the purchase data analyses of heroin and d-methamphetamine have been broken up into two levels for the current analysis. In the case of powder cocaine, three of the four quantity levels have changed: The two lowest quantity levels in the purchase analysis (≤ 1 gram and 1g to 10g) are now combined into the lowest level, and the highest level has been broken up into two different quantity levels.

The analysis considers all domestic observations collectively, not by location. This introduces the possibility of variation over time in the composition (spatial distribution) of observations, confounding trends over time, so minor fluctuations in the time series should be examined in greater detail before strong conclusions are drawn about them. However, including all of the data gives the best sense of general trends experienced by the nation as a whole.

¹⁸ This information was obtained through a project meeting with representatives from DEA on November 24, 2003.

To summarize, purity trends in this section differ from those in the previous section in the following ways: (1) they include data from seizures; (2) they include all U.S. observations in one pool, rather than aggregating city-specific trends for certain cities; (3) they are based on actual, not predicted, purities; (4) they are determined for more and somewhat different ranges of transaction sizes; and (5) they are not determined for crack.

Summary of Variation in Purity Across Quantity Levels

It is known that traffickers sometimes dilute or adulterate drugs as the drugs move through the distribution chain, and there is little evidence that traffickers refine or otherwise increase purity after the drugs are first produced. Hence, it would not be surprising for purity to decrease as the drug moves from higher quantity levels down toward retail transactions. That is indeed what the data often indicate, as shown in Tables 11 through 13 and Figures 36 through 38, but there are interesting exceptions and caveats.

For example, there are only very modest differences in average heroin purity between quantity levels Q1(≤ 1 g) and Q2 (1g –10g), but average purity at the higher levels (10g to 200g and > 200 g) is substantially higher (see Figure 36). This suggests that heroin is more often diluted or “cut” between the two top quantity levels and between Q2 and Q3 (i.e., between quantities <10 g and those >10 g) than between Q2 and Q1.

In contrast, as shown in Figure 37, there was a regular progression of purity across quantity levels for powder cocaine in the 1980s, suggesting that dilution could occur between each pair of quantity levels. However, inasmuch as the average purity even at the lowest levels has almost always been at least 50 percent, the total dilution of cocaine has not been that substantial, on average. (A single “one-for-one cut” would reduce even perfectly pure cocaine to 50 percent purity.) By the 1990s, these purity differences for cocaine across the lowest three quantity levels had largely disappeared, in part as purities at the highest quantity levels fell, suggesting that cutting or diluting cocaine was not as common a practice in the 1990s as it was in the previous decade. The difference in purity between the third and fourth quantity levels remained. From about 1998 on, average purity was higher for the lowest quantity level (Q1) than for the second quantity level (Q2), and even the third (Q3) in 2002 (see Figure 37). Such inversions could occur because of compositional effects stemming from aggregating varying numbers of transactions from higher- and lower-purity regions or markets, not because distributors are refining cocaine inside the United States. However, this inverse trend further underscores the conclusion that, except at the highest quantity levels, most cocaine is no longer commonly diluted in the United States. Certainly some is still diluted; cocaine samples with very low purities, containing a variety of diluents and adulterants, can still be found. But such samples are now the exception rather than the norm.

Historically, there has been little variation in average d-methamphetamine purity across quantity levels, but since the late 1990s, the highest purities have been observed at the lowest quantity levels. This purity inversion was also seen for predicted average purity from the purchase observations and extends to the entire interquartile range of values for the purchase and seizure data (results are not shown here). It is not clear why this happens. Conceivably, for d-methamphetamine, this may indicate difficulty controlling purity when converting large batches

of precursor chemicals into methamphetamine or it may be an indication of some variation in the type of precursor chemicals that are used at specific quantity levels.

Overall, the purchase and seizure data reveal that differences in purity across quantity levels exist only for heroin and, to a modest degree, cocaine during the early 1980s. Thus, the “classic” understanding of dilution/adulteration may not be a useful construct for thinking about the purity of powder cocaine and d-methamphetamine at different quantity levels. Additional analysis is needed to provide new insights into the variability of purity at different quantity levels for each of these drugs.

Variation in Purity Trends When Seizure Data Are Included

Heroin

As discussed above, average (and even median) purity calculated from the heroin seizure and purchase data sort neatly by quantity level, with 10 to 20 percent differences between quantity levels. The one exception is average purity at the two lowest quantity levels, between which there is relatively little difference in purity until about 1995. These differences in average purity across quantity levels, particularly between the higher and lower quantity levels, are consistent with what was observed for average purity in the purchase data shown in Figure 20. The general trend of rising purity during the 1980s and early 1990s and the leveling off during the mid-1990s, followed by a moderate decline in the 2000s, is also consistent with what was observed from the purchase data alone. Indeed, even the spike in average purity observed in 1989 and the trough in 1991 can be seen in Figure 36.

However, some differences in the level of average purity at certain quantity levels are revealed when seizure data are included. Specifically, the average purity at the two highest quantity levels (between 10 and 200 grams and > 200 grams), as shown in Figure 36, are generally higher than those observed in the purchase data (Figure 20). The observed increase in average purity is not entirely due to a breaking out of the highest quantity level in Figure 20, as even the third quantity level in Figure 36 (which has a smaller range of amounts than is included in the third quantity level in Figure 20) generally has higher average purity than is found in the third quantity level of purchase observations. This suggests that seized heroin at the two highest quantity levels generally has higher purity than corresponding purchased heroin. The data demonstrate a similar pattern for the two lower quantity levels, but the differences are not nearly as consistent or as large as those observed for the higher levels.

Powder Cocaine

As with heroin, the trends in average purity for powder cocaine over time and across quantity levels are generally consistent with those observed for the purchase data (Figure 4) when seizure data are included in the analysis (Figure 37). Like Figure 4, Figure 37 shows a substantial decline in average purity across quantity levels in 1985 and 1990 and a trough in 2000 and 2001. It is interesting to note that the overlapping of purity trends at specific levels during the late 1990s and early 2000s that was observed in the purchase data alone is also seen in the seizure and purchase data for the three lowest quantity levels. Purity at the highest quantity level (> 750 grams), however, remains substantially higher than that for the other three markets.

Once again, the average purity reflected in the combined seizure and purchase data is generally higher than that observed in the purchase data alone. The differences are much more substantial at the higher quantity levels than at the lower levels, where the result is not consistent across all years.

d-Methamphetamine

The inclusion of seizure data in an examination of d-methamphetamine purity dramatically increases the number of observations available for analysis. Thus, it is not surprising that trends reported in the seizure and purchase data (Figure 38) are far less volatile than those reported in the purchase data alone. However, the underlying trends of the combined purchase and seizure purity data are generally consistent with those observed in the purchase data (Figure 26), with troughs in purity in 1990/1991, 1996, and 1998 and a local peak in purity in 1994. The data also show higher average purity at the lowest quantity level than at the higher quantity levels from 1996 on.

The inclusion of seizure data in the analysis produces two primary differences: First, the rise in average purity from 1985 to 1989 is generally more pronounced than that shown in the purchase data alone, and the average levels of purity across each of the four quantity levels during this time period are more similar. Second, the levels of average purity reported in the seizure and purchase data are consistently higher than those indicated by the purchase data alone at all quantity levels, showing again that the typical purity in seized observations is generally higher than that in purchase observations.