The Effect of Cocaine and Heroin Prices and Arrests on Cocaine and Heroin-Related Deaths

Bret Johnson Creech*
East Carolina University
Department of Economics
Masters Paper
July 28, 2000

Abstract

This paper examines the effects of cocaine and heroin prices and possession arrests on medical examiner mentions of cocaine and heroin in 37 metropolitan statistical areas (MSAs) over the 1990-1998 period. Using data from DAWN, STRIDE, Uniform Crime Reports, BEA, BLS, and the Census Bureau, OLS regression results show that without the inclusion of MSA dummies, there is a highly significant negative relationship between cocaine and heroin prices and mentions of both drugs. However, when MSA dummies are added, only cocaine prices have a significant negative relationship with cocaine and heroin mentions, while heroin prices are no longer significantly related with mentions of either type. Possession arrests rates do not significantly affect cocaine or heroin mentions regardless of whether MSA dummies are included.

* The author would like to thank Dr. Jeffrey DeSimone for his help with all aspects of this paper.

I. Introduction

Cocaine use causes anxiety, insomnia, irritability, mood changes, confusion, paranoia, and irrationality. Negative effects of cocaine include reduced employment and increased crime. In the extreme case, cocaine use, even just one time, can be fatal. Death can result from cardiac arrest or other reactions to cocaine, and also from fatal accidents that would not otherwise happen. Since cocaine is a stimulant, cardiac arrest can be caused by acceleration of the heartbeat.

Heroin use can also lead to death. Heroin enters the brain rapidly, causing a euphoric "rush" that is accompanied by a warm flushing of the skin and dry mouth. Overdose can produce drowsiness, respiratory depression, constricted pupils, nausea, vomiting, and severe itching. Heroin-induced death can occur when breathing and cardiac functions are severely slowed.

Illegal drug policy in the United States attempts to increase the price of illegal drugs through penalizing drug use and sales as well as cracking down on drug shipments and supplies. The rationale is that such actions will raise both monetary prices and non-monetary costs of drug use, which by the law of demand will reduce use. If use decreases, then the chance of dying from cocaine or heroin use should also decrease.

This paper estimates the effects of cocaine and heroin prices and arrests on cocaine and heroin medical examiner drug mentions, which occur when autopsies reveal that cocaine or heroin is present in the system of the deceased person, in 37 metropolitan statistical areas (MSAs) during the 1990-1998 period. The primary hypothesis tested is that raising cocaine and heroin prices reduces the number of mentions of these drugs. A secondary hypothesis is that cocaine and heroin possession arrest rates negatively affect the number of drug mentions. This has a direct implication on whether a beneficial aspect of drug enforcement policy is that it can potentially save lives by reducing use of cocaine and heroin.

The results of OLS regressions show that without inclusion of MSA dummies, there is a highly significant negative relationship between cocaine and heroin prices and mentions of cocaine and heroin. However, when MSA dummies are added, only cocaine prices have a negative and significant relationship with cocaine and heroin mentions, while heroin prices are no longer significantly related. The relationship between possession arrests rates is not significant with mentions of either drug regardless of whether MSA dummies are included.

The next section reviews literature on cocaine and heroin prices and on drug mentions. Section III describes the various data sources – DAWN, STRIDE, Uniform Crime Reports, BEA, BLS, and the Census Bureau – that are used in this analysis. Section IV outlines the conceptual model for the determinants of medical examiner drug mentions as well as the economic specification using weighted least squares regressions. Section V shows and interprets the results of the estimation. Finally, section VI concludes with a discussion of policy implications and limitations of the analysis as well as suggestions for related further research.

II. Literature Review

The only previous study of the relationship between cocaine prices and medical examiner drug mentions is by Hyatt and Rhodes (1995), who explored the relationship between the price of cocaine and cocaine-related emergency room and medical examiner mentions as well as the percentage of arrestees testing positive for cocaine. The results show that cocaine prices have a significantly negative relationship with both emergency room and medical examiner mentions. The analysis, however, did not control for other covariates or fixed effects for metropolitan area and year.

A related study by Model (1993) analyzes the effects of marijuana decriminalization on drug-related emergency room episodes in 24 large cities between 1975 and 1978, when 12 states decriminalized first time possession of small amounts of marijuana. Model finds that decriminalization increases marijuana episodes, providing evidence that marijuana demand is negatively related to its full price. She also finds that decriminalization reduces non-marijuana episodes, suggesting that drugs such as cocaine and heroin are substitutes with marijuana.

Two articles explored the price responsiveness of cocaine demand. Grossman and Chaloupka (1998) apply the rational addiction model to the demand for cocaine by young adults in the Monitoring the Future data set. Their results suggest that both annual participation and frequency of use given participation are negatively related to cocaine prices, implying a long run consumption elasticity of –1.35. Saffer and Chaloupka (1999) estimate the effects of alcohol prices, marijuana decriminalization, cocaine prices, and heroin prices on the demand for these four substances. Their estimated price elasticity of past- year participation was -.44 for cocaine and -.82 for heroin. Results for cross-price effects provide evidence that cocaine and heroin are economic complements. Note that neither of these studies control for state fixed effects.

III. Data

3.1 Cocaine and Heroin Mentions

Data from DAWN, the Drug Abuse Warning Network, has reported annual medical examiner mentions of many types of drugs in various metropolitan areas since the 1970s. The Office of Applied Statistics (OAS) of the Substance Abuse and Mental Health Services Administration (SAMHSA) is responsible for DAWN data collection. A mention of a drug indicates that the drug was determined to either directly cause or be a contributing factor to a death, and that the reason for taking the drug was psychic effect, dependence, or suicide. Most mentions result from drug overdoses. A problem with the DAWN data is that medical examiner reporting practices vary across jurisdictions and reporting practices are not consistent, so comparisons of DAWN drug abuse deaths across metropolitan areas must be made with caution. There were 43 MSAs included at least once during 1990-1998, the period that we analyze. Of these 43 MSAs, six of the smaller ones were dropped from the analysis because it was not possible to construct reliable measures of drug prices in these areas.

3.2 Cocaine and Heroin Prices

Cocaine and heroin prices are obtained from the System to Retrieve Drug Evidence (STRIDE) of the Drug Enforcement Administration. STRIDE compiles data on illegal substances purchased by DEA, other federal, and state and local agents. Information is recorded on the type, purity, weight, and price of the drug as well as the date and location at which the transaction occurred. The prices that we use in the analysis are the real annual median prices of cocaine and heroin in the relevant geographic areas, as defined below. These are deflated to 1998 dollars using the CPI. The median is used instead of the average to reduce the influence of outliers.

Two issues involved in the construction of the cocaine and heroin price variables are calculating prices for metropolitan areas in which STRIDE price data are inadequate and accounting for both quantity discounts and imperfectly observed purity. Our resolution of these issues is based on Caulkins (1994).

Regarding the first issue, when MSAs have greater than five STRIDE observations for the price of a drug, then only observations from that MSA are used in the determination of the price of that drug in the MSA. However, when MSAs have less than five price observations in several different years, they are assigned a price that is constructed using observations from all MSAs of similar population in the same region that are not separately included in our data. The rationale is research (Caulkins 1994) finding that the primary geographic determinants of illegal drug prices are population size and proximity to points of entry of the drug into the U.S. Such adjustments for inadequate data were made only in five cases for cocaine prices but in about three times as many cases for heroin prices.

Regarding the second issue, the straightforward way to calculate price per pure gram of an illegal drug purchase would be to divide the price by the pure weight of the drug. However, this ignores two problems. One is that buyers imperfectly observe purity, so that the purity buyers thought they were paying for in unlikely to equal the actual purity of the transaction. The other is that similar to the case for legal goods, doubling the pure weight of an illegal drug transaction increases but does not double the price.

After eliminating outliers, again following the guidelines suggested by Caulkins (1994), a two-stage regression procedure is used to deal with these problems. The first stage regresses log purity on log weight and dummies for year and MSA. This regression is used to generate a predicted purity for each transaction, which is multiplied by weight to calculate the predicted pure weight of a transaction. The second stage regresses the log of price on log of predicted purity, log weight, and the year and MSA dummies. This regression is identified by constraining the coefficient on log weight to equal that of log predicted purity. The logic is that pure weight, not weight and purity separately, determines the price. The coefficient on (log predicted purity + log weight), β, is the quantity discount factor. The formula used to calculate the price per pure gram is:

Price / (Predicted pure weight) ^ β = Adjusted price per pure gram.

The estimated β is approximately 0.8 in these data, meaning that doubling the pure weight will increase the price by $(2)^{.8}$ = 74 percent.

3.3 Possession Arrest Data

Cocaine and heroin possession arrest data for each MSA comes from the FBI's Uniform Crime Reporting program. One-year lags were used, so data from years 1989 to 1997 were collected. This data file contains county-level counts of arrests for part 1 offenses, which are murder, rape, robbery, aggravated assault, larceny, burglary, and auto theft. This file also contains counts of arrests for possession and sales of several types of drugs. To proxy for the probability of arrest for cocaine and heroin possession, we construct the variable measuring cocaine and heroin possession arrests per part 1 arrests. In the numerator, cocaine and heroin arrests are combined because they are reported this way by the FBI, and possession arrests are more related to use than are sales arrests. In the denominator, part 1 arrests are used because data on the ideal variable, the number of possession violations, is not available. This variable therefore provides a measure of cocaine and heroin enforcement relative to enforcement for part 1 offenses.

3.4 Other Explanatory Variables

Personal income and population data are obtained from the Bureau of Economic Analysis' Local Area Personal Income data file. Personal income includes earnings (wages and salaries, other labor income, and proprietors' income), dividends, interest, rent, and transfer payments received by residents. Personal income is divided by population to obtain the per capita personal income variable used here, which is then deflated to 1998-dollar values using the CPI. The population variable represents the July 1 Census Bureau estimates for each year.

Unemployment and employment data are obtained from the Bureau of Labor Statistics' Local Area Unemployment Statistics data file, which reports monthly estimates for employment and unemployment for approximately 6,800 areas. The reported annual employment and unemployment figures are used here. These are divided by the population to get employment and unemployment percentages.

Demographic data is obtained from the Census Bureau's Estimates of the Population of Counties by Age, Sex, Race and Hispanic Origin data files. These data files are estimates of the resident population of the counties in the United States by age, sex, and race. The Census uses four race categories and two ethnicity categories, Hispanic and Non-Hispanic, meaning that all individuals are classified as a member of one of the race categories and being either Hispanic or Non-Hispanic.

IV. Model

The dependent variable is medical examiner drug mentions. For a drug mention to occur, a person must use a drug, die shortly after using the drug, and then have a medical examiner find evidence of drug in his or her body. Therefore, the conceptual model is:

Pr (Medical Examiner Drug Mention) =

Pr (Report, Death, Use) = Pr (Use) * Pr (Death | Use) * Pr (Report | Death, Use),

where the first event (Use) states than an individual uses the drug, the second event (Death) states that a person dies after using the drug, and the third event (Report) states that the medical examiner reports the mention. Taking logs of both sides translates this model into a log-linear model suitable for regression estimation:

Log Pr (Mention) =

Log Pr (Report | Death, Use) + Log Pr (Death | Use) + Log Pr (Use).

For drug prices to affect drug mentions, they must affect either use, death conditional on use, or reporting conditional on death and use. By the law of demand, we expect prices and arrest probability to be negatively related to drug use. Prices and arrest probability could affect the intensity of the drug use by the individual, thereby affecting Pr (Death | Use), although the sign of this relationship is not clear a priori. Pr (Report | Death, Use) is plausibly unrelated to prices and enforcement, but it is conceivable that the propensity of medical examiners to report drug-related deaths is related to drug enforcement intensity and attitudes in an area.

Based on the above equation, a regression equation can be estimated for log of medical examiner drug mentions as a function of prices, arrest rates, and other independent variables that could have an effect on drug mentions. The econometric model is:

$$\mathbf{Log\ D_{it} = \beta_0 + \beta_1 C_{it} + \beta_2 H_{it} + \beta_3 A_{it} + \beta_4 X_{it} + \beta_5 Y_t + \beta_6 M_i + \varepsilon_{it},}$$

where D_{it} represents medical examiner drug mentions, C_{it} equals the cocaine price, H_{it} equals the heroin price, A_{it} equals cocaine and heroin possession arrests per part 1 arrests, X_{it} is a vector containing other explanatory variables, Y_t denotes year dummies, M_i represents MSA Dummies, and ε_{it} is the residual.

Two regressions will be estimated for each type of drug mention. The first regression includes the MSA dummies to capture the within-MSA effect of prices and enforcement on cocaine and heroin mentions. The second regression excludes the MSA dummies as a comparison. These regressions are both weighted by population.

By the law of demand, it is expected that cocaine and heroin mentions will fall as the price of cocaine and heroin increases and as arrest probabilities for these drugs increase. Cocaine and heroin are normal goods, so the effect of income should be positive. Holding income constant, employment could affect the ability to use cocaine and heroin through time costs. The other control variables could also affect mentions although there are no specific hypotheses about them.

V. Results

5.1 Descriptive Statistics

Regression sample sizes are 297 for cocaine mentions and 291 for heroin mentions. Table 1 lists the 37 metropolitan areas that are included in the study and the years that they were included in the sample. Reasons for exclusion in a particular year include not participating in DAWN collection, having zero mentions (because the mentions variable is logged in the regressions), or having missing possession arrest data.

Table 2 lists the descriptive statistics for the sample. In order to be consistent with the regressions that follow, these means are also weighted by population. The average number of total cocaine mentions is 245 where the average number of heroin mentions is 222. The average median price of cocaine is $118 and the average median heroin price is $750. The mean for the possession arrest per part 1 total arrest is 0.162, meaning that for every 100 part 1 total arrests in an MSA, there are on average 16.2 cocaine and heroin possession arrests. The average population in the participating MSAs is 4,628,408 and the average real personal income is $29,377. The average percentage of people in the 15-24 and 25-34 age ranges are 13.7 percent and 17.2 percent, respectively. Males encompassed 48.6 percent of the sample. White Hispanics covered 13 percent, blacks covered 17.4 percent, and other races covered 5.9 percent of the sample. Finally, three percent are unemployed and 48.6 percent are employed. The reason that unemployment and employment percentages do not sum to 100 is that the data set includes young people, senior citizens, and working-age adults not looking for work.

5.2 Trends in Cocaine and Heroin Prices and Mentions

Figures 1 shows the time trends of cocaine prices and mentions per 1,000,000 people from 1990 through 1998. The average number of mentions per 1,000,000 people is calculated by summing mentions and population across MSAs each year, and then dividing total mentions by total population. The figure shows that overall mentions have increased over time whereas price has decreased. The correlation coefficient between prices and mentions is –0.594, indicating a negative relationship. The p-value of 0.0914 indicates that this relationship is significant at the 90 percent confidence level.

Figure 2 is the analogous graph for heroin prices and mentions per 10,000,000 people from 1990 through 1998. Again the figure shows an inverse relationship. The correlation between average heroin prices and total heroin mentions is –0.817, with a p-value is 0.072. This provides strong evidence that these variables are negatively related across time.

5.3 Cocaine and Heroin Regressions

Table 3 shows regressions with the log of cocaine mentions as the dependent variable. With the MSA dummies included, the coefficient of the cocaine price is –0.003, which implies an elasticity of –0.306. This means that a 10 percent increase in the price of cocaine will decrease cocaine mentions by 3.06 percent. This result is significant at the 90 percent level. The heroin price has a coefficient of 0.0002, translating to an elasticity of 0.016, but is not significant. The possession arrest per type 1 arrest coefficient is –0.572 with an elasticity of –0.092, but this is also not significant.

When the MSA dummies are excluded from the regression, the coefficient on cocaine price is –0.007 with an elasticity of –0.777. A ten percent increase in cocaine price decreases cocaine mentions by 7.77 percent. The coefficient on heroin price is –0.00037 with an elasticity of –0.277. A ten percent increase in the price of heroin decreases cocaine mentions by 2.77 percent. Both of these results are significant at the 99 percent level. The coefficient on possession arrests per part 1 total arrests is 0.163 with an elasticity of 0.026, but this is not significant.

Two F-tests are run on the regression that includes MSA dummies. The F-value for the test of joint significance of cocaine prices, heroin prices, and the possession arrest variable is 1.878, with a p-value of 0.134. This suggests that these three cocaine and heroin policy variables do not jointly affect cocaine mentions. The F-value of the test of joint significance of the MSA dummies is 14.787 with a p-value of 0.0001. The MSA dummies thus have a large effect on cocaine mentions and should not be left out of the cocaine mention regression. Thus, the coefficients on the regression without MSA dummies are biased.

Table 4 shows regressions with the log of heroin mentions as the dependent variable. With the MSA dummies included, the coefficient on heroin price is –0.00003 with an elasticity of –0.225 but is not significant. The coefficient on cocaine price is –0.004 with an elasticity of –0.471 and is significant at the 95 percent level. A ten percent increase in the price of cocaine will decrease heroin mentions by 4.71 percent. This suggests complementarity between cocaine and heroin. The coefficient on the possession arrest variable is –0.425 with an elasticity of –0.069. However, as with the cocaine mention regressions, this coefficient is not significant.

When the MSA dummies are excluded from the regression, the coefficients once again change. The coefficient on heroin price is –0.0005 with an elasticity of –0.375 and is significant at the 99 percent level. A ten percent increase in the price of heroin will decrease heroin mentions by 3.75 percent. The coefficient on cocaine price is –0.005 with an elasticity of –0.589 and is significant at the 99 percent level. A ten percent increase in the price of cocaine will decrease heroin mentions by 5.89 percent. The coefficient on the arrest variable is 0.203 with an elasticity of 0.033 but is not significant.

The two F-tests on the regression that includes MSA dummies have similar results to those from the cocaine mention regression. The F-value of the test of joint significance of prices and possession arrests is 1.826 with a p-value of 0.143, again implying that these policy variables do not jointly influence heroin mentions. Meanwhile, the F-value of the test of joint significance of the MSA dummies is 14.337 with a p-value of 0.0001. Therefore, as with the cocaine mention regression, the MSA dummies have a large effect and should not be left out of the heroin mention regression, meaning that the coefficients of the regression without MSA dummies suffer from omitted variable bias.

Table 5 shows the other variable coefficients in the cocaine and heroin mention regressions that include the MSA dummies. The 15-24 age variable coefficients are significantly negative at the 99 percent level in both regressions. Other variables that are significant in both regressions are the Percent White Hispanic and the Log of Per Capita Income variables. Both cocaine and heroin mentions decline as the composition of White Hispanics in an MSA rises. A one-percent increase in per capita income increases cocaine mentions by 1.824 percent and heroin mentions by 2.484. In both regressions, all year dummies are significant at the 90 percent level and are positive. This shows that mentions in each year are higher than in 1990, which is the omitted year.

VI. Discussion

The results show that without the inclusion of dummy indicators for Metropolitan Statistical Areas, there is a negative and significant relationship between cocaine and heroin prices and both cocaine and heroin mentions. When the MSA dummies are included, only the cocaine price is significant in both the cocaine and heroin mention regressions. The F-test on the joint significance of the MSA dummies in this regression is highly significant, showing that the coefficient estimates in the regression that excludes them suffer from omitted variable bias because there are MSA-specific characteristics that are related to cocaine and heroin mentions.

There are several reasons why this could be the case. One is that in each MSA unobservable characteristics that could cause cocaine and heroin mentions. For example, the New York City MSA has more availability of cocaine and heroin than compared to Oklahoma City's MSA. Also, environments and lifestyles may vary greatly across these MSAs. An example is the difference in lifestyles between individuals living in Las Vegas and Salt Lake City. Holding observable variables constant, people in Las Vegas engage in behavior that is more correlated with drug use than do those in Salt Lake City.

Policy makers should take into account that although enforcement that raises cocaine prices does appear to reduce deaths related to cocaine and heroin use, the effects are smaller than implied when such MSA-specific differences are not accounted for. Similarly, the negative correlation between heroin prices and drug mentions appears to be purely the result of MSA-specific characteristics, meaning that heroin price increases within an MSA will not reduce deaths caused by cocaine and heroin. An implication is that policy makers must examine these within-MSA characteristics more closely in order to decrease cocaine and heroin mentions.

Policy makers should also be aware that saving lives is a benefit of raising cocaine prices that should be included in cost-benefit calculations involving cocaine enforcement decisions. Viscusi (1992) reviewed economic estimates of the value of life, finding that most estimates were in between three and seven million dollars. Using the lower end of this range and the estimates from this analysis, an increase in cocaine price of ten percent in New York would save 22 lives and therefore 66 million dollars. Even in Oklahoma City, a much smaller metropolitan area, a ten- percent cocaine price increase in Oklahoma City would save one life and thus three million dollars.

One drawback with the data used in this analysis is that many MSAs lacked adequate heroin price data, raising the possibility that the lack of significance of the heroin price in the regressions was the result of measurement error. A possible extension of this research is a study of the effect of methamphetamine prices and arrests for possession of synthetic drugs on methamphetamine mentions. A potential problem with this is that very little methamphetamine use occurs outside the western and southern portions of the United States, and limiting the study to these regions reduces the sample size greatly.

References

Caulkins, Jonathan P, "Developing Price Series for Cocaine," *RAND*, 1994.

Grossman, Michael and Chaloupka, Frank J., "The Demand for Cocaine by Young Adults: A Rational Addiction Approach," *Journal of Health Economics,* August 1998, pp. 427-74.

Hyatt, Raymond R. and Rhodes, William, "The Price and Purity of Cocaine: The Relationship to Emergency Room Visits and Death, and to Drug Use Among Arrestees," *Statistics in Medicine*, Vol. 14, 1995, pp. 655-68.

Model, Karyn E., "The Effect of Marijuana Decriminalization on Hospital Emergency Room Drug Episodes: 1975-1978," *Journal of the American Statistical Association*, September 1993, pp. 737-47.

Saffer, Henry, and Chaloupka, Frank J., "The Demand for Illicit Drugs," *Economic Inquiry*, July 1999, pp. 401-11.

Viscusi, Kip, W., "The Value of Risks to Life and Health," *Journal of Economic Literature,* December 1993, pp. 1912-46.

Table 1: City-Year Combinations Included in Sample

City	Years Included in Sample
Anchorage	1992-95
Atlanta	1990-98
Baltimore	1990-98
Birmingham	1992-98
Boston	1990-98
Buffalo	1990-93, 1996-98
Chicago	1990-98
Cleveland	1990-98
Dallas	1990-98
Denver	1990-98
Detroit	1990-98
Indianapolis	1990-94, 1996-98
Kansas City (MO)	1990-98
Las Vegas	1992-98
Los Angeles	1990-98
Louisville	1992-98
Miami	1991-96
Milwaukee	1993-98
Minneapolis/St. Paul	1990-98
New Orleans	1990-98
New York	1990-98
Newark	1990-98
Norfolk	1990-98
Oklahoma City	1990-93, 1995-98
Omaha	1992-98
Philadelphia	1990-98
Phoenix	1990-98
Portland	1992-98
Providence	1993-98
St. Louis	1990-98
Salt Lake City	1992-98
San Antonio	1990-98
San Diego	1990-98
San Francisco	1990-98
Seattle	1990-98
Washington, D.C.	1990-98
Wilmington DE	1992-93, 1996-97

Note: In addition, heroin mention regressions exclude Anchorage 1993, Indianapolis 1994, Kansas City 1992, Milwaukee 1993, and Omaha 1992 and 1995.

Table 2: Descriptive Statistics (n = 297)

Variable Name	Mean	Standard Deviation
Total Cocaine Mentions	245	240
Total Heroin Mentions	222	221
Real Cocaine Price	118	31
Real Heroin Price	750	504
Possession Arrests per Part 1 Arrests	0.162	0.114
Population	4,628,408	3,191,745
Real Per Capita Income	29,377	4,032
Percent Age 15-24	0.137	0.011
Percent Age 25-34	0.172	0.015
Percent Male	0.486	0.009
Percent White Hispanic	0.130	0.131
Percent Black	0.174	0.087
Percent Other Race	0.059	0.044
Percent Unemployed	0.030	0.008
Percent Employed	0.486	0.041

Sources: DAWN, STRIDE, Uniform Crime Reports, BEA, BLS, Census
Means are Weighted by Population

Table 3: Cocaine Mention Regressions

	MSA Dummies Included	MSA Dummies Excluded
Dependent Variable:	Log of Cocaine Mentions	Log of Cocaine Mentions
Cocaine Price	-0.0026*	-0.0066***
	(0.0014)	(0.0016)
	[-0.306]	[-0.777]
Heroin Price	0.00002	-0.00037***
	(0.00007)	(0.00009)
	[0.016]	[-0.277]
Possession Arrests Per Type 1 Arrests	-0.572	0.163
	(0.482)	(0.339)
	[-0.092]	[0.026]

F-tests

MSA Dummies Included	F-Value	Prob<F
Cocaine and Heroin Prices and Possession Arrests	1.878	0.134
MSA Dummies	14.787	0.000

Standard Errors are in Parenthesis
Elasticities are in Brackets
Regressions are Weighted by Population
**Significant at the 90% Level*
***Significant at the 95% Level*
****Significant at the 90% Level*

Table 4: Heroin Mention Regressions

	MSA Dummies Included	**MSA Dummies Excluded**
Dependent Variable:	Log of Heroin Mentions	Log of Heroin Mentions
Heroin Price	-0.00003 (0.00009) [-0.023]	-0.00049*** (0.00011) [-0.375]
Cocaine Price	-0.0035** (0.0017) [-0.471]	-0.0053*** (0.0019) [-0.589]
Possession Arrest Per Type 1 Arrests	-0.425 (0.579) [-0.069]	0.203 (0.407) [0.033]

F-tests

MSA Dummies Included	F-Value	Prob<F
Cocaine and Heroin Prices and Possession Arrests	1.826	0.143
MSA Dummies	14.337	0.000

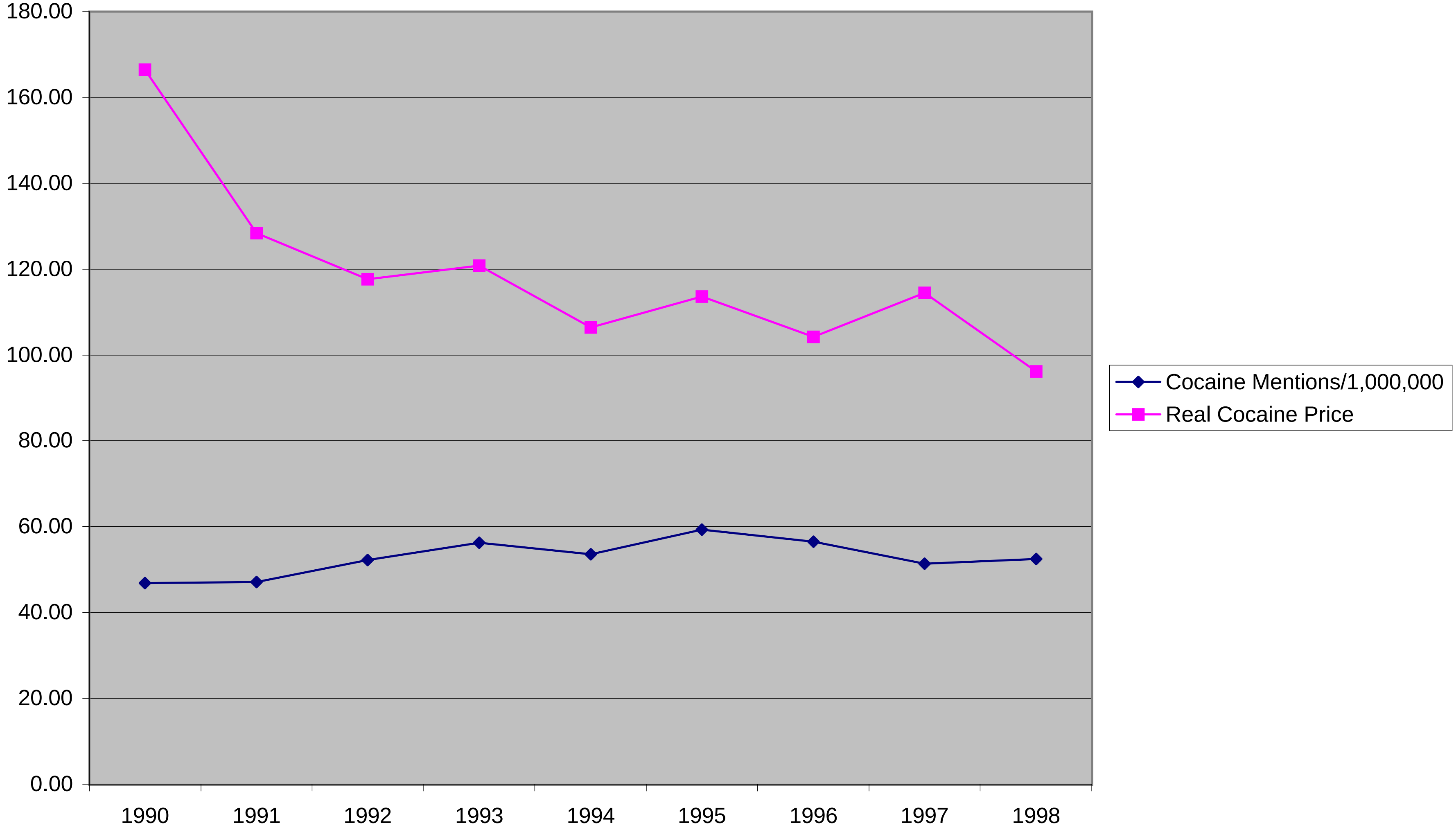
Standard Errors are in Parenthesis
Elasticities are in Brackets
Regressions are Weighted by Population
**Significant at the 90% Level*
***Significant at the 95% Level*
****Significant at the 99% Level*

Table 5: Other Variable Coefficients in Regressions that Include MSA Dummies

Variable Name	Log of Cocaine Mentions	Log of Heroin Mentions
Percent Age 15-24	18.544***	23.412***
	(6.584)	(7.904)
Percent Age 25-34	-11.290	-13.950
	(9.376)	(11.263)
Percent Male	-20.682	-32.533
	(20.717)	(24.859)
Percent White Hispanic	-9.160**	-13.289***
	(3.986)	(4.794)
Percent Black	2.013	-3.268
	(2.692)	(3.230)
Percent Other Race	-10.084	-13.515*
	(6.444)	(7.737)
Percent Unemployed	-9.839	0.755
	(6.184)	(7.502)
Percent Employed	0.919	-1.897
	(2.818)	(3.396)
Log of Population	0.193	-0.311
	(0.389)	(0.466)
Log of Real Per Capita Income	1.824*	2.484**
	(1.007)	(1.211)
1991	0.413***	0.258*
	(0.114)	(0.136)
1992	0.576***	0.421**
	(0.161)	(0.194)
1993	0.720***	0.752***
	(0.182)	(0.219)
1994	0.744***	0.707***
	(0.2185)	(0.262)
1995	0.749***	0.911***
	(0.248)	(0.298)
1996	0.817***	0.860**
	(0.287)	(0.345)
1997	0.718**	0.937**
	(0.321)	(0.385)
1998	0.626*	0.795*
	(0.365)	(0.439)

Standard Errors are in Parenthesis
Regressions are Weighted by Population
** Significant at the 90% Level*
*** Significant at the 95% Level*
****Significant at the 99% Level*

Figure 1: Trends in Cocaine Prices and Mentions per 1,000,000 People 1990-1998



Prices are in 1998 Dollars

Figure 2: Trends in Heroin Prices and Mentions per 10,000,000 People 1990-1998